CASE 6533: EL PASO NATURAL GAS COMPANY FOR AMENDMENT OF ORDERS NOS. R-1670 AND R-1670-C, BASIN-DAKOTA POOL, SAN JUAN AND RIO ARRIBA COUNTIES, NEW MEXICO

CASE NO.

6533

APPLICATION,

TRANSCRIPTS,

SMALL EXHIBITS,

ETC.

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STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
State Land Office Building
Santa Fe, New Mexico
30 April 1979

COMMISSION HEARING

IN THE MATTER OF:

Application of El Paso Natural Gas Company for the amendment of Orders Nos. R-1670 and R-1670-C, Basin-Dakota Pool, San Juan and Rio Arriba Counties, New Mexico. CASE 6533

BEFORE: Commissioner Ramey
Commissioner Arnold

TRANSCRIPT OF HEARING

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NEW MEXICO OIL CONSERVATION COMMISSION

COMMISSION HEARING

SANTA FE, NEW MEXICO

Hearing Date APRIL 30, 1979 Time: 9:00 A.M.

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G E. Brown	Getty Oil Co	Denver
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James Young	Mesa Petroleum Co	Denver Co
Bob McCrary	Gas Co New Mexico	Dallas Tx
Sudesh Arora	SUPRON ENERGY	Dallas
L.O. Van Ryan	Southland Royalty Co.	Farmington
David Hamilton	Mesa Petr. Co.	Denver
WA MERRICK	AMERADA HESS	MONUMENT. N.M.
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SANTA FE, NEW MEXICO

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NAME	REPRESENTING	LOCATION
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R. J. Gibb	Tenneco Oil Co	Denver, Colo
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Bill Mayhew	ELPAMCO INC.	ALBUQ

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SANTA FE, NEW MEXICO

Hearing Date APRIL 30, 1979 Time: 9:00 A.M.

NAME	REPRESENTING	LOCATION
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AR Kendrick	"	Hobbs
T. Chang	"	"
Gordon D. Ryan	Amoco	Denver
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MR. RAMEY: The hearing will come to order. We have one case on the docket this morning, Case 6533.

MR. PADILLA: Application of El Paso Natural Gas Company for the amendment of Orders Numbers R-1670 and R-1670-C, Basin Dakota Pool, San Juan and Rio Arriba Counties, New Mexico.

MR. RAMEY: Ask for appearances at this time.

MR. LOPEZ: May it please the Commission, my name is Owen Lopez, with the law firm of Montgomery, Andrews, and Hannahs, Santa Fe, New Mexico, appearing on behalf of the applicant, El Paso Natural Gas Company, and I have two witnesses to be sworn.

MR. RAMEY: Any other appearances?

MR. LOPEZ: Mr. Chairman, if I may, I'd also like to introduce Dave Burleson, who's from the Office of General Counsel from El Paso Natural Gas Company, who is appearing with me here today; Mr. Dane Adams, who's Director of the Reservoir Engineering Department for El Paso Natural Gas Company, and Mr. John McGruder, who's in charge of the Proration Department for El Paso.

MR. RYAN: My name is Gordon D. Ryan, I'm an attorney at law for Amoco Production Company, Denver, Colorado, appearing on behalf of Amoco Production Company.

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We're also appearing in association with the firm of Atwood and Malone, Roswell, New Mexico.

MR. RAMEY: Do you have any witnesses, Mr. Ryan?

MR. RYAN: Yes, I have one witness to be sworn.

MR. CARR: May it please the Commission, I am William F. Carr, appearing for Mesa Petroleum Company. I'm appearing today in association with Richard C. Byrd of Ottaway, Kansas, who will participate in this hearing for Mesa Petroleum.

I'm also appearing for Southland Royalty Company. I have one witness.

MR. BYRD: And Mesa will not have a witness.

MR. RAMEY: Do you have a witness, did you say, Mr. Carr?

MR. CARR: Yes, sir.

MR. TULLY: Richard Tully, General Counsel, Dugan Production Corp. Possibly counsel, myself, might wish to read a statement into the record.

MR. STOGNER: Tracy Stogner for Consolidated Oil and Gas. We will read a statement into the record.

MR. ARORA: Sudesh Arora, Supron Energy in Dallas. I'd like to read a statement into the record, please.

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MR. RAMEY: What was your name again?

MR. ARORA: Sudesh Arora, A-R-O-R-A.

MR. GIBB: My name is Bob Gibb. I'm from Tenneco Oil Company in Denver. I'd like to read a statement into the record.

MR. BROWN: Gerry Brown from Getty Oil Company, Denver. We want to read a statement into the record.

MR. RAMEY: Any other appearances?

Ask that all witnesses stand at this time and be sworn.

(Witnesses sworn.)

MR. RAMEY: You may proceed, Mr. Lopez.

MELVIN A. EHRLICH

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

DIRECT EXAMINATION

BY MR. LOPEZ:

Q. Please state your name and place of residence.

A. Melvin A. Ehrlich. I reside in El Paso, Texas.

Q. By whom are you employed and in what capa-

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city?

A. By El Paso Natural Gas Company as a Vice President.

Q. As a Vice President for El Paso, for what area of activity are you responsible?

A. My responsibility covers the gas supply of El Paso Natural, which includes gas purchases, reservoir engineering, and gas proration.

In addition I am responsible for the marketing of natural gas through our Customer Affairs Department.

Q. Have you previously testified before this Commission and had your qualifications accepted?

A. No.

Q. Would you please describe your educational background and employment experience?

A. In 1950 I received a degree in commercial science from Enid Business College in Enid, Oklahoma.

I was thereupon employed by Phillips Petroleum Company in Bartlesville, Oklahoma, where I was responsible for coordinating the requirements of Phillips' Accounting Department with certain activities of Phillips' Natural Gas Department.

In June of 1955 I accepted employment with Pacific Northwest Pipeline Corporation as Director of their

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Natural Gas Accounting Department. I remained employed with this company until their merger with El Paso on December 31, 1959.

I might also mention that for the last two years prior to the merger I was Director of their Gas Marketing Department and Regulatory Affairs Department, Pacific Northwest Pipeline.

From 1960 until August of 1968 my chief responsibilities for El Paso pertained to gas marketing and customer relations for El Paso's Northwest Division. My responsibilities in this area covered the implementation and evaluation of market surveys, the negotiations of agreements for the sale of gas and other responsibilities in connection with the Northwest Division System marketing activities.

Starting in the fall of 1968 my chief responsibilities were in the same area but were expanded to include the Southern Division System, first as Manager, and then as Director of Gas Marketing and Customer Relations.

The Northwest Division and Southern Division together included the entire El Paso system.

In 1974 I became an Assistant Vice President and was in addition to Gas Marketing and Customer Relations, put in charge of Reservoir Engineering, Proration, and Gas Purchase Departments.

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In 1977 I was promoted to full Vice President.

Q. Have you previously testified before other regulatory bodies?

A. Yes. I have on numerous occasions testified before the Federal Energy Regulatory Commission, formerly the Federal Power Commission, the California Public Utilities Commission, the Arizona Corporation Commission, and the Nevada Public Service Commission.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this case is to introduce and explain the proposed rule -- pool rule changes we wish to be implemented by the Commission in the event our application is granted.

In addition, I propose to show that the El Paso system has sufficient capacity to transport all additional recoverable reserves that will be realized as a result of an infill drilling program.

Q. Are you familiar with El Paso's application in this case?

A. Yes, I am.

MR. LOPEZ: Mr. Chairman, are the qualifications of the witness acceptable?

MR. RAMEY: Consider him qualified.

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Q. (Mr. Lopez continuing.) Mr. Ehrlich, please state briefly what El Paso is seeking in this case.

A. El Paso is seeking to change the existing rules governing the drilling and producing of gas wells in the Basin-Dakota Gas Pool of San Juan and Rio Arriba Counties, New Mexico, to permit, at the option of the operator of each 320 acre proration unit, the drilling of a second well on that unit, with the prorated allowable for that unit being calculated according to the same formula that is now in use, exceptthat the deliverability of the unit will be calculated by adding together the deliverability of the two wells on the unit.

We are also asking that in considering wells as marginal or non-marginal, and in balancing over-production or under-production, both wells' production be considered as being produced from one proration unit.

We further seek a finding by the Commission that a second well on each 320-acre proration unit in the Basin-Dakota Gas Pool is necessary to efficiently and effectively drain the proration unit; that the drilling of an infill well in the Basin-Dakota Gas Pool will increase the recovery of reserves from each proration unit in the pool; will result in more efficient use of reservoir energy; and will tend to insure greater ultimate recovery of gas from the pool.

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Q. All right, now I hand you what has been marked for identification as El Paso's Exhibit Number One, and ask you to identify it.

A. This exhibit sets forth El Paso's proposed rule changes to Order R-1670, as supplemented by Order R-1670-C, which, if the application is granted, would be applicable to the Basin-Dakota Gas Pool in San Juan and Rio Arriba Counties, New Mexico.

Q. Without going into detail, would you describe to the Commission the essential changes the proposed rules seek to effect as they pertain to the Basin-Dakota Gas Pool?

A. There are essentially two areas where if the application is approved the rule should be changed.

The first deals with the well location and acreage requirements which would pertain to the infill well. In this connection I would draw the Commission's attention to Exhibit Two, which consists of two pages, on which a theoretical 320-acre proration unit is set forth on each page.

The first page of the exhibit shows rectangular and square areas within which a well must be located within the proration unit pursuant to present pool rules.

Q. Mr. Ehrlich, if I could interrupt, I think

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probably everyone should get a copy of Exhibit Two who wants one so they can follow your testimony.

Q. Okay, if you'll proceed.

A. The second page shows the same theoretical 320-acre unit, but shows square areas within which, according to the proposed rules, an initial well or an infill well must be located.

It should also be mentioned that if a well already exists within an existing proration unit in the Basin-Dakota Gas Pool, then any infill well must be drilled on the opposite 160-acre quarter section within the proration unit.

Again, of course, within the square areas reflected on page two of Exhibit Two, distances from various boundaries are also shown on the exhibit.

Q. Did El Paso consider requesting 160-acre spacing rather than the option of drilling a second well on the existing 320-acre proration unit?

A. Yes. We gave that full consideration but we decided against it because this would disturb the equities in present proration units, some of which have been in existence for more than eighteen years.

Q. Mr. Ehrlich, I believe you stated that there were two essential changes that need to be effected by the proposed rules set forth in Exhibit One.

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Would you now please discuss the second major change?

A. The second essential change in the rules has to do with the allocation formula.

The present formula grants allowable to wells in two parts. Sixty percent of the allowable is calculated by using the ratio of the well's acreage to the total acreage of the pool, and forty percent of the allowable is calculated by using the ratio of that well's deliverability, as determined by the State deliverability test, to the total pool deliverability, which is adjusted by the acreage factor.

With the drilling of a second well in a proration unit there would be the same allowable factor based on acreage, but for the deliverability portion of the formula, the deliverability of two wells on a proration unit would be added together. This sum would be the value used to calculate that portion of allowable related to deliverability.

Q. Mr. Ehrlich, would you explain why the deliverability of the second well should be added to the first in calculating the deliverability factor to be used in the allocation formula?

A. As the spacing would remain 320 acres, adding the deliverability of both wells for the purpose of

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calculating the allowable for the proration unit would permit an operator the opportunity to recover his total reserves. This is the same method currently being followed in the Blanco Mesaverde Gas Pool.

Q. Does Exhibit One have any additions, deletions, or corrections contained in it that are different from the proposed rule changes that were contained in Exhibit A, attached to El Paso's application for this hearing?

A. Yes, it does. For the most part the changes contained in Exhibit One are as a result of minor typographical errors or grammatical mistakes that were made in the Exhibit A attached to El Paso's application.

I have here an errata sheet that shows where these changes were made, and will be glad to distribute them to those who are interested.

In addition I should mention that the only possible significant change is the addition of Rule 10(D), which you will find set forth at the bottom of page 4 and top of page 5 of Exhibit One.

This is a new rule that we would like to see incorporated into the proposed rules so that the testing procedures are up to date with what is necessary for completion test requirements for each new well on the proration units.

Q. With the exception of the addition of

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Rule 10(D), in your opinion do any of these changes really modify or change any of the rules set forth in Exhibit A attached to El Paso's application?

A. No, sir. These corrections were made in an effort to cause the proposed rules contained in Exhibit One to be as correct as possible and to parallel as nearly as possible the other general rules and special rules which have been set out in Order R-1670, as supplemented by Order R-1670-T, which set forth the special rules for infill drilling in the Blanco Mesaverde Pool.

Q. Mr. Ehrlich, do you have an opinion as to the gas price applicable to the gas produced from the Dakota infill wells?

A. Our evidence, to be presented by Mr. Van Everdingen, will show that the infill wells are required in the Basin-Dakota Gas Pool to efficiently and effectively drain the gas reserves underlying the present 320-acre proration units.

Under the regulations recently adopted pursuant to the Natural Gas Policy Act, the Dakota infill wells will be in a category similar to the Blanco-Mesaverde infill wells, and subject to the State of New Mexico issuing an order, similar to the order issued for the Blanco-Mesaverde Gas Pool, will qualify for the gas price prescribed under Section 103 of the Act for new onshore production

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gas wells.

Q. How much gas can El Paso's facilities in the San Juan Basin handle on a daily basis?

A. El Paso's facilities are presently designed to handle 1,400-million cubic feet of wellhead gas per day. After deducting shrinkage, fuel, and field use, these facilities have the capability of delivering approximately 1,300-million cubic feet a day to our mainline.

During 1978 the field production attached to El Paso's system averaged approximately 1,100-million cubic feet.

Q. Mr. Ehrlich, assuming that this application would be granted to permit infill drilling the Blanco-Mesa -- the Basin-Dakota Gas Pool, would El Paso have the capability to handle these additional gas volumes, including the projected gas supply from infill wells drilled in the Blanco-Mesaverde Gas Pool?

A. Yes. Production estimated to become available to El Paso from the infill drilling of both formations would essentially normalize the decline of both -- excuse me, would essentially normalize the decline in deliverability and maintain the production essentially level over the next several years. This volume will be necessary for El Paso to meet its customers' high priority needs.

Q. If this application is granted, do you

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foresee that El Paso would be required to reduce its take from existing wells?

A. Production from the wells in the San Juan Basin have been on the decline for many years, and El Paso firmly believes that it will be able to take all of the additional gas made available to us in the San Juan Basin, whether this additional gas results from other development wells in existing fields or from infill well programs.

Q. Mr. Ehrlich, in your opinion would the granting of the application in this case be in the interest of the prevention of waste and protection of correlative rights?

A. Yes. Under the proposed rules each operator would have the opportunity to increase his recoverable reserves and deliverability underlying this 320-acre proration unit, thereby preventing waste and protecting correlative rights.

Q. In your opinion what are the principal advantages to be gained by the proposed infill program?

A. There are many advantages which will result from this program, but I think the most important advantage is the increase in the gas recovery and availability from the Basin-Dakota Gas Pool, which Mr. Van Everdingen will discuss more fully in his testimony.

By virtue of the increased production and

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increased recoverable reserves, more gas will be produced at a time when our country desperately needs the gas. Further, because the facilities will be fully loaded, the consumer could get the gas cheaper since the unit volume costs them less.

Also, by utilizing the existing facilities more fully, and taking advantage of the available reservoir energy, this type of waste would be prevented. The producer would benefit from this infill program, as it would afford them an opportunity to increase their recoverable reserves. The royalty owners would be substantial beneficiaries from the proposed program. These would include the State of New Mexico and the Federal government.

The State of New Mexico would benefit through increased taxes brought about from the increased production, plus the increase in business activity fostered by the approval of the infill program.

I believe, in summary, that there are a great many benefits to be gained from an infill program and many recipients of these benefits.

Q. Mr. Ehrlich, were Exhibits One and Two prepared by you or under your supervision?

A. Yes.

MR. LOPEZ: At this time we'll move El Paso's Exhibits One and Two be received in evidence.

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MR. RAMEY: They will be admitted.

MR. LOPEZ: Mr. Chairman, this concludes our direct of this witness.

MR. RAMEY: Any questions of the witness?

MR. BYRD: Mr. Chairman, I have a couple questions I'd like to ask.

MR. RAMEY: Mr. Byrd.

CROSS EXAMINATION

BY MR. BYRD:

Q. Mr.Ehrlich, referring to proposed new rule 2(C), do I understand that -- I do understand that's the same provision that's in the Mesaverde order, is that right?

A. Yes, sir.

Q. Could you tell me what you mean by economically -- as long as it's economically feasible to do?

A. Well, we feel that both wells should be produced. We think that under today's conditions it's difficult to predict just when it will not be economically feasible to produce a well; therefore, we suggest that -- that both wells be produced for just as long as it's economically possible.

Q. So the purpose, your intended purpose of the provisions of rule 2(C) is to make sure that both wells

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remain on production as long as they're producing.

A. Yes, sir.

Q. Also, referring to your proposed rule 9(E), there, as I understand your proposal, the unit allowable may be produced from both wells, is that correct?

A. Yes, sir.

Q. And that provision is exactly the same as is presently in the Mesaverde, is that right?

A. Yes, sir.

Q. Could you accomplish the purpose of Rule 2(C), guaranteeing production from both wells, by providing that the unit allowable be produced proportionately from the two wells on the unit, based on their deliverability?

A. I suppose you could; however, that's not what we are proposing here today.

Q. I -- I understand that. You also made the statement in your direct testimony that in your opinion the infill well will be entitled to a 103 price under the Natural Gas Policy Act, providing you received an order from the State Commission similar to the one that you received in Mesaverde.

Isn't it true that in addition to that order the FERC requires an affidavit from the producer and the pipeline that the well will be produced based according to their ability to produce into your pipeline?

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A. Let me ask you -- I wasn't following your question. Who requires this?

Q. Doesn't the Federal Energy Regulatory Commission require that in the Mesaverde Pool --

A. Yes, sir, that's correct.

Q. And isn't the purpose of that affidavit to make sure that the wells are produced in accordance in affect, to the deliverability?

A. Yes, sir, I'm sure that they would frown on shutting in only one, if that's what you're driving at, with the lower price in order to collect the -- the higher price under the allowable formula.

Q. Thus the provision in the State Commission's rule requiring that deliverability of the two wells determine how the production is going to be distributed within the unit would eliminate the necessity of that affidavit, wouldn't it?

A. I'm not sure whether it would eliminate it, but I'd think that it would certainly eliminate a lot of stumbling blocks we might otherwise have.

MR. BRYD: Thank you.

MR. RAMEY: Any other questions of the witness?

MR. RYAN: Just a few questions, if I might.

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CROSS EXAMINATION

BY MR. RYAN:

Q. Mr. Ehrlich, you've indicated that if this application is granted that there'll be additional wells and that El Paso has the facilities to process that gas, that additional gas, is that correct?

A. Yes, sir.

Q. If that gas is produced does El Paso have a market for the gas?

A. Yes, sir. I -- I could go into considerable detail, but let me just tell you this, that we have a transmission capacity of roughly 3.9-billion, for which we have a market demand of at least that figure. We're now supplying about 2.9-billion to that market. In other words, we have roughly a billion cubic feet a day cut off of our system every day.

Q. So if -- if these additional wells that are being considered would be drilled and it could be marketed, it wouldn't need to be left in the ground.

A. Be no question.

MR. RAMEY: Any other questions? Mr. Arnold, do you have a question?

MR. ARNOLD: Yes.

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CROSS EXAMINATION

BY MR. ARNOLD:

Mr. Ehrlich, when the original proration order was written in the Basin-Dakota Pool, there had to be a finding that the deliverability was related to the reserve in the pool in order to justify the proration factor, deliverability factor.

A. Yes, sir.

Q. How do you relate add-on deliverability to reserves in the tract?

A. I'm not sure, Mr. Commissioner, I understand the question. There would be an additional deliverability and additional recoverable reserves, as a result of the second well, and what we're suggesting here today is that -- that the deliverability of the two wells be added together in order to determine the forty percent of that deliverability.

Q. Wouldn't you reach a point some place in drilling infill wells where you know -- where the relationship no longer -- what if you drilled a third well?

A. That might be possible. I think after we get on with this program for a few years we might take a look at that, but I think here today we're convinced that

the second well needs to -- to be drilled, without any question, and I think, to answer your question, it's going to depend largely on economics, and the shortage of gas in this country is so great and the decline of deliverability is so great each year, that I don't know how far down we will lower our gathering pressures at some time just to keep residential load on, but that's going to have a big important part in this.

Q. Right, the only issue I was making -- making of question was the relationship between deliverability and reserves in a proration formula when you drill additional wells on a proration unit.

A. Well, that's probably a question better answered by Mr. Van Everdingen, but it would seem to me that deliverability probably will decline faster than the reserves will.

MR. RAMEY: Any other questions of the witness? Mr. Nutter?

CROSS EXAMINATION

BY MR. NUTTER:

Q. The proration department of El Paso Natural Gas Company has always maintained to the Commission that wells classified as marginal are put on the line and left on the line at all times.

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Now, in the Blanco-Mesaverde, if we have a unit that is classified as non-marginal and subject to limitation to the allowable, but one of the wells is a poor well, is that well put on the line and left on the line at all times and the unit's production curtailed from the better well only?

A. No, sir, as I -- as I understand it, if it's classified as non-marginal we attempt to follow the proration rules, or the proration -- the allowable for that particular well, and it's --

Q. So all of the -- the poor well is also subject to curtailment, then?

A. No, sir, the marginal wells we leave on at all times.

Q. No, I'm talking about the poor well, which would be a marginal well, but it's on a unit where there's a good well and the unit is not marginal, is the poor well left on at all times?

A. Yes, sir, it will.

Q. So the brunt of curtailment falls on the good well only.

A. Yes, sir, as long as it's non-marginal.

Q. Okay. Now, in what respect does the rule proposed by El Paso in Exhibit One differ from the Mesaverde rules that we have at the present time?

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Now, I don't mean different from the Mesaverde rules, because I realize we've got a different allowable formula, for instance, 60-40 compared to 25-75.

A. Yes, sir.

Q. But in what respect do the changes in these rules from the present Dakota rules differ from the changes that we have embodied in 1670-T, which was the infill drilling rule for the Mesaverde?

A. The only major change that I recall is the -- let me see if I can find it -- well, I guess it was the 10-D that I mentioned in my earlier testimony, that, well, sets out the testing, I guess you'd say, to better clarify the testing procedures when you complete a new or infill well.

Q. Okay, 10-D is a new rule, then, that is not included in the Mesaverde pool?

A. Yes, sir.

Q. And in effect does 10-D provide that in the event one of the wells on the unit would be classified an exempt marginal well and the other well is a testable well, that both wells would have to be tested? So you could get a true deliverability picture of the unit?

A. The old well, not necessarily if it's had a current test, it would not require a further test until the next appropriate time. The new well would.

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Q. If the new well required testing, the old well requires testing also, is that it?

And the old well would never fall into an exempt marginal status.

A. If I understand what we proposed here, the -- if the old well has had a current test recently and still in effect, we would not have to have a new test for that old well. You would on a new one.

Q. Okay, for the current test.

A. Right.

Q. Now, for future testing requirements, if one required testing would the other require testing?

A. Yes.

Q. Also?

A. Yes, sir, that's correct.

Q. Okay, and then is there also a change in Rule 15-B, which is different from the Mesaverde rules?

A. Yes. As I recall, on the Dakota-Mesaverde, that 500 Mcf per month in order to keep a well on, I believe that's 1000 in the -- in the Mesaverde.

Q. I believe, Mr. Ehrlich, that the Rule 15-B for the Mesaverde reads that a well that's subject to shut-in would receive 500 Mcf, and it's been interpreted that both wells would receive the 500 Mcf on the unit.

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A. Oh, I see.

Q. It's been reworded so the unit itself --

A. Well, I stand corrected. When I read that I thought you could add the two together.

Q. Here we're limiting it to 500 Mcf per unit.

A. Yes, sir, right. I think this probably clears up an area that probably would have been cleared up in the Mesaverde.

Q. All right.

MR. NUTTER: Okay, thank you, Mr. Ehrlich.

MR. RAMEY: Any other questions of the witness?

He may be excused.

MR. LOPEZ: Mr. Chairman, at this time I'd like to call Mr. Van Everdingen to the stand.

In this connection I might point out, all the exhibits that Mr. Van Everdingen plans to tender are set forth on the walls, beginning with Exhibit Three.

Exhibit Four is a computer printout of reserves in the Basin-Dakota Pool. We do not have extra copies of this exhibit. The Commission has a copy and they will have a working copy which people can check with, but I do not have any extra copies of Exhibit Four, which is the computer printout.

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These packets, and we might as well distribute those to those who do not have copies of exhibits, contain all the exhibits that are on the wall, except for Exhibit Three and Exhibit Four.

In addition, we don't have on the wall some photographs that are also contained in an exhibit, which is Exhibit Ten, three parts, A, B, and C.

So, with that little -- oh, incidentally, I'd also like to introduce Ms. Hyla Kriss, Mr. Van Everdingen's assistant, and I think I'll have her point to things on the charts and let Mr. Van keep his chair.

A. F. VAN EVERDINGEN

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

DIRECT EXAMINATION

BY MR. LOPEZ:

Q. Would you please state your name and where you reside?

A. I am A. F. Van Everdingen and I reside in Dallas, Texas.

Q. By whom are you employed and in what capacity?

A. I'm a Senior Vice President of DeGolyer

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and MacNaughton.

Q. Mr. Van, have you previously testified before this Commission and had your qualifications accepted as a matter of record?

A. Yes. I have testified in the case of the Mesaverde formations on the same subject we are talking about here.

MR. LOPEZ: Mr. Chairman, I'd ask the Commission to take administrative notice of Mr. Van's qualifications as set forth in the Blanco-Mesaverde application.

MR. RAMEY: The Commission will consider the witness qualified.

Q. (Mr. Lopez continuing.) Mr.Van, since you testified in that Mesaverde case, have you had an occasion to do any further studies with respect to reservoir behavior?

A. Yes. I mean reservoir behavior has been always, it seems always in my blood, and we did at D&MN, awhile after the Mesaverde was out, and published a paper from the last meeting in Houston, the big SPE meeting, and that paper deals with the same subject. It was written by myself, I should say and Hyla Kriss, on the same subject we are talking about now.

Q. Okay. And you are familiar with El Paso's

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application in this case?

A. Very much so, sir.

Q. And the Commission has already ruled that you are qualified to testify here, so we'll get on with it.

In connection with your testimony that you plan to give today, have you made a study of the possible results that might be realized by doubling the well density in the Basin-Dakota Gas Pool?

A. Yes, I have.

Q. And what are some of the factors you feel you must consider?

A. I feel you should look, take a look at the ultimate production, at the amount of gas which is in place, and the reservoir characteristics of the formation.

Q. Now, in this connection, I turn your attention to what has been marked as Exhibit Three, El Paso Exhibit Three, and ask you to identify it.

A. Exhibit Three is a map giving all the locations of all existing wells in the Basin-Dakota, and of some -- in red, some of the figures of the units that exist, all of the units that exist.

MR. LOPEZ: If the Commission needs them we have some extra copies of ExhibitThree. Would you like to have them right now? I don't think we're going to be referring to Exhibit Three that much.

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MR. RAMEY: I think we can pretty well see it.

MR. LOPEZ: You can see it over there?

Q. (Mr. Lopez continuing.) Have you done a study of the estimated recoverable reserves under present field rules, and the estimated additional reserves that might be recovered if the application is granted?

A. Yes, I have.

Q. At this time I turn your attention to --

A. Exhibit Four.

Q. -- Exhibit Four, and ask you to explain what it is and what it shows. If you could discuss from --

A. I think I can.

Q. Okay.

A. Exhibit Four gives for all the existing wells in the field, in order of magnitude, the total of the amount yet to be recovered, and the reserve formation --

Q. Remaining reserves.

A. Remaining reserves, which is the amount yet to be recovered as of 1/1/79, and so -- well, that's all there is to it.

Q. Right. Now, as I understand it, this is a computer run prepared by the El Paso Reservoir Engineering Department. Did DeGolyer and MacNaughton, under your supervision prepare a similar study of the estimated reserves in

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the Basin-Dakota Pool, and were you able to compare the two?

A. We prepared, we have, and always keep up to date, a similar one for individual wells, and we compared almost eighty percent of the wells that are listed here to our own figures, finding out that the differences were only negligible. So we have accepted the figure that is shown in this, the total ultimate given here as 5-trillion cubic feet.

Q. Now, If I understand your testimony, then, you say that this exhibit shows that the estimated recoverable reserves, according to the calculations, under present pool rules in the Basin-Dakota, is approximately 5-trillion cubic feet.

A. You are quite right, sir.

Q. Okay. Now I'd turn your attention to what has been marked for identification as El Paso's Exhibits Five, Six, Seven, and Eight, and ask you to identify each exhibit and explain what they show.

A. Now ExhibitFive -- before I go into exhibits, I felt it was necessary, not only to go on the basis of only wells and their behavior, the pressure behavior, or whatever you have on individual wells, but we also should take an overall view of the field.

Exhibit Five gives you the total production of the Basin-Dakota, and this one, it's plotted on

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similar paper, and it's one of the easiest graphs that can be made, can be extrapolated down to an economic limit, and it yields about 4.9, 5-trillion cubic feet ultimate.

Number --

Q. Six.

A. -- Six is the same graph as Number Five, except that we are not convinced that seven years on which we have data, and a little portion to come, to see what that means, if you say you can extrapolate it out and produce it, because it brings us to the year 2042 before all that gas will be recovered.

And now we come -- I can't see which one?

Q. Exhibit Seven.

A. I can't see it because I'm on the end, you know.

Q. Average line pressure.

MR. KRISS: Average line pressure.

A. Now, in making the graph of the rate of production, it is known on Exhibit Seven that during the time that the graph -- the data were assemblied, there was some drilling going on in the Basin-Dakota, and also, the line pressure decreased from around 300 to 200 pounds, which means that the factors favorable, which justify -- which would really put the question of 5-trillion in some doubt. And so we also have made the Number Eight, which

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gives you the P/Z curve for the field as a whole, and which undoubtedly indicates that on that basis you would expect about 6-trillion cubic feet.

So that our answer on the whole thing in summary is you can rely on 5-trillion cubic feet as the amount of gas as is coming out today.

Q. Okay. Now, as I understand it, as you just explained, Exhibits Five through Eight address the amount of recoverable gas under present pool rules.

A. Yes.

Q. Have you done any calculations with respect to the amount of gas in place in the Basin-Dakota Gas Pool?

A. Yes, we have done quite a lot of work on it. As a matter of fact, El Paso estimated, by what they call high grading electric logs, that there would be slightly over 10-trillion cubic feet of gas in place.

Now, that's nice, except the high grading makes you feel there should be more gas in place. So we went off the logs once again, only to find out that any logging engineer with a lot of experience will give you more, though they say that this is the very minimum that you can see. It is the quantity on all the sands where there is no dispute possible, but there is other sand where there is a dispute. You do not know what you have, whether --

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or how much gas comes out of the less permeable sands that are not present over the entire -- that are not present well developed over the entire structure.

Therefore, we had to give up the assembly of additional data on logs, and we went to a lot of core data for which -- of which a lot of are available, all taken before 1965. Those core data were analyzed and they are reviewed on our Number Nine.

Q. Exhibit Nine.

A. On Exhibit Nine, where is it?

Q. It's the last one down there. Now, as I understand it, Mr. Van, you said that you and El Paso both examined various electric logs, as well as core data -- or you took the core data --

A. Yes, sir.

Q. -- and analyzed it.

A. Yes, sir.

Q. Could you tell us how many and, for how many wells?

A. Oh, we had fifteen wells on which core data on the Basin-Dakota were available, and those fifteen wells are given here on this map. I think they are the wells marked in red in the better portions of the field.

Well, here they are. They're not.

Q. Now these core data were taken from fif-

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teen wells and the wells are indicated on the Exhibit Three.

A. This -- these wells were chosen because they both, we thought, are in the middle of the field, in the better portions, and so we could rely that whatever we get out of it, that is available over there.

There is only in that field -- Hyla, point to --

There is one other portion in the field that is real good; that's the one on the top where the best well in the field had been drilled. A well from Number Five, from Exhibit Five -- Four, that shows 11-trillion.

Here on the Huerfano wells there is one that has 10-trillion. It's where the core data are coming from.

So we feel that we had a representative sample of core data for the field as a whole.

Q. I believe you said 10-trillion; you meant 10-billion.

A. Oh, definitely.

Q. Okay. Now, I think we ought to go back to your Exhibit Nine and explain what it represents and how you came up with even more gas in place than El Paso is willing to predict.

A. Well, El Paso almost did. They almost indicated there is more gas by their descriptions high-

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grading it, you know. So we first checked the highgrading, was it correct, and it is correct. We checked that in the office. We don't always take a client's word for granted.

And then we did some additional work that showed there is more than they have given. Now that work was done by the core data, and grouping them in 2 percent porosities.

So the first set was from zero to 2, which you might say is practically not -- has no gas in it, but from 2 to 4 there is some gas in it; from 4 to 6, et cetera, up to 14 to 16.

Some samples were not permeable, and by permeable we mean they -- they had the porosity and permeability of 1/10th of a millidarcy or less, and we knocked those out.

But all of the samples given here, even the 2 to 4 percent had a permeability, which is only 1/2, which is 1/2 of the average for the reservoir. The permeabilities are given in the -- in column four, enclosure 9.

And remarkable, the average is less than 1/10th of a millidarcy, and this makes the -- the field almost the least permeable I've ever come in my fifty years, you know, come across in my fifty years.

You see another characteristic, which is to be expected. The number of impermeable samples decreases

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when the total porosity goes up.

You see the 2-to-4 had 40 permeable samples, which is less than -- which is 40 percent, but if you come to the 8-to-10 class, there's only 40 out of a total 150 more impermeable, and later on in the 14-to-16 group, everybody is permeable.

Now, you can add up these figures. We had to make some kind of an assumption as to how should we use these figures, and we have assumed that like El Paso did it in the 10.3-trillion, they took 6 percent porosity as the base. Anything less than 6 percent was knocked out. And they took 50 percent water as a base. Anything more than 50 percent was knocked out.

Unfortunately, I don't have data for water, but I have, of course, plenty of data for porosity, and that showed that out of the total percentages porosity that we have analyzed, there was 1,056 samples and they together contained 8000 percentages porosity, which is kind of a hybrid form to express it in. And those percentages of porosity, only 5000 were present in formations with more than 6 percent porosity and less than 50 percent water.

No, for 6 porosity; on the water I am quiet.

Consequently, it showed, that analysis showed, that there is 50 percent more pore space available.

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I'm saying pore space available that could be filled with gas that you would obtain from the basis on which El Paso has worked.

Now, 50 percent, you -- you don't have always to accept the highest figure possible. You could say well, I do not care to know the lower figures.

No. I was told to go slow or I mess it up, and now I don't want to mess it up.

Q. Well, this area you're discussing, Mr. Van --

A. Yes, sir.

Q. -- you're talking about El Paso used a 6 percent cutoff and you're saying that in calculating the gas in place you decided that the area between 2 and 6 percent porosity had the same permeability, so you couldn't just necessarily discount that, isn't that right?

A. Not necessarily. You could discount it some. You must discount it some or it's not as good as the top above 10 percent, and we didn't know just how to handle it, you know. I mean because we don't have from core data the exact water percentages.

But you can take out of the figures that's shown on this Nine, you can make up comparisons and one of them would give you an additional 20 percent, which is darned sure that it is 20 percent higher than El Paso had

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given us, you see.

So, now you have a gain as normal in cases like this. You are talking about two sets of figures, one, the highest; one -- and you could, out of the fifty percent more, you can put 15-trillion initial in place.

Out of the twenty percent more you can put 12, 12-1/2-trillion in place.

And I can only say, take your choice. Probably the truth sits somewhere in the middle but we cannot define it.

Now, that gives you one figure which is higher than the 10-trillion given by El Paso, mentioned before, and therefore it makes an estimate of additional recovery more amenable.

Now, in order to get an impression, may I now introduce --

Q. Exhibits Ten A, B, and C, sure.

A. C, which give you -- let me go back. There were available some thin sections. Now, a thin section, I think the geologists know what they are, but these thin sections, that always impresses me, were one-ten-thousandth of an inch thick. So when I heard that, I thought there might be some porosity visible in it.

So we went out to the thin sections, checked about 25 of them, and had some photographs made of

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them, you know.

Now, you do this by -- by going to the university and ask -- they have the best of equipment -- could they please make you a color picture, and they give you a slide on it at that time. And those slides, you magnify, Xerox does it for you, and then you get the graphs out like you see here, which on Number Eight is a graph of -- gives an indication the various minerals. White is always quartz, but how much other minerals you will find in it, you know, how many, and if you -- that does not give you much detail, but on B, where we have blown it up to 100 and better, you know, you see that the grains have grown together. Look at the blue one; now look at the forms that comes in there. It was not feasible for us, or not possible for us to find any holes in it until we come to 10-C, which gives you a slight indication of a fracture present, and since I talk about the fracture, there are, for anybody who has the core data on it, core data really show one-half of the cores to be fractured, and if a thing is fractured, you think the gas just walks out.

Now, we have listed fracd permeabilities and unfracd permeabilities separately. And for the classes given we always find that fractured, as described in core data, and unfractured, are exactly the same.

So that put to rest the idea that frac-

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ture, if a man talks fractured permeability, or fractured core date, he will have a better than average well.

The wells, or the fracture -- the fractured wells or the fractured average was just the same, 1/10th of a millidarcy as it was in the non-fractured wells.

Q. Okay, Mr. Van, I know that you've covered this, but I just want to make sure the record is complete.

In your opinion are the core samples that you studied from the fifteen wells in the Basin-Dakota Gas Pool well representative of the Basin's characteristics?

A. Yes. I think they are very representative of it.

Q. Okay, good.

Now, I think in addition to studies of the core samples and their respective permeabilities and porosities, did you do any other studies to support your estimate of the effects of the infill drilling program, and in this connection I'd ask you to turn your attention to El Paso's Exhibits Eleven and Twelve.

A. Yes. You know, when you are talking first about 10-trillion, and you are talking about those tight formations that existing -- exist, that there's nothing but tight formations, then you doubt whether infill drilling can be -- can be very effective, because it's so tight you wouldn't expect much more than 50 percent in the

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first go around. That's a nice recovery.

But it turns out there is, let us simply say, 14-trillion that is waiting for production, or waiting to be let out, total. So to do that we went back to simple reservoir engineering and made the build-up tests. We collected all the tests we could find, and here is a well, 212 on the map here -- okay, that's 212 -- drilled in '78 in which the first build-up gave us 2650 pounds, which is exactly the build-up that this well had shut-in pressure, which is about equal to the build-up pressures found when the first well in that neighborhood was drilled ten years ago.

Now, what that log tells me, ten years of production and we have not been able to decrease the pressure perceptibly, or at all. I won't fight for five pounds if somebody wants to bring it up, but this is, I would say, is an indication that it's not being drained.

Now, wellhead pressures are, to me, they are good, but just to be safe, there was also measured the bottom hole pressure, and if you put the weight of the gas and the total depth of the well together, bottom hole pressure just confirms the wellhead pressure that was given.

There's also on the graph a little hump, which is, of course, somebody went haywire there. I can't -- I can't explain it. But he came back to normal pressures

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again for the bottom hole.

Now this is about 2600 at that spot. Then I ought to show -- it's just now an isolated spot, because it's somewhat meagre to go on one, and told me first, let's make another in that neighborhood, which Hyla is right now next to it, and our Well 212 is right there in the black -- in blue. That's 212.

Q. Now she's pointing to Exhibit Twelve.

A. Yes. And now Exhibit Twelve shows that all of a sudden showed that 258 and 259, also shown in blue, they're exactly the same. You find initial pressures back on all those wells that were drilled in 200 on the present spacing of 320, and they are also surrounded by wells that are ten years old.

So this gives you the idea that there is no drainage at those points. Now that idea is not entirely new because when you look at the -- well, back to Number Eleven, when you go to those old wells you will see that the pressure is -- the pressure line, Hyla, on Number Eleven. You see, the downhole pressure assumes a horizontal position, which is one characteristic of a reservoir of a well that has reached the highest pressure it can possibly get in that reservoir.

The logical conclusion comes then, if

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that's the highest pressure and then you haven't been able to do anything for it in the ten years that you produced the well, that's what we call a limited, a bounded, or whatever terms you wish to use, it's not covering the acreage, 320.

There is here room for infill drilling. Yes, sir.

Q. Okay. Now I turn to -- I turn your attention to what has been marked for identification as Exhibits Thirteen, Fourteen, and Fifteen, and ask you now to explain how these exhibits also support your conclusion that the drilling of infill wells will result in recovery of substantial additional gas reserves.

A. I will start on Twelve, Thirteen, Fourteen just one second.

Mind that in the Number Eleven that big pressures have been reached. You might say the turning point in pressures has been reached in less than ten hours. I think seven or eight hours is where the curve turns over and becomes practically horizontal.

Now go to Eleven, Twelve, and Thirteen, those are the Huerfano wells on which good pressure build-ups were available, and I mean by good pressure build-ups El Paso has had permission to shut the well in, and some were shut in for two or three years, you know, to get the

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data that are shown here.

And mind you, in the first two wells, Twelve and Thirteen, it took the well almost two years -- no, it took the well a year before it reached its maximum pressure, and because the well had been producing for some time. The producing time is given -- is written up in the bottom.

How long did they produce that well? I can't read it from here.

MS. KRISS: 390 days.

A. 390 days, and it took them another 390 days, I think, to come to its maximum pressure.

I shouldn't ask this question because it was in here if I just turn over.

Yes. The well had been producing 188 days, that's on Number Thirteen, and it took 390 days before it came to a maximum pressure. After that it varied a little bit, but it did not add any more pressure.

That's 117, or Exhibit Thirteen.

Fourteen, unfortunately 121 is the next one. Is that the excellent well?

MALE VOICE: Yes.

A. And there they accuse each other of losing the beginning, but after 349 days the well had reached its maximum pressure and it's also at about 1750 to

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1800 pounds.

Q. That's Exhibit Fifteen.

A. Okay, okay, okay. I take it at Fifteen because I've got two numbers and don't know which one to believe.

Q. Okay.

A. Okay, this is Fifteen. Then I have Fourteen, then, which shows build-up time -- the well which has produced 190 days and takes 708 days before he nullifies whatever he has taken out in the 190 days, and after that they shut him in another 400 days, or better than a year, and he doesn't add any pressure to it.

But here we have three wells that in themselves also show that we're talking about limited reservoirs present even in the best part of the field. Mind you, that one has only that little thing in it, you know. That's number two in the -- I think that's number -- the second best well in the field.

Q. Okay. I think now we could go to Exhibit Sixteen and I'd ask you to explain what that exhibit shows.

A. Let me say first, Exhibit Sixteen, the simplest way of explaining it, it is a summary of Exhibit Four, the printout. The printout gives us the total cumulative -- the total gas to be expected from every one of the 2500 wells.

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Sixteen shows in the bottom simply the well number from 100 to 2500, you see. Vertically above it we have given the total gas that's expected from the well. So it shows, it starts from 11.4 and then goes to 10, and then dives under 10, and it goes down to 100-million cubic feet. There we stopped it.

There are some more wells who are not expected to produce a 100-million cubic feet, but we -- the graph stops at 100-million cubic feet.

If you integrate, then the size of the well, and the number, of course, you come to the 5-trillion cubic feet that we expect ultimately out of it.

It is one representation of the variety that exists in the field, because a man would say, well, if I have 15-trillion cubic feet; I expect 2-trillion; do you expect 2-trillion per well. Do you expect 2-trillion per well out of every well that's being infill drilled?

Well, this graph shows you you shouldn't. There are some wells -- if a well is drilled within a billion cubic feet ultimate, you get another well with a billion cubic feet ultimate, but if you have -- you drill a well between wells of 5-billion cubic feet, you don't -- you are just too darned optimistic to expect 5-billion.

So we have used graph 16 to determine how much ultimate can be expected from the infill drilling pro-

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gram.

Now, that graph we cut in three parts. We said, well, it looks as if nobody is going to drill anything that will only give him 400-million. Some people may do it but we said, huh-uh, 500-million is the limit we take. If you don't have 500-million you are not supposed to infill drill it. If some want to risk their money, that's their business, but I'm not going to say that it's profitable.

The cost of 500-million we come up along the curve up to a total of 3-billion over that range. Wells within that range, I expect you could probably do as good as the already existing well, you see, but when you go above 3-billion, then we just cut it off. We said the best you can do is 3-billion from an intermediate well.

And the net result is that the first -- the best group of wells will give you a total additional of 1.2-billion.

The second group, and there are in that group, there are 1700 wells, they will give you an additional 3.2-trillion.

And then the third group, from 500 down, that's only a small amount, but they will give you nothing.

Is that sufficient, sir?

Q Right. I think, I just need to point out

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to the Commission that the graph on the wall has two "X's" marked on the curve which the hand-outs don't have. These were just put in recently, and obviously the point, in accordance with Mr. Van's testimony, is that he did not in making his calculations compute the best wells in the reservoir. He used a 3-billion gas in place cutoff, and continued it, and then -- recoverable gas in place, and then on the down side of the scale there's another "X" where he, after 500-million, used a cutoff point, too.

So, I'll just make that observation.

A. We could add here, you know, if you're interested, when you have some wells in the field, just find out what number you are on the list that you have, or that is available from El Paso, and you find out which number or where are the people that are larger than or which are the wells smaller than. Then you'll fit into this graph.

It is really a summary of --

Q. Exhibit Four.

A. -- Exhibit Four.

Q. And as everyone knows Exhibit Four is the computer printout, starting with the best well in the field to the worst well in the field.

A. Yes. You can, if you want to find out where a 2-billion well -- 2-billion cubic feet well fill in, simply make a horizontal line through the 2-billion mark on

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the vertical axis. You see there are given -- the axis is given -- so you start on 100-million, 200, 300, 400, up to 1000-million. Then you to to 10-billion again, so you take a horizontal line and then the vertical line downward and there you are, or vice versa, if you want to be number 412, 412, you come up vertically, go horizontal until you intersect; go horizontally and you'll know how big number 412 is.

Q. Okay. Now, Mr. Van, in your opinion what is the amount of additional recoverable gas that will be realized by infill drilling the Basin-Dakota Gas Pool?

A. Well, this question I think I answered. Maybe I talked too fast and I'll answer it again.

Q. Okay.

A. Here we have 4 to 4-1/2-trillion cubic feet on the basis as shown.

Q. In your opinion will it be possible under the infill program for a producer to develop additional reserves, and in this connection I turn your attention to what has been marked as Exhibit Seventeen.

A. Well, Seventeen is a payout schedule for an infill well, and I was told that the initial cost for a well varied a little bit from Two Eighty-five, Two Eighty-six, to Two Sixty-five, depending on whether your talking about the east or the west side of the field.

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It cost a little bit -- it cost another $6,000 to prepare it; $200 was given as an operating cost. And at the price of gas of $2.00, which is apparently the NGPA price, uncorrected for quality and uncorrected for fluids that may come along, fluids are not present everywhere, you can then say, now, depending on how good a well I get, do I get 100,000, do I get 200,000 allowable, or 300,000 allowable per day, depending on that allowable and the cost figures given, the payouts are at most 57 months and at least -- that's the highest figure -- and they could come down to less than a year and a half.

And I think our figures are, as I say, conservative because I have heard that quality and liquid may obtain, please, the $2.00 to as high as $2.40.

Q. Very good. Do you have an opinion as to how the performance in the Basin-Dakota will compare to that which has been experienced in the Mesaverde, and in this connection I turn the Commission's attention to Exhibit Eighteen.

A. Do I have an opinion? Sounds somewhat contrary, you know. We have here in the Basin-Dakota a formation which is definitely tighter than our friends in the Mesaverde, you know, but for infill drilling a tight formation is better, because the tighter the formation, the more you can expect out of it -- additional you can expect

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out of it as a percentage basis.

But to show you what has been accomplished in the past, Number Sixteen, that's him, Number Sixteen is a graph of all wells from the Blanco-Mesaverde which produced as of one month, 1975. That's the yellow rate of production on the graph.

And then the blue wells give you the additional production obtained to date from those wells that were infills.

And as you can see without any further explanation on my part, the production is rising for the first time. For years it has been coming down; it goes down even on the infill wells, but the total production of the field now is coming up, and I think the latest figures show that there's forty percent of all gas of Blanco-Mesaverde coming from infill wells, which are now almost 650 at the end of 1978, 650 have been drilled I think out of a total of, I think, 2500, but that I'm not sure.

Q. This, I think you misspoke, Mr. Van. It's Exhibit Eighteen, not Sixteen, that we're talking about.

A. Yeah, Exhibit Eighteen, you're right. Did I? Oh, well, excuse me.

Q. Okay. In your opinion is it necessary to drill an infill well in the Basin-Dakota Gas Pool in order to efficiently and effectively drain the proration unit?

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A. Very much so. There is gas in this pool and -- or in this formation. The gas that you get by an infill well is gas you will not see at all, never mind how long you wait for it, you know. You'll get the 5-trillion, no doubt about that; you may even get 5-1/2-trillion; but you do not get those 4-trillion I said here, I have mentioned here, because a well is not capable of draining past the 160-acres. You couldn't do it in 320 in ten years, so I am afraid that he cannot do 160 in the time that you can make some money out of it.

Q. In your opinion will the granting of this application be in the interest of the prevention of waste and protection of correlative rights?

A. Yes, sir.

Q. Were Exhibits Three through Eighteen prepared by you or under your supervision?

A. Oh, yes. Yes, sir.

MR. LOPEZ: At this time I'd like to introduce -- or will introduce Exhibits Three through Eighteen.

MR. RAMEY: Exhibits Three through Eighteen will be admitted.

MR. LOPEZ: This concludes our direct.

MR. RAMEY: Okay. We're going to take a fifteen minute recess.

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(Thereupon a recess was taken.)

MR. RAMEY: Are there any questions of Mr. Van Everdingen?

MR. BYRD: Mr. Chairman, I just have a couple questions.

MR. RAMEY: Mr. Byrd.

CROSS EXAMINATION

BY MR. BYRD:

Q. Mr. Van, am I correct from your study that you've concluded that one well will not drain more than 160 acres?

A. Yes.

Q. So that if the Commission approved the infill drilling program as proposed, the second well should recover as much gas as the original well, is that right?

A. Yes, sir, but here I make some reservations, you know, going to drill a well next to an 11-billion well, because there you may not get more than -- I have put it, after talking to myself a long time, at 3-billion.

MR. BYRD: Thank you.

MR. RAMEY: Any other questions of the witness? Mr. Arnold?

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CROSS EXAMINATION

BY MR. ARNOLD:

Q. Mr. Van, you may have said what the average well reserve was in the field by your study on 160-acre spacing. I didn't get it.

A. Now, total reserve as it is now, the total, now I talk reserve, the term is a bit loose, you know, the total ultimate, as it exists now, if 5 or 5.5, if you consider the few locations that still can be drilled without infill drilling, you know, and there you have from 2-billion to 2.2-billion ultimate. Now, the reserve is a different story; simply you deduct what you have, you see, and in the future you have 4.4, you get 5-trillion more from infill drilling.

Now, does that answer the question? That is ultimate production, not necessarily -- well, the infill drilling is all reserves as yet, you know.

Q. What would that give you as the total ultimate recoverable reserve on 160-acre spacing?

A. Well, my graph, Number Eighteen, on that last graph, you know, it depends on where you want to sit on the acreage. There are wells that will not make but 100-million, the lowest one we show there. When you drill in there, you get 100-million, and if you can make a little

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profit off 100-million, you can drill a lot of wells, because he does drain only a limited amount. He is real tight.

The question that, I think that Mr. Chairman asked, 80 acres later, you know, well how do you know; I don't know. I haven't seen enough data on it, but it is possible it has to be considered 25 years from now, 20 years from now. It's possible that we can still get better when we have more wells, more experience, more data.

Makes me think about something. All of the wells that I came across, it's possible from dry data to make a map of it like this. Now I notice that you do not allow to make open flows any more, which is good. I mean that saves the gas. I think it's from you here somewhere. But the well had shut in pressures that are given there, are very, very informative, you know, and you can do a lot with it.

As to logging, we are talking about such mediocre stuff. Excuse me for saying it that way. It's stuff that's sandy all through, you know, and I have been hopped upon by the El Paso people because it's limited. The sand is not so much limited, it is the permeability which is varying a little bit and it varies just slightly and you have nothing left, you know. To me it looks -- assume that you have a lot of -- that you have a square

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mile in the original base, of sand of same calibre. That is just wishful thinking. Can you imagine that there's a sand exists or a sea exists in which all the sand will be 10 feet thick and of exactly the same calibre, or exactly the same grain size, and that the rivers that will bring in that sand never flooded; all of this? Why that is just not in the cards.

I have been instrumental for keeping on in computing work so that we could figure out the water influx, and if you can't compute the water influx, by the way, you don't ever get a water influx here, don't you worry. I mean that is too darned tight to have any water coming in, and you get the first water when you come to the Morrow, but upon the sides, no, sir.

You have to get it out, out of the energy as it sits in the reservoir.

That stuff can be, well, depending how fast it varied, the permeability goes from, let us say, 1 - 2/10ths to something that you can hardly drain, and you need all this sand and it doesn't matter how low a permeability in order to get all the gas there is, and you need it.

So you have to frac your holes, make the best completion you can, in order to come up to the figures we have given. They may be exceeded; I wish we were here

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to look at it, but that's a long time yet. It comes out slow.

I made a promise one time. I promised -- I think it was you -- I promised I make an estimate as to what the pressure is if I take 100,000 cubic feet of gas and how much is the pressure drop at 160 acres. No go. You cannot get 100,000 cubic feet of gas out of 1/10th of a millidarcy unless you make it very, very thick and you get a pressure drop at 160 acres in 10 years.

That thing does not work. That gas equation does not work under the conditions existing here.

You know, I quite often try to explain why, look, that gas is so expandable, and you know how expandable it is, you open a valve and it only has to expand a little bit, it drops out, you know. It does not really have to flow. No, that thing has to go work itself into the formation for a long time, and then you have two systems working for you, one with a low pressure, and one with a high pressure, and Lord, I'm not clever enough to solve it, and whoever says they can solve it, well, it's not on my conscience.

No, I -- this is -- this is such tight formation that unless you do something for it you don't get the gas that's in it.

Now, have I confused you enough?

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Q. Well, using whatever economic cutoffs you were using, did you come up with a total reserve to be added in the pool by going to --

A. Yes, it -- I would put them now at 4-1/2 billion. And to make life simple, I would give them the total of 10-trillion for the whole pool, that's the total ultimate production.

Q. Okay. Thank you.

A. By the way, when I talked about this, it was my point, you have to drill 2500 wells in the field. There are still 100 more to come. But on my graph for infill drilling we used 2120 and there entered the 500-million or less, and I've already been told of people who would gladly drill a 500-million cubic feet well.

So you can add a few more wells to my 2120 that we mentioned there.

Q. Do you think there will be that many infill wells drilled eventually?

A. Oh, yes, very much so. Someone's got to do it. I beg your pardon?

Q. You do have a deliverability point after awhile where maybe it won't be economic.

A. Well, how much does it cost to add one more well or to keep them on, you know, and then the question is, it's not the total or average, it's the question

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how much can I save by taking them off, you know, and I was told that it comes -- the pressure is to go down to 50 pounds and the cost is appreciably less than the $200 I have used, appreciably less, but I was told to stay away from cost because it might not sit well, so I didn't go into detail there.

Q. Did you use a deliverability cutoff on a well and --

A. No, we have used -- no, we have not used deliverability cutoffs. We have used, for the graph over there, which consists of 2100 wells, I think a last figure of 7-million cubic feet of gas per day with all the wells as exist now, if they go down on the percentage decline, there's about 7-million. Now, that's in 2040. By that time I bet the price is not going to be any longer $2.00. It's going to be somewhat more, but anyhow, that's the figure we have used now; on the basis of $2.00, 7-million per day. That means operating the field, roughly, 7-million that would be $14,000, see, which you can save by shutting down --

Q. You didn't mean 7-million a day.

A. Oh, yes, you have a look at that, 2500 wells at 7-million.

Q. Total field, that would be total field.

A. Yes, sir, total field. That is less than

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the 100,000, oh, yes, way less than the 100,000. 2500 into 7-million, that's about 140 -- 14,000 cubic feet per day per well.

Q. Okay.

MR. RAMEY: Mr. Nutter?

CROSS EXAMINATION

BY MR. NUTTER:

Q. Mr. Van Everdingen, looking at your Exhibit Number Twelve, it would appear that the early wellhead shut-in pressures were something in the neighborhood of 26, 27, 2800 pounds.

A. Yes, sir.

Q. Would that be representative of original wellhead shut-in pressure?

A. Yes. I was told, the graph is not here but we -- did we bring one graph?

We had the initial wellhead pressures per township but had not separated on it per well, and we finally decided to leave it out. The initial wellhead pressures can go, I think, as high as 2800; slightly higher on the east side; 2400 on the west side of the field. As a matter of fact, that you are talking about not one sand but various sand and they vary under different conditions.

You also have the variation in gasoline

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content. I mean how much gasoline do you get, or liquid do you get, and in some cases, even oil do you get, but it's only in parts of the field; other parts I saw there was never a mention of any liquid content.

Q. Well then, if we had an original bottom -- an original wellhead shut-in pressure of 24 on the west and 28 on the east, why do we have here on Exhibit Number Eight, this graph of cumulative production, when you have zero production you only have a wellhead shut-in pressure on it of 1500 pounds on that one?

A. Well, these are the wellhead pressures. These are the pressures measured for the rules and regulations of the 7-day shutin. They were measured once a year, so you have a year of production; in seven days there's no way that you ever get anything representing the average for the reservoir. It gives you a figure, which if you accumulate it over a year, is long enough, it helps you out in determining where you're going, but it's not representative of the actual pressure in that reservoir.

Q. In other words, this is only a 7-day buildup.

A. Oh, yes.

Q. And one of your other exhibits showed a 790-day buildup.

A. That's right, that's what you needed to

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come back to the pressure as it existed after you have produced for a year.

Q. Well now, in determining that the production would decline here in the year 2042 to 7-million Mcf per day --

A. Is it 7-million Mcf per day?

Q. -- 7-million cubic feet.

A. Oh, that's different. 7-million --

Q. Is this taking it to an economic limit or is this taking it to some reservoir abandonment pressure?

A. We took, if I remember properly, less than 50 pounds. It's some economic limit, yes, vaguely now, because it's so far in the future there won't be any around to ask me about it.

Q. Well now, where does Exhibit Eight stop? When you have a wellhead pressure here of approximately 700 pounds, the cumulative production is less than 3-trillion.

A. Yes, sir.

Q. And yet our Exhibit Number Four shows that we already have more than 3-trillion cubic feet. So when was the cutoff point for Exhibit Number Eight?

A. We have it at about 5-trillion cubic feet, and it is at 100 pounds or slightly better, because now we are talking about a 7-day shutin pressure, you know, which is -- you should tell the wellhead shutin pressure --

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Q. Well, isn't this what we have already achieved on Exhibit Eight?

A. So far we have achieved 2. -- this thing ends probably in the year '77, because it's no longer required to put in every year to measure wellhead shutin pressure. I think they vary from every other year, you see.

Q. Okay.

A. And that --

Q. In other words, Exhibit Eight is not up to date as far as total production and decline of pressure.

A. No, it gives you all the pressures that were correct, you know, and there are some measurements by El Paso on a hundred wells and they differ materially from what you see here. These are wells -- these are 1000's and more wells that goes into this average and it is just not correct to use a sample that somebody has on his own well that may not be the field over all.

So I had to leave a few figures for '79 -- '78 out.

Q. Because you didn't have them, okay. Now, Exhibit Number Two, this --

A. Yes, sir.

Q. -- listing of the wells, Exhibit Number Four, I'm sorry.

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A. Yes, sir.

Q. . The listing of the wells, was this prepared by your office or is this an El Paso --

A. This El Paso did. We have the same wells we have them -- these data are handy, available in the Dwight's yearly -- which are based on the figures you have -- you publish here, you know, you give out here.

Dwight's collects them and gives you a 10-year review in those data. Now that's the one we have used as a basis because right now it's '79, we have nine years of good data and Dwight's gives you the cumulative and they started in 1970, and on that basis, from Dwight's and from the graph you had, I had about, I would say, 70 to -- 70 to 80 percent of the wells that were given in Number Four, also individually worked up by DMN and confirmed with the percentages, are what they show.

Q. Okay --

A. But we have, if anyone doesn't want to take it, we have the map with us and I showed both figures, but I didn't want to show it.

Q. I presume you're acquainted with the El Paso -- with El Paso's Exhibit Number Four and know how it was derived.

A. Yes. They have wells, they have used pressures and the --

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Q. All right, are these original recoverable reserves and cumulative production and remaining reserves based on a production versus pressure decline?

A. Yes, sir.

Q. And what abandonment pressure was used in that calculation?

A. Well, they probably also used close to 500 -- close to 50 or 100 pounds. It's probably less than 50 because abandonment, you take a well in as long as you can, it doesn't cost you much -- it's very difficult to say what you should use. You can use and it's on an average -- well, I think -- where is my production man, what did you quote?

Where is the production from, you people?

A SPECTATOR: 112

MR. LOPEZ: 112.

A. Oh, they took 112.

Q. Okay. Now, Mr. Van Everdingen, assuming that the pool today has 4.9-trillion cubic feet of remaining reserves and another maybe 1/10th of a trillion for additional wells that would be drilled under today's spacing, would give us a total ultimate recoverable reserves of 5-trillion, I think you stated, is that correct?

A. Please, sir, tell me once more, because you used a term reserves. I think you mean we have recovered

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almost 3-trillion.

Q. Yes, and I think --

A. And there's 1.9 to come yet.

Q. Right, so we have approximately 4.9-billion cubic feet of total recoverable reserves in the pool.

A. Yes, sir.

Q. Under today's spacing.

A. Yes, sir.

Q. And then I think you said that there were also some additional locations under today's spacing that had not been drilled --

A. That's right.

Q. -- and the drilling of those would bring the total recoverable reserves in the pool under today's spacing to approximately 5-trillion cubic feet.

A. That, or even 5.5.

Q. 5.5?

A. Yes, sir.

Q. Now you stated that you thought the additional drilling under the proposal here would recover another 4.5-trillion cubic feet?

A. Yes, they allow me to take 5.5 and then this 4.5 come up, right you are.

Q. Okay. I'm slow, Mr. Van Everdingen, and I didn't catch it. Would you explain why? Why we're going

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to get 4.5 additional trillion cubic feet of gas from the infill drilling program?

A. Because the wells, as I interpret the pressures, which is the best, to me has always been the most reliable source of information, if I interpret the pressures that have been measured correctly, they show that they do not -- that they do not pertain to what is in the -- in the oil business you use as an infinite reservoir.

You were talking about the limited drainage areas on practically all of the wells.

Q. Is it exemplified, Mr. Van Everdingen, by your Exhibit Number Twelve?

A. Yes, sir.

Q. Where we have No. 212 that was drilled in 1978 right in the middle of a pattern of wells which had been drilled a number of years before, maybe ten years before --

A. Not all, there are some five year wells; but to say on eight year wells, and then eight year wells, those surrounding wells, have not been capable to reduce the pressure at the location of 212 by a measurable -- to a measurable extent.

Q. And No. 212 recovered what was almost virgin reservoir --

A. Yes, sir.

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Q. -- pressures?

A. Yes, sir. Then I thought, well, that was fairly late, and then we made the map just behind you, that I think is Number Twelve, yeah, same map. It's right behind you on the wall. We found the same two -- we found two wells, 258 and 259, which showed the same picture, and I will bet you if I could take time off and make a map for the entire field, you will find that that phenomenon is not an isolated case; that you will find many more wells when they are drilled later than the surrounders, giving the initial pressure. You get more familiarity, but unfortunately, I was not clever enough to start on that way when the job came up.

Q. Well now, digressing just a moment, Mr. Van Everdingen, do you remember in 1974 when you testified in Blanco-Mesaverde --

A. Yes, sir.

Q. -- case, what were the expected pressures in the undrilled 160-acre tracts supposed to be at that time?

A. This problem did not arise. I do not know. I do not know. The one thing that, when that testimony came up, you know, for the first time we saw there buildups, I think they had a half a dozen, that lasted for two years and the wells were still going, you know. Now,

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I think the most was almost three years, and I never thought about measuring pressures or giving instructions or requiring that the pressures be measured within 24 days, like you have here, WH, whatever you call them, wellhead shutin pressures upon completion.

That's what -- I could have done a better job on that.

Q. I was thinking we were expecting pressures some place in the nature of 75 percent of the original pressures --

A. Leave me out on account of age. I don't recall.

Q. I see.

MR. NUTTER: I believe that's all, thank you.

MR. RAMEY: Any other questions of the witness? He may be excused.

Do you have anything further, Mr. Lopez?

MR. LOPEZ: No, Mr. Chairman. That concludes our case.

(There followed a discussion off the record.)

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MARLAN THOMPSON

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

DIRECT EXAMINATION

BY MR. CARR:

Q. Will you state your name and place of residence?

A. My name is Marlan Thompson. I live in Arlington, Texas.

Q. Mr. Thompson, by whom are you employed and in what capacity?

A. I work for Southland Royalty Company as a reservoir engineer.

Q. Mr. Thompson, have you previously testified before this Commission and had your credentials accepted and made a matter of record?

A. No, sir.

Q. Will you briefly review for the Commission your educational background and work experience?

A. I graduated from the University of Texas in 1963 with a Bachelor of Science degree in petroleum engineering.

I worked for Southland Royalty for the past year as a reservoir engineer. Most of the prior ex-

perience, which totals about fifteen years, I spent with Texaco. About nine out of the fifteen years I worked as a reservoir engineer.

Q. Are you familiar with the subject matter of this case and the Basin-Dakota pool?

A. Yes, I am.

MR. CARR: Are the witness' qualifications acceptable?

MR. RAMEY: They are acceptable.

Q. (Mr. Carr continuing.) Mr. Thompson, as a reservoir engineer does your area of responsibility include the San Juan Basin?

A. Yes, sir.

Q. How many wells does Southland operate in the San Juan Basin?

A. About 600 in the San Juan Basin.

Q. How many of these are in the Basin-Dakota?

A. 172.

Q. Will you please refer to what has been marked for identification as Southland Royalty Company's Exhibit Number One and explain to the Commission what it is and what it shows?

A. Exhibit Number One is a comparison of pressures between recently drilled wells and older offset wells. Not only is the -- the initial shutin pressure is

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shown on both the original -- or both the new and the original well, and also a current or recent shutin pressure on the older wells.

There are six -- six groups of wells that show this pressure comparison, and these wells cover six different townships in the San Juan Basin.

The first four are in the Aztec area and the other two are in the Jicarilla Reservation area.

Looking at -- looking at the first comparison, would be Southland Royalty's Culpepper-Martin No. 17, showing that this well is located in Section 33 of 17 North, 12 West. This well was completed in October of '78; had initial shutin wellhead pressure -- this is a 7-day shutin pressure -- of 1583 pounds.

The offsetting Culpepper-Martin No. 3 Well, drilled in 1966, May of 1966, had initial shutin pressure of 1578.

The new well, Culpepper-Martin 17, the pressure is five pounds higher in the new well than in the older offset well.

Referring to a recent shutin wellhead pressure in the offset well, this number is 780 pounds, which is considerably lower than the -- than the shutin pressure in the recently drilled well, this pressure being 1583 pounds.

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The other five groups of wells have similar comparisons. As you can see, three out of the six, the new well has higher pressures than the older wells, while three have somewhat lower pressures than the older wells.

Another case, the recent, or what we might call a current shutin wellhead pressure was considerably lower than the shutin pressure in the new wells. All these new wells were drilled in 1978 or '79.

Q. Mr. Thompson, what conclusion do you draw from this exhibit?

A. I concluded that from this exhibit, that a well will not drain 320 acres. This pressure -- these pressure comparisons, these small differences in pressure in these newer wells compared to the older wells, indicates that one well will not drain a full 320 acres.

Q. Do you have a recommendation to make to the Commission in this case?

A. Yes. My recommendation is that the infill program, infill Dakota program, as proposed by El Paso be adopted.

Q. Mr. Thompson, do you believe that granting the application of El Paso will result in recovery of gas which otherwise would be left in place?

A. Yes, I do.

MR. CARR: At this time we would offer

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Southland Royalty Company Exhibit Number One.

MR. RAMEY: Southland Royalty Exhibit Number One will be admitted in evidence.

MR. CARR: I have nothing further on direct.

MR. RAMEY: Are there any questions of the witness? Mr. Arnold?

CROSS EXAMINATION

BY MR. ARNOLD:

Q. Mr. Thompson, you're not necessarily saying that you think four out of five of the infill wells you're going to drill are going to have a higher pressure than the first well drilled?

A. No, sir. I'd say they'ld be very nearly the same. I'd say that no drainage had occurred in that particular area.

Q. In fact, if the new well got higher pressure than the old well, must indicate something other than drainage area.

A. There is some small differences. This could be some inaccuracy in measurement. They are only a small amount higher than the older well. I think that's probably measurement inaccuracy, measurement conditions. I'd say they're essentially the same.

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MR. RAMEY: Any other questions of the witness?

MR. VAN EVERDINGEN: I would like to know has he shutin the wells, new wells, for how long and how long were they produced before being shut in.

A. The initial wellhead pressures are 7-day shutin pressures, and the wells had produced only a very short time, the production during the initial testing operation.

Now, the recent shutin wellhead pressures, the wells have been producing a long time.

In fact from the completion date in -- in the case of Culpepper-Martin No. 3, it was completed in 1966, and this recent shutin wellhead pressure was taken in '77.

MR. RAMEY: Any other questions of the witness?

MR. STAMETS: Mr. Ramey.

MR. RAMEY: Mr. Stamets.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Thompson, these initial shutin pressures, were those taken after a period of flow? What I'm trying to determine is how close are these to a reservoir

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pressure, or how close are they to actual shutin pressures?

A. They are taken after a period of flow. They are not -- they're all taken on the same basis. We presented the comparison and do not represent them as being the initial reservoir pressures.

Q. So they're not stable?

A. They're not fully built up, no, sir.

Q. So you really don't know whether or not, if they were allowed to stabilize, whether the new tests would show decrease in pressure or increase in pressure?

A. No, sir, they're all taken under the same conditions, so I think when -- when -- I think you can compare them and say that the reservoir conditions are the same.

They're all taken after a flow period and after a shutin -- shutin period, 7-day shutin period.

MR. STAMETS: That's all.

MR. RAMEY: Any other questions of the witness? He may be excused.

MR. CARR: We have nothing further.

MR. RAMEY: Mr. Ryan, would there be some where we could stop in about ten or fifteen minutes?

MR. RYAN: What I was thinking, Mr. Chairman, if we wanted to -- I have some preliminary remarks to make, and if you wanted to do that, I mean I need to qualify

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the witness, and we might do that in advance of the lunch hour.

MR. RAMEY: Okay, let's --

MR. RYAN: Then during the lunch break we can put our exhibits on the board and then we can have those.

L. E. NEIBERGER

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

DIRECT EXAMINATION

BY MR. RYAN:

Q. As sort of a preliminary statement, I'd like to fill in the Commission a little bit about what Amoco's position is in this hearing, and what we purport to show with an expert witness and some exhibits.

Amoco is a major operator in this field. We operate 356 wells and have an interest in an additional 382 wells.

Our net production for December, 1978 was 44-million cubic feet of gas per day.

To the present time, the end of 1978, Amoco's share of the gas has been 777 Bcf, which represents about 22 percent, or 21 percent, of the field.

Amoco is supporting El Paso's application

to infill drilling, so that the nation needs the gas and the gas is there, and it will not be produced by the existing wells.

In arriving at this, Amoco had done an extensive study, which was presented by Mr. Neiberger in preparation for this hearing. He did an independent study apart from El Paso's study, to arrive at whether Amoco wanted to participate and recommend an infill drilling program.

That study, in anticipation of that, how much money we were going to spend and what we were going to do, we anticipate if this application is granted, that over the next decade we'll drill in the neighborhood of 350 wells, so we really anticipate doing infill drilling in practically all -- practically all of our locations, and that will cost at present figures, in excess of $100-million, or we estimate $115-million at the present time.

We do plan to get into the program of drilling as soon as possible if the application is granted, and start certainly next year operating four or five rigs if they're available and during the first part of the 1980's do a great part of our drilling.

Part of the situation that prompted this study that we did was because of the results that we feel that we've had from the Mesaverde infill drilling program.

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Our original forecast in that -- in that program was we thought we would recover an additional .85 Bcf per well and we've recovered far exceeding that by over 1-billion cubic feet of gas.

We expect, as our figures will show in the study, that we anticipate that we will get far better results out of the -- out of the Dakota infill drilling program.

I think our conclusion is that we'll get over 2-billion with the additional wells, and of course, depending on frac techniques, we can even get greater than that.

I would say at this point that the field rules proposed by El Paso, we have no objection to them. We would recommend that those rules be adopted.

I do have one witness and I'd like to qualify him at this time.

Would you please state your name, by whom you're employed, and in what capacity?

A. My name is Lance Neiberger. I'm employed with Amoco Production as a Senior Petroleum Engineer.

Q. First of all, would you spell your last name?

A. N-E-I-B-E-R-G-E-R.

Q. And would you speak up loudly where all

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can here you?

Have you ever testified before this Commission?

A. No.

Q. Would you briefly state your qualifications first as to education and then as to work experience?

A. I graduated from the University of Colorado in December of 1974 with a Bachelor of Science in civil engineering. January of 1975 I began work with Amoco Production as a production engineer in the Casper, Wyoming office. Approximately a year and ten months later I was transferred into Denver as a reservoir engineer and worked there for a little over two years.

For the last six months I've been transferred back up to Casper, Wyoming and an engineering supervisor.

I am registered in the State of Colorado as a professional engineer.

Q. During the two years that you were in the Denver office working as a reservoir engineer, was the area that's the subject of this application within your jurisdiction?

A. Yes, sir.

Q. And did you work closely with the BAsin-Dakota Field?

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A. Yes, sir.

Q. And in your reservoir study, did you do an extensive study of the field for reservoir purposes?

A. Yes, I did.

Q. And did you compile this field study? That was done by you?

A. Yes.

Q. And that's an extensive reservoir study of the field?

A. Yes, it is.

Q. And did you do that to estimate reserves and to -- to see the feasibility of an infill drilling program within that field?

A. Yes, I did.

Q. And the results of that study, do you have them complete?

A. Yes.

Q. And in preparation for this hearing have you prepared certain exhibits that you are -- are going to introduce in this hearing related with this field and your study?

A. Yes, I have.

MR. RYAN: May he be qualified as an expert witness?

MR. RAMEY: Yes, we'll consider him to be

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qualified.

And with that, let's recess until 1:30.

(Thereupon the noon recess was taken.)

MR. RAMEY: Mr. Ryan, you may continue.

MR. RYAN: Yes. I might explain as a preliminary matter that I think everyone -- we've put the exhibits, we've got a whole stack of them there, there are two stacks of exhibits. The first one is a map marked as Exhibit One. The second one is a packet of exhibits. This contains a total of six exhibits, two of which are multiple page, but I stamped the first page of each exhibit with the official stamp so that will give you an indication of how they are numbered and we'll go through them individually.

Q. (Mr. Ryan continuing.) Mr. Neiberger, you are still sworn and did you prepare certain exhibits in this cause?

A. Yes, I did.

Q. Would you please refer to what the reporter has marked as Exhibit Number One, and I'll ask you to identify that exhibit and explain it, please.

A. Exhibit Number One is a map of the Basin-Dakota Field. For the general purposes the wells on here are all BAsin-Dakota wells. This line across the top is a border between Colorado and New Mexico and the town of

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Farmington lies approximately here.

A few things I'll be talking about later on I'd like to point out at this time.

The green dots shown in here are wells on which we ran pressure buildup tests for study.

The small red dots are areas on which I studied in order to condense my study instead of studying all of our Amoco wells in the field. I broke it down into a two township area to our main study area, Township 29 North, Range 12 West, and Township 30 North, Range 12 West.

In addition to this two township area there are model wells in each of the other areas as shown by the red dots.

In addition there are two red arrows on the map. These arrows indicate locations which simulate infill drillings. I'll explain later.

Q. Now, on Exhibit One, that basically shows all of the wells that have been drilled to date in this formation?

A. Yes, it does.

Q. Is there anything else on Exhibit One at this time?

A. I don't believe so.

Q. Now, you've indicated that you have

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done a study, a complete study in your opinion, on this field in preparation for this hearing?

A. Yes, I have.

Q. Are you prepared at this time to go through a step by step version of some of the things that you did in the study?

A. Yes, I am.

Q. And are those shown by the exhibits?

A. Yes, they are.

Q. Can we now look at what the reporter has marked as Exhibit Number Two. Is that a four-page exhibit?

A. Yes, it is. Exhibit Number Two is four pages. These are material/balance graphs on the four subject wells on which we are --

Q. Would you identify what wells they are by which dots they are on Exhibit One.

A. These are the green dots on Exhibit One. These wells are the Pan American Gas Com. "B" No. 1, Section 31, Township 30 North, Range 11 West; Sullivan Gas Com. "D" No. 1, Section 26, Township 29 North, 11 West; the Gallegos Canyon Unit No. 173, Section 29, Township 29 North, Range 12 West; and the L.C. Kelly No. 1, Section 5, Township 30 North, Range 12 West.

Q. Now, let's look first at Page 1 of Exhibit Two, and I will ask that you state what went into that

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exhibit.

A. This exhibit, as I stated earlier, is a material/balance prediction for the well. The real data I wanted to show with the use of the exhibit was the fact, that was mentioned earlier by Mr. Van Everdingen, that pressure data, true static pressure of a reservoir, is not measured acurately by the seven-day test as required by the State. The three or four circled areas begin with a previous State seven-day deliverability BHP/Z points. All of the triangles were data that were gathered from our pressure buildup tests. The tests range in length from twenty-four days to fifty-six days and a method of extrapolating to a static reservoir pressure was used. The bottom triangle in each case is the pressure that was measured the seven-day period so as to correlate with the State test.

The next triangle up was the pressure as it was last measured on each well and I might say here that the pressure was increasing on each well as the bombs were pulled. The highest pressure there, the highest triangle, is the extrapolated static reservoir pressure on this well.

These four buildup surveys were run in order to try and get a correlation between the seven-day deliverability test and the static reservoir pressure.

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Because of fracture effected data on all wells accept for this Pan American Gas Com. "B" only a conservative estimate of reservoir pressure could be obtained. In other words the fracture data had effected the mathematical methods of obtaining the true reservoir pressure.

Because only one well yielded the results I was looking for, I considered this method for my study and my determination for gas in place as not conclusive.

Q. Now, pages 2, 3, and 4 of Exhibit Number Two are similar graphs for those individual wells?

A. Yes, they are.

Q. And what did you conclude on this study that you did on these wells?

A. I concluded that I could not use this method throughout my report to determine gas in place --

Q. On a field wide basis?

A. -- on a field wide basis.

Q. Did you at that time think it would be necessary to consider another method of calculating gas in place on a field wide basis?

A. Yes, I did.

Q. And what method was that?

A. I went to a computerized mathematical model which was developed by a Mr. Carter of Amoco's

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Tulsa Research Center especially for extremely tight gas reservoirs.

Q. Do you feel that that was necessary step? That the information that you gained from the wells on Exhibit Two would indicate that the reservoir was tight and that it was necessary to go to another method?

A. Yes, I do.

Q. Is Exhibit Three, marked by the reporter, some of the factors that were considered in the gas reservoir model?

A. Yes, these are.

Q. Could you give us a little background on the model and what went into that.

A. Okay. Through a computer analysis of log and core data certain formation characteristics were determined. These characteristics were all -- well, the net pay, water saturation, porosity under the input data. In order to run the model all of the input data and the variables were put into the computer. The computer by matching a point in time cumulative at this point in time and a producing rate at this point in time, all three factors gave future performance predictions or performance predictions. They gave rate versus time predictions, production -- cumulative production versus time and a reservoir pressure versus time. By changing the

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variables a match was then obtained on each well after probably an average of thirty to forty runs per well, which actually overlaid the actual production of the well.

Q. How many wells did you use in the study?

A. I used seventy-eight wells of which they were all in these study areas, as previously mentioned.

Q. So you took the seventy-eight wells and used the input data that you indicated on Exhibit Three to arrive a situation that is comparable to that well?

A. Yes, I did.

Q. And then is that the method that you used to project future reserves?

A. Yes, this method gives a rate versus time history and so it can actually be used not only to match actual production but to project future production.

Q. Has Amoco used this method in the past?

A. Amoco has used this method very successfully in the past.

Q. Have they been pleased with the results?

A. We have been very pleased.

Q. Is there anything else you wish to indicate on Exhibit Number Three?

A. I do not believe so.

Q. Now, what has been marked as Exhibit Number

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Four, are those individual wells that follow through with the study you talked about on Exhibit Three?

A. Yes. Exhibit Number Four is a ten-page exhibit. These are actually model history matches of five wells. Each well has two pages. The first page being a rate versus time code. The actual production is shown along with the model production. The second page on each well shows little dots on there, those are the average productions for each year and the line that is drawn through those is the projection as made by a computerized model. By changing the parameters this model projection might lie anywhere on this page. However, until the reservoir formation characteristics are in a range which approximates the formation characteristics the model projection will not overlie the actual production.

Q. For example, if you look at page 1 of Exhibit Number Four could you indicate by the two symbols there of how you arrived at the model production versus the actual production.

A. Oh, the model production and the actual? Okay. The actual production is historical data on each of these wells. Each well had certain input data that were held constant by varying both the permeability of the well and the spacing pattern of the well. The model projection varied until these two parameters were found for this well

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that gave this overlying history match. I did not feel that I had formation characteristics that were reliable.

Q. Now, page one of that exhibit indicates a comparison of the model production from the actual production, and page two then is the -- is the future estimate of reserves.

A. Yes, it is.

Q. Well, what's the spacing factor that is considered?

A. Okay, originally the spacing was stated at 320 acres per well; however, as I said, it varied on each well once I got into matching wells.

The average drainage area for the wells that was modeled turned out to be approximately 195 acres, given a well life of 101 years.

Q. Before we get into that next exhibit, are the remaining pages of Exhibit Number Four similar situations, just using different wells?

A. Yes, they are.

Q. Did you feel by -- by -- and these are, the five wells you've used and shown here on Exhibit Number Five, are they indicative of -- of the wells that you used in this study?

A. Yes, these are typical wells used in the study.

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Q. It wasn't limited to the five, though. You did the study --

A. No.

Q. -- with seventy-eight wells.

A. We did the study with seventy-eight wells.

Q. And were the wells picked at various parts in the reservoir and in the field to give some sort of indication to what the total situation would be?

A. Yes,they are.

Q. And you feel that you have a pretty acurate study as far as this type of study is concerned?

A. I feel I do.

Q. Now, are the results of this study with the seventy-eight wells shown on what has been marked as Exhibit Five?

A. Yes, they are.

Q. Now, could you look at that exhibit and explain what that exhibit is?

A. Exhibit Five is a tabulation of the results of my modeled data. This is the data as determined for the average well of the seventy-eight as modeled. Barring no problems with corrosions or anything that would shorten the wells natural life the study indicated that the wells would actually produce up to one hundred one years. This average well would produce forty-eight percent of the

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three hundred twenty-acre gas in place and drain one hundred ninety-five acres. The average well would produce 4.2 BCF and with the present spacing one hundred twenty-five acres would be untouched by the present well.

Because of corrosion problems and Amoco has had a lot of problems with corrosion and had to abandon a number of wells. The purpose of my study -- I limit the well life to fifty years. With a fifty-year well life the average well presently producing with my seventy-eight would recover forty percent of the three hundred twenty acre gas in place, would drain one hundred sixty-thre acres, recover 3.5 BCF, and leave undrained one hundred fifty-seven acres.

If we were allowed to drill a second well with a one hundred one year well life my modeled data indicates that the average well would have 2.68 BCF additional recoverable reserves. Based on the fifty-year well life my model indicates 3.36 BCF per well additional recoverable reserves.

Because of the vast differences in a field this large I applied a seventy percent factor to take care of the differences which have not been obtained through the use of modeling different areas of the field. Applying the seventy percent to these previous numbers you come up with, for the one hundred one well life again,

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1.88 BCF of additional reserves. For the fifty-year well life 2.36 BCF of additional reserves.

Q. I have a couple of questions before you go on. Is it your opinion that you needed to get away from the one hundred one years because probably the well would not last that long as far as the casing is concerned and other factors --

A. That is right.

Q. -- and that fifty years is more realistic for the total life of the well.

A. The asterisk as shown on reserves will give us a range of additional reserves based on form drilling of the present system in Basin Dakota of 1.88 BCF per well. This model predicts that there is 4.6 TCF of additional recoverable reserves which could be obtained by infill drilling and 3.36 BCF per well that could be as much as 8.2 TCF additional recoverable reserves. This just shows the range by infill drilling the reserves would be increased, the whole field by at least 4.6 TCF and as much as 8.2 TCF.

Q. Now, when you apply the seventy percent factor to the second well, does that a conservative figure in your opinion?

A. Yes, I believe it is.

Q. And that is taking in the factors that you

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can't predict at this point.

A. Exactly.

Q. But even using that figure it is your prediction that the additional recovery from the infill drilling program will be 4.6 TCF additional recoverable reserves.

A. That's right.

Q. And you are talking about under that system 2.3 BCF additional reserves from a three hundred twenty-acre spacing as it now exists.

A. Yes, sir.

Q. Now, that would indicate that that is more than what is -- you've come to realize from the Mesaverde, is that correct?

A. Yes, it is.

Q. Is there anything else on that exhibit?

A. No, I think that is it.

Q. Now, in your opinion is the models that you have graphed to come up with these conclusions -- do you feel confident about that study?

A. Yes, I feel very confident about it. As I have said, we have used this method in numerous other tight gas reservoirs and we have gone back and double-checked the data years later and the data we have on reservoirs we've seen have predicted performance very good.

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Q. Now, did you do an additional study to simulate actual well conditions?

A. Yes. The modeling told us that we were not getting full drainage of the area so in order to further prove this we -- Amoco drilled two wells to simulate infill drilling.

Q. Now, are those wells and the results thereof shown on what the reporter has marked Exhibit Number Six?

A. Yes, they are.

Q. And that is a four-page exhibit.

A. Yes.

Q. And are the first -- pages one and three on the board there?

A. Pages one and three, yes.

Q. Why don't you explain what went into those pages of the exhibit.

A. The well that Amoco drilled here is the Federal Gas Com No. 4, Southeast quarter of Section 23, Township 29 North, Range 10 West. This is legal 320 location and the previous Amoco well here had been plugged and abandoned because of corrosion problems. The offset wells are shown here. The drainage radiuses calculated for these wells are the shaded areas encompassed by the circle. When drilling this well, because of the fact that the drainage radiuses had not reached into this area

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virgin pressure or pressure approaching virgin pressure was expected. On page 3 of the same exhibit we have the Lopez Gas Com No. 1, the Northwest quarter, Section 2, Township 29 North, Range 9 West. This well is on a undrilled tract. It was drilled basically between two of Amoco's wells again. We felt that this simulated an infill drilling location.

Q. Now, pages 2 and 4 of Exhibit Number Six, those are the pressure data?

A. Yes, they are.

Q. And how much time did you use in getting the pressure?

A. On the Federal Gas Com No. 4 one hundred fifty hours was used to obtain pressure. On the Lopez one hundred ten hours was used.

Q. And the pressure on page 2 of the exhibit for the Federal Gas Com No. 4 well, what was your final pressure at the end of one hundred fifty hours?

A. At the end of one hundred fifty hours we had 2,569 PSI.

Q. Now, does that seem to approach virgin pressure?

A. Yes, it does.

Q. Now, what about the other well, the Lopez?

A. The other well at the end of one hundred ten

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hours we reached 1,982 PSI, which again I feel approaches virgin reservoir pressure.

Q. That certainly is higher than existing pressure in the field of surrounding wells.

A. Yes, it is, quite a bit.

Q. So this exhibit by drilling these two wells, and those wells were drilled not as infill wells but actual unit wells.

A. Yes.

Q. As on page one of Exhibit Six, to fill in for a well that was plugged and abandoned, is that correct?

A. Yes, sir, that is.

Q. But it ended up on 160-acre pattern?

A. Yes.

Q. And your conclusion is that the -- you did reach approximate virgin pressure with those wells.

A. Yes.

Q. Now, going back just for a minute to -- to the conclusions of your modeled study, even though the wells in this field were -- if they were capable of being produced for over 100 years, you indicated that they wouldn't drain the entire 320-acre unit, is that correct?

A. That is correct.

Q. At the end of this study that you made do you have any recommendations to make?

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A. I would recommend infill drilling as proposed by El Paso. I believe that we cannot fully drain the reservoir without a second well.

Q. So in your opinion a second well in each 320-acre tract is necessary to efficiently and effectively drain the proration unit of 320 acres?

A. Yes, it is necessary.

Q. In your opinion if additional wells are not drilled in the 320-acre spacing, will certain amounts of gas be undrained from that 320-acre spacing unit?

A. Yes, sir, they will be left where they are.

Q. And will not be produced at all?

A. That's right.

Q. In your opinion would that be physical waste of gas?

A. Yes, it would be.

Q. In your opinion can a second well be drilled in each of these 320-acre spacing units without violating the correlative rights of offsetting operators?

A. They can.

Q. The second well will not drain beyond the drilling spacing unit.

A. No.

Q. In your opinion is the granting of this

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application in the best interest of conservation?

A. Yes, it is.

Q. Certainly the country needs the gas, don't they?

A. I think so.

Q. It would be good for the economy of the country and of New Mexico.

A. Yes.

Q. Certainly of the area around Farmington where this field is located.

A. Yes, it would.

Q. Were exhibits One through Six prepared by you or under your direct supervision?

A. Yes, they were.

MR. RYAN: I offer the exhibits into evidence at this time.

MR. RAMEY: Exhibits One through Six will be admitted

Do you have anything further, Mr. Ryan?

MR. RYAN: In my opening remarks I indicated that Amoco has a program of drilling additional wells. Is that your understanding that it is being planned in the next few years to drill in the neighborhood of three hundred fifty wells?

A. Yes.

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Q. And we are going to get really serious in this program?

A. Yes, Amoco is very serious about it.

Q. That is all I have

MR. RAMEY: Any questions of Mr. Neiberger? Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q. Mr. Neiberger, as I understand it you used seventy-eight wells and then designed your computer program so that you get production versus time decline curve and then move that thing up and down until it fitted the actual decline curve.

A. Yes, by changing the variables the modeled prediction changes.

Q. And then based on that seventy-eight -- that was based on seventy-eight wells?

A. Yes.

Q. The results of the seventy-eight wells then are tabulated right here on Exhibit Five, is that it?

A. Yes, sir, that is the average of the seventy-eight wells.

Q. Now, are those seventy-eight wells good wells, bad wells, average wells, or what?

A. We took great lengths to try to obtain

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a good average over the field of wells. So they are good, bad, and medium wells in that average.

Q. Well, what were your average recoverable reserves for those seventy-eight wells?

A. I don't have that number off of the top of my head, but it would just simply be seventy-eight times the reserves as shown on here.

Q. Now, on Exhibit Five where you show recoverable reserves 4.2 BCF upon a 101-year basis, are those the recoverable reserves under the 195 acres?

A. Yes, sir.

Q. So that's not the full 320?

A. No, it is not.

Q. The total number of reserves under the 320-acre tract then would be the 4.2 plus the 2.68?

A. Yes.

Q. And was the 7 BCF then an average 320-acre tract?

A. A little over 6 BCF.

Q. It would be 7. Almost 7. 4.2 plus 2.7 is 6.9.

A. Oh, okay. Excuse me, I was looking at the wrong column. Yes, you are correct.

Q. Is 7 BCF typical of a Dakota well over there as far as the reserves under 320 acres?

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A. Well, based on the wells that I used, yes, they were.

Q. Based on your seventy-eight?

A. Based on my seventy-eight wells.

Q. Have you converted this additional reserve to be obtained under the 50-year or the 100-year program to the field as a whole so that we know what additional reserves we need for the entire field?

A. No. What I have done here is the asterisk as shown on Exhibit Number Five showed a range for the total field. In other words, using the lowest figure of the recoverable reserves for a second well of 1.88 BCF per well, I would say that at least 4.6 TCF could be recovered and using the highest number in those 4, 3.36 BCF per well, possibly as much as 8.2 TCF could be recovered.

Q. Now, the 8.2 is not based on seventy percent?

A. No, this is just a range.

Q. I believe that is all.

MR. RAMEY: Are there any other questions? You may be excused. Is there anything further, Mr. Ryan?

MR. RYAN: That is all of the testimony I have.

MR. RAMEY: Mr. Tully, do you have a

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witness?

MR. TULLY: No, sir, I would just like to make a statement for the record at the proper point in the procedure.

MR. RAMEY: I think we are ready for statements so you can start now, Mr. Tully.

MR. TULLY: Dugan Production Corp. wishes to state its support of El Paso Natural Gas Company's application for infill Dakota well. The approval of this application by the Division will provide an opportunity for natural gas operators to recover additional natural gas from the Dakota formation which would not be recovered from one Dakota well and the currently established 320-acre proration unit. Without wishing to cloud the issues presented to the Division by El Paso Natural Gas we wish to draw the Divisions attention to certain circumstances now existing for the Basin-Dakota Pool. We agree with El Paso's testimony that the existing Dakota Proration Unit should not be disturbed. However, there are situations where an operator may own the Dakota operating rights for only 160 acres.

We wish to submit for your consideration that this Division, in rendering its decision, provided for an administrative approval procedure for a Dakota well on a 160-acre proration unit, for a 320-acre Dakota proration

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unit does not presently exist.

Thank you for your consideration of the above comments. Respectfully submitted, Thomas A. Dugan, President.

MR. RAMEY: Mr. Carr, do you have anything?

MR. CARR: I have Mr. Morris, Vice President of Southland Royalty Company, who would like to make a statement.

MR. MORRIS: I would like to re-emphasize what our testimony was by Mr. Marlon Thompson. We are in support of El Paso's position to drill a second well on the 320-acre spacing in this pool.

MR. RAMEY: Thank you, Mr. Morris. Mr. Byrd do you have anything?

MR. BYRD: Mr. Chairman, no prepared statement, but we do want the record to reflect that the Mesa Petroleum does support the application .

My questions on cross examination of the witnesses were to point out some possible alternate language that you might consider in those two sections that I questioned.

MR. RAMEY: Thank you, Mr. Byrd.

Mr. Stogner?

MR. STOGNER: Yes, sir.

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I have a statement to read into the record. Consolidated Oil and Gas, Inc concurs with El Paso Natural Gas Company's application to ammend Order R-1670 and R-1670-C to permit the optional drilling and production of an additional well on roration units in the Basin-Dakota gas pool of San Juan and Rio Arriba Counties, New Mexico, and for the assignments of allowables for such additional wells and proration units.

Consolidated is currently operating 69 wells in the Basin-Dakota pool and has been operating gas wells in the San Juan Basin for over 20 years. Based on its experience with the Basin-Dakota formation, Consolidated has concluded that one well will not effectively and efficiently drain the existing 320-acre proration units and that the drilling of additional wells will be necessary in order to drain those portions of the proration units which can not be drained by the existing wells.

MR. RAMEY: Thank you, Mr. Stogner. Mr. Arora.

MR. ARORA: My name is Sudesh Arora. I am the Manager of Reserves and Evaluation of Supron Energy Corporation.

Supron Energy Corporation owns and operates a substantial number of gas wells producing from the Basin-Dakota gas pool of San Juan and Rio Arriba

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Counties, New Mexico. Each of these wells has been drilled on a 320-acre spacing unit in accordance with previously effective spacing rules of the Oil Conservation Commission pertaining to the Basin-Dakota gas pool.

Supron Energy Corporation has reviewed the pending application of El Paso Natural Gas Company in this case seeking an amendment of the existing spacing rules to permit the drilling of an additional infill Dakota well on each established 320-acre spacing unit. Our company concurs with the views expressed by El Paso Natural Gas Company with respect to the desirability and necessity of additional infill Dakota formation wells in the San Juan Basin and supports the application of El Paso Natural Gas Company in that regard.

MR. RAMEY: Thank you, Mr. Arora. Mr. Gibb.

MR. GIBB: Tenneco Oil Company recommends approval of the application for infill drilling presented by El Paso Natural Gas Company today.

We feel that the testimony presented, as well as our own studies, shows that infill drilling in the Basin-Dakota is necessary to efficiently and effectively drain the remaining reserves.

MR. RAMEY: Thank you, Mr. Gibb. Mr. Brown.

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MR. BROWN: Getty Oil Company wishes to go on record as supporting the application of El Paso Natural Gas Company for infill drilling in the Basin-Dakota pool in San Juan and Rio Arriba Counties, New Mexico.

MR. RAMEY: Anyone else have a statement?

Well, the Commission will take the case under advisement, and the Hearing is adjourned.

(Hearing adjourned.)

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REPORTER'S CERTIFICATE

I, SALLY WALTON BOYD, a Court Reporter, DO HEREBY CERTIFY that the foregoing and attached Transcript of Hearing before the Oil Conservation Division was reported by me; that said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability, knowledge, and skill, from my notes taken at the time of the hearing.

Sally W. Boyd CSR
Sally W. Boyd, C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. _____ heard by me on _____ 19____.

_____, Examiner
Oil Conservation Division

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STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE NO. 6533
Order No. R-1670-V

APPLICATION OF EL PASO NATURAL
GAS COMPANY FOR THE AMENDMENT OF
ORDER NOS. R-1670 and R-1670-C,
BASIN-DAKOTA POOL, SAN JUAN AND
RIO ARRIBA COUNTIES, NEW MEXICO,
TO PERMIT THE OPTIONAL DRILLING
AND PRODUCTION OF A SECOND WELL ON
PRORATION UNITS IN SAID POOL, TO
ESTABLISH WELL LOCATION REQUIREMENTS,
AND TO PROVIDE THAT THE DELIVERABILITIES
OF BOTH WELLS ON THE UNIT WOULD BE
ADDITIVE FOR ALLOWABLE PURPOSES.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9:00 a.m. on April 30, 1979, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 22nd day of May, 1979, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the "Dakota Producing Interval" in San Juan and Rio Arriba Counties, New Mexico, was created and defined by Commission Order Nos. R-1287, dated November 21, 1958, and R-1287-A, dated March 2, 1959.

(3) That the Basin-Dakota Gas Pool, located in San Juan and Rio Arriba Counties, New Mexico, was created by Commission Order No. R-1670-C, dated November 4, 1960.

(4) That the Basin-Dakota Gas Pool is governed by special rules and regulations, promulgated by the Commission in Order Nos. R-1670 and R-1670-C, as amended, which provide for 320-acre proration units and for the assignment of allowable to each proration unit in the pool based on the amount of acreage in the unit and the deliverability of the unit well.

(5) That the applicant, El Paso Natural Gas Company, seeks an order amending said Order Nos. R-1670 and R-1670-C, as amended, to permit the optional drilling of an additional well on each 320-acre proration unit in the Basin-Dakota Gas Pool; to determine the deliverability of each proration unit upon which an additional well is drilled by adding the deliverabilities of the two wells; to permit the production of the allowable assigned to a proration unit containing two wells from both wells in any proportion; to consider both wells on a proration unit as one well for purposes of balancing underproduction or overproduction; to report the production of each well on the unit as well as the total unit production; and to compare the unit production against the unit allowable for determining whether a unit should be classified marginal or non-marginal.

(6) That the Basin-Dakota Gas Pool has been developed for approximately 18 years on 320-acre proration units.

(7) That to change the unit size now in said pool would disturb the equities under many of the existing proration units.

(8) That the provisions set forth in Order No. R-1670-C, as amended, relative to acreage dedication and vertical and horizontal limits shall continue to be applicable.

(9) That the proration unit size in the Basin-Dakota Gas Pool should continue to be 320 acres.

(10) That Section 70-2-11, New Mexico Statutes Annotated, 1978, empowers the Commission to prevent waste of hydrocarbons and to protect the correlative rights of the owners of each interest in said hydrocarbons.

(11) That Section 70-2-6, New Mexico Statutes Annotated, 1978, confers jurisdiction on the Commission over all matters relating to the conservation of oil and gas.

(12) That "waste" is defined by Section 70-2-3, New Mexico Statutes Annotated, 1978.

(13) That the producing formation of the Basin-Dakota Gas Pool is comprised of various sands of low permeability and porosity which are not being efficiently and effectively drained by

existing wells in the various proration units in the pool, and which can be more efficiently and effectively drained by the drilling of additional wells pursuant to the rule changes proposed by the applicant.

(14) That the infill drilling of a second well on an established proration unit in the Basin-Dakota Gas Pool is necessary to effectively and efficiently drain a portion of the reservoir covered by the proration unit which cannot be effectively and efficiently drained by any existing wells within the proration unit.

(15) That infill drilling will substantially increase recoverable reserves from each proration unit in the Basin-Dakota Gas Pool.

(16) That infill drilling will result in greater ultimate recovery of the reserves under each of the various proration units in the pool.

(17) That infill drilling in the Basin-Dakota Gas Pool will result in more efficient use of reservoir energy and will tend to ensure greater ultimate recovery of gas from the pool, thereby preventing waste.

(18) That implementation of infill drilling in the Basin-Dakota Gas Pool will afford each operator the opportunity to produce, without waste, his just and equitable share of the gas from the Pool, and his correlative rights, as defined by Section 70-2-33, New Mexico Statutes Annotated, 1978, will not be impaired.

(19) That both wells on a proration unit should be produced so long as it is economically feasible to do so.

(20) That the application should be approved.

IT IS THEREFORE ORDERED:

(1) That Rule 2 of the Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, is hereby amended to read in its entirety as follows:

"RULE 2(A)

The initial well drilled on a proration unit shall be located not closer than 790 feet to any outer boundary of the quarter

section on which the well is located, and not closer than 130 feet to any quarter-quarter section line or subdivision inner boundary.

The initial well to be drilled on a proration unit may be drilled in either quarter section in the proration unit.

Any gas well location approved to be drilled in accordance with the location rules in effect prior to May 22, 1979, will be considered as a standard location.

In the event any such well is completed as an oil well at a location nearer than 330 feet to a governmental quarter-quarter section line, said well shall not be produced unless and until such time as the unorthodox oil well location has been approved by the Division after notice and hearing.

"RULE 2(B)

The second well drilled on a proration unit shall be located in the quarter section of the unit not containing a well, and shall be located with respect to the unit boundaries as described in Rule 2(A) above.

No Dakota infill well shall be drilled nearer than 920 feet to an existing Dakota well on the same proration unit.

The plats (OCD Form C-102) accompanying the Application for Permit to Drill (OCD Form C-101 or Federal Form 9-331-C) for the second well on a proration unit shall have outlined thereon the boundaries of the unit and shall show the location of the first well on the unit as well as the proposed new well.

"RULE 2(C)

In the event a second well is drilled on any proration unit, each well shall be produced for so long as it is economically feasible to do so."

(2) That Rule 3 of the Special Rules of the Basin-Dakota Gas Pool as promulgated by Order Nos. R-1670 and R-1670-C, as amended, is hereby amended to read in its entirety as follows:

"RULE 3

The Director of the Division shall have authority to grant an exception to the footage requirements of Rules 2(A) and 2(B), without notice and hearing where an application therefor has been filed in due form and the Director determines that such exception is necessitated by topographical conditions and good cause exists for granting such exception.

Applicants shall furnish all offset operators a copy of the application to the Division and applicant shall include with his application a list of names and addresses of all such operators, together with a written statement that proper notice has been given said operators by registered or certified mail. The Director of the Division shall wait at least 20 days before approving any such unorthodox location, and may approve such unorthodox location only in the absence of objection from any offset operator. In the event such an operator objects to the unorthodox location, the Division shall consider the matter only after proper notice and hearing."

(3) That the Special Rules for the Basin-Dakota Gas Pool as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 9:

RULE 9(A)

The product obtained by multiplying each proration unit's acreage factor by the calculated deliverability (expressed as MCF per day) for the well(s) on the unit shall be known as the AD Factor for the unit. The acreage factor shall be

determined to the second decimal place by dividing the acreage within the proration unit by 320, provided however, that a unit containing from 316 acres to 324 acres shall be considered a standard unit. The AD Factor shall be computed to the nearest whole number.

RULE 9(B)

The monthly allowable to be assigned to each marginal proration unit shall be equal to its latest available monthly production.

RULE 9(C)

The pool allowable remaining each month after deducting the total allowable assigned to marginal proration units shall be allocated among the non-marginal units entitled to an allowable in the following manner:

(1) Forty percent (40%) of the pool allowable remaining to be allocated to non-marginal units shall be allocated among such units in the proportion that each unit's "AD Factor" bears to the total "AD Factor" for all non-marginal units in the pool.

(2) Sixty percent (60%) of the pool allowable remaining to be allocated to non-marginal units shall be allocated among such units in the proportion that each unit's acreage factor bears to the total acreage factor for all non-marginal units in the pool.

RULE 9(D)

The current deliverability tests, taken in accordance with the "Gas Well Testing Rules and Procedures - San Juan Basin, New Mexico," shall be used in calculating allowables for the proration units in the pool for the 12-month period beginning April 1 of the following year.

RULE 9(E)

When calculating the allowable for a proration unit containing two wells in accordance with Rule 9 of these rules, the deliverability of both wells shall be added in calculating the AD Factor and the unit allowable may be produced from both wells.

(4) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rules 10(C) and 10(D):

RULE 10(C)

The calculated deliverability at the "deliverability pressure" shall be determined in accordance with the provisions of the current "Gas Well Testing Rules and Procedures - San Juan Basin, New Mexico."

No well shall be eligible for reclassification to "Exempt Marginal" status unless it is located on a marginal proration unit.

RULE 10(D)

Within ninety (90) days after gas from the second well on the unit is first delivered to a gas transportation facility, both wells on the unit shall have been tested in accordance with "Gas Well Testing Rules and Procedures - San Juan Basin, New Mexico" and the results of the tests filed with the Division's Aztec office and with the gas transportation facility to which the well is connected. If a test for the current test period has previously been filed for the first well on the unit, a second test of said well will not be required. Both tests will be treated as Initial Tests for purposes of assigning allowables to the unit. This rule shall apply to newly completed wells.

(5) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 12:

RULE 12

The full production of gas from each well, including drilling gas, shall be charged against the proration unit's allowable regardless of the disposition of the gas; provided, however, that gas used in maintaining the producing ability of the well shall not be charged against the allowable.

(6) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 14:

RULE 14(A)

Underproduction: Any non-marginal proration unit which has an underproduced status as of the end of a gas proration period shall be allowed to carry such underproduction forward into the next gas proration period and may produce such underproduction in addition to the allowable assigned during such succeeding period. Any allowable carried forward into a gas proration period and remaining unproduced at the end of such gas proration period shall be cancelled.

RULE 14(B)

Production during any one month of a gas proration period in excess of the allowable assigned to a proration unit for such month shall be applied against the underproduction carried into such period in determining the amount of allowable, if any, to be cancelled.

(7) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended,

are hereby amended by the addition of the following Special Rule 15:

RULE 15(A)

Overproduction: Any proration unit which has an overproduced status as of the end of a gas proration period shall carry such overproduction forward into the next gas proration period. Said overproduction shall be made up during the succeeding gas proration period. Any unit which has not made up the overproduction carried into a gas proration period by the end of said period shall not be produced until such overproduction is made up.

RULE 15(B)

If, during any month, it is discovered that a proration unit is overproduced in an amount exceeding six times its average monthly allowable for the preceding twelve months (or, in the case of a newly connected proration unit, six times its average monthly allowable for the months available), it shall not be produced that month nor each succeeding month until it is overproduced in an amount six times or less its average monthly allowable, as determined hereinabove.

RULE 15(C)

Allowable assigned to a proration unit during any one month of a gas proration period in excess of the production for the same month shall be applied against the overproduction chargeable to such unit in determining the amount of overproduction which must be made up pursuant to the provisions of Rule 15(A) or 15(B) above.

RULE 15(D)

The Director of the Division shall have authority to permit a proration unit which is subject to shut-in, pursuant to

Rules 15(A) or 15(B) above, to produce up to 500 MCF of gas per month upon proper showing to the Director that complete shut-in would cause undue hardship, provided however, such permission shall be rescinded for any proration unit produced in excess of the monthly rate authorized by the Director.

RULE 15(E)

The Division may allow overproduction to be made up at a lesser rate than permitted under Rules 15(A), 15(B), or 15(D) above, upon a showing at public hearing that the same is necessary to avoid material damage to the unit well(s).

RULE 15(F)

Any allowable accruing to a proration unit at the end of a gas proration period due to the cancellation of underage in the pool and the redistibution thereof shall be applied against the unit's overproduction.

RULE 15(G)

The Director of the Division shall have authority to grant a pool-wide moratorium of up to three months on the shutting in of gas wells in a pool during periods of high-demand emergency upon proper showing that such emergency exists, and that a significant number of the wells in the pool are subject to shut-in pursuant to the provisions of Rules 15(A) or 15(B) above. No moratorium beyond the aforementioned three months shall be granted except after notice and hearing.

(8) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Section E:

E. CLASSIFICATION OF UNITS

RULE 16(A)

The proration period (as defined in Rule 13) shall be divided into four classification periods of three months each, commencing on April 1, July 1, October 1, and January 1. After the production data is available for the last month of each classification period, any unit which had an underproduced status at the beginning of the proration period shall be classified marginal if its highest single month's production during the classification period is less than its average monthly allowable during said classification period; provided however, that the operator of any unit so classified, or other interested party, shall have 15 days after receipt of notification of marginal classification in which to submit satisfactory evidence to the Division that the unit is not of marginal character and should not be so classified.

RULE 16(B)

The Director may reclassify a marginal or non-marginal proration unit at any time the unit's production data, deliverability data, or other evidence as to the unit's producing ability justifies such reclassification.

RULE 17

A proration unit which is classified as marginal shall not be permitted to accumulate underproduction, and any underproduction accrued to the unit prior to its classification as marginal shall be cancelled.

RULE 18

If, at the end of a proration period, a marginal proration unit has produced more than the total allowable for the

period assigned to a non-marginal unit of like deliverability and acreage, the marginal unit shall be reclassified non-marginal and its allowable and net status adjusted accordingly. (If the unit has been classified as marginal for one proration period only, or a portion of one proration period only, any under-production cancelled as the result of such classification shall be reinstated upon reclassification back to non-marginal status. All uncompensated-for overproduction accruing to the unit while marginal shall be chargeable upon reclassification to non-marginal.)

RULE 19

A proration unit containing a well which has been reworked or recompleted shall be classified non-marginal as of the date of reconnection of the well to a pipeline until such time as production data, deliverability data, or other evidence as to the unit's producing ability indicates that the unit should be classified marginal.

RULE 20

All proration units not classified marginal shall be classified non-marginal.

(9) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 21(A):

F. REPORTING OF PRODUCTION

RULE 21(A)

The monthly gas production from each well shall be metered separately and the gas production therefrom shall be reported to the Division on Form C-115 in accordance with Rule 1115 of the Division's Rules and Regulations, so as

to reach the Division on or before the 24th day of the month next succeeding the month in which the gas reported was produced. The operator shall show on such report what disposition has been made of the gas produced. The sum of the production from both wells on the proration unit shall also be reported for multiple-well units.

(10) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rules 22 and 23.

G. GENERAL

RULE 22

No gas, either dry gas or casinghead gas, produced from the Basin-Dakota Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Division after notice and hearing.

RULE 23

Failure to comply with the provisions of this order or the rules contained herein shall result in the cancellation of allowable assigned to the affected proration unit. No further allowable shall be assigned to the affected unit until all rules and regulations are complied with. The Division Director shall notify the operator of the unit and the purchaser, in writing, of the date of allowable cancellation and the reason therefor.

(11) That the effective date of this order shall be July 1, 1979.

(12) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

ALEX J. ARMIJO, Member

EMERY C. ARNOLD, Member

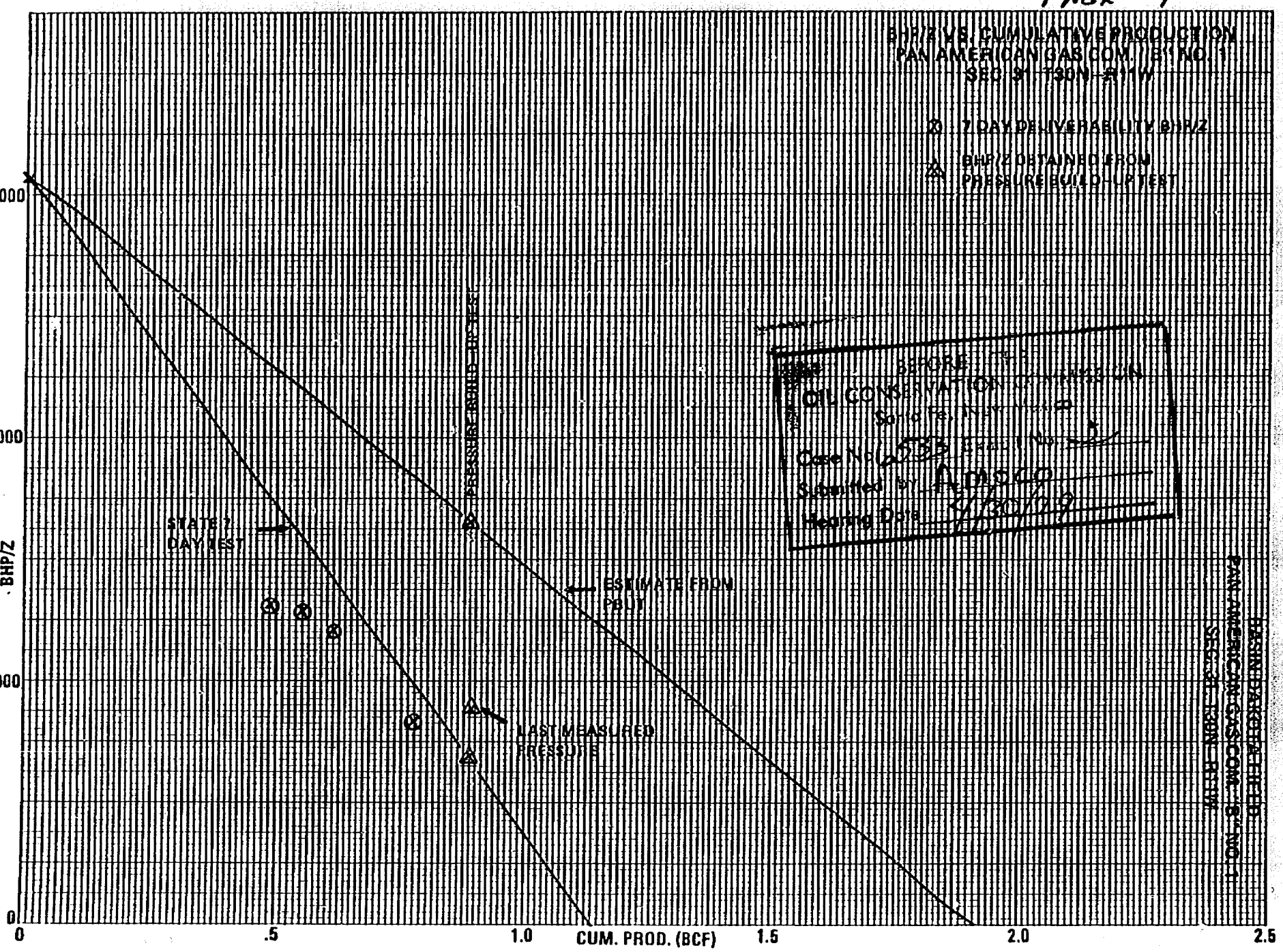
JOE D. RAMEY, Member & Secretary

S E A L

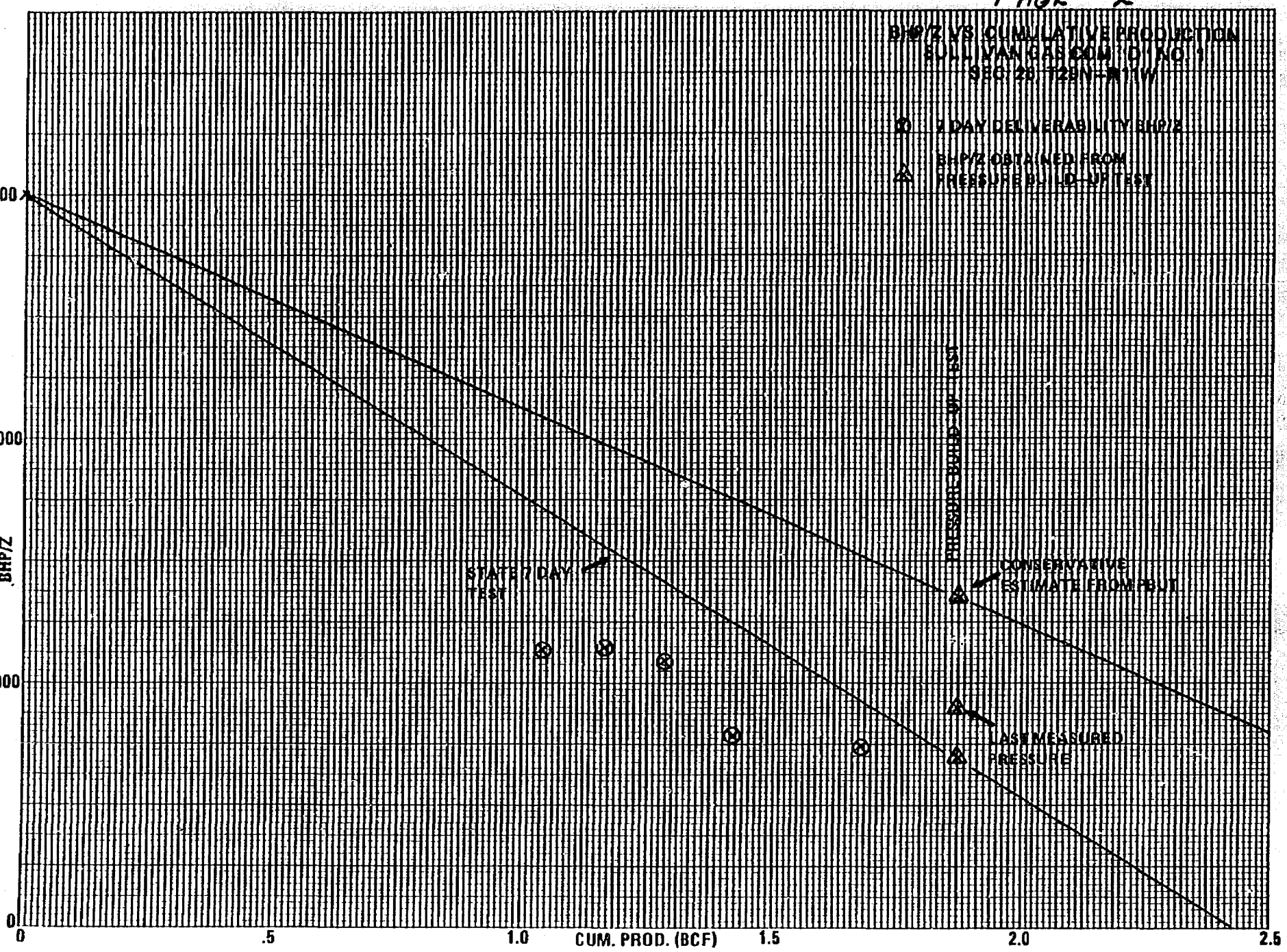
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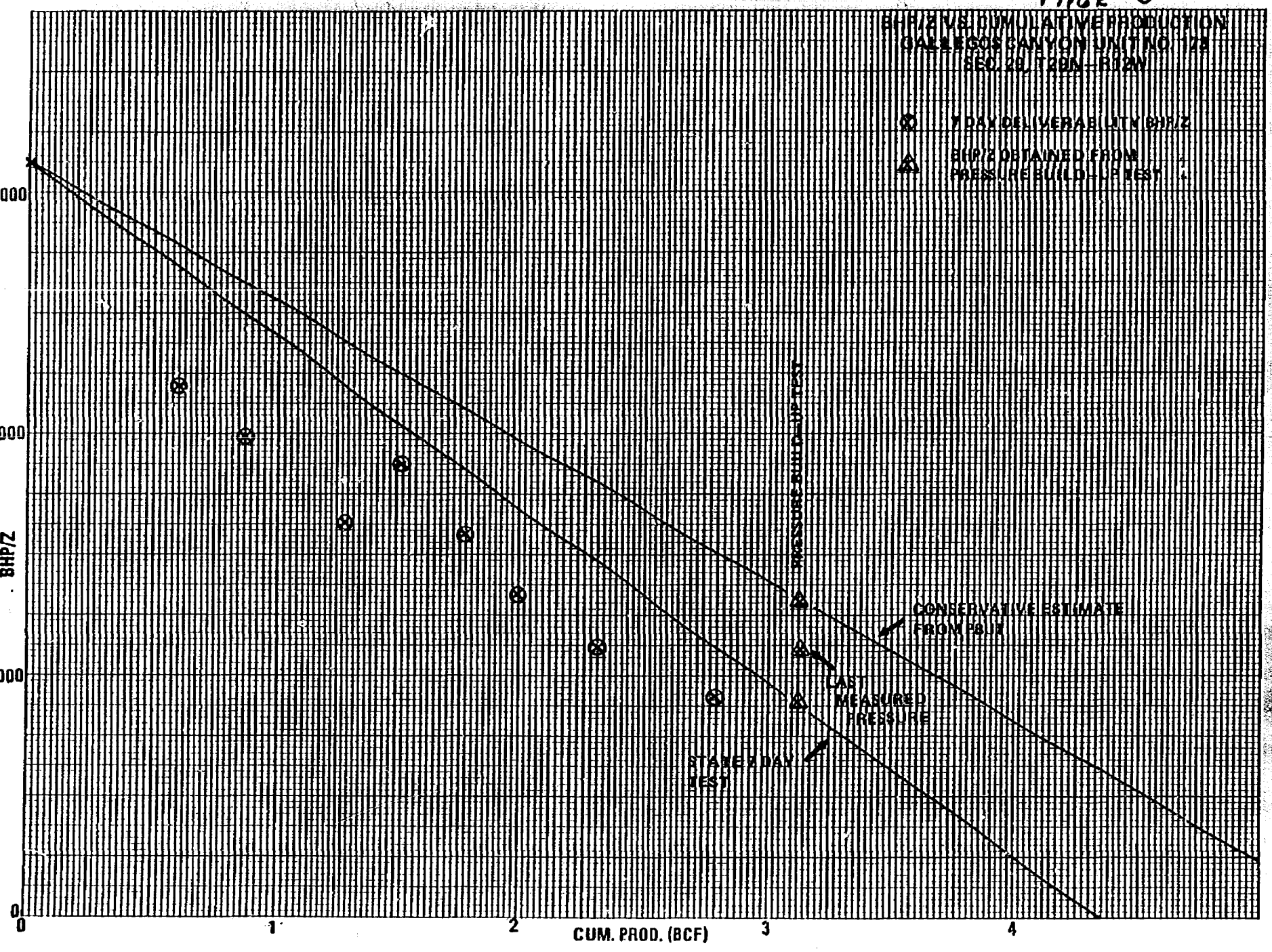
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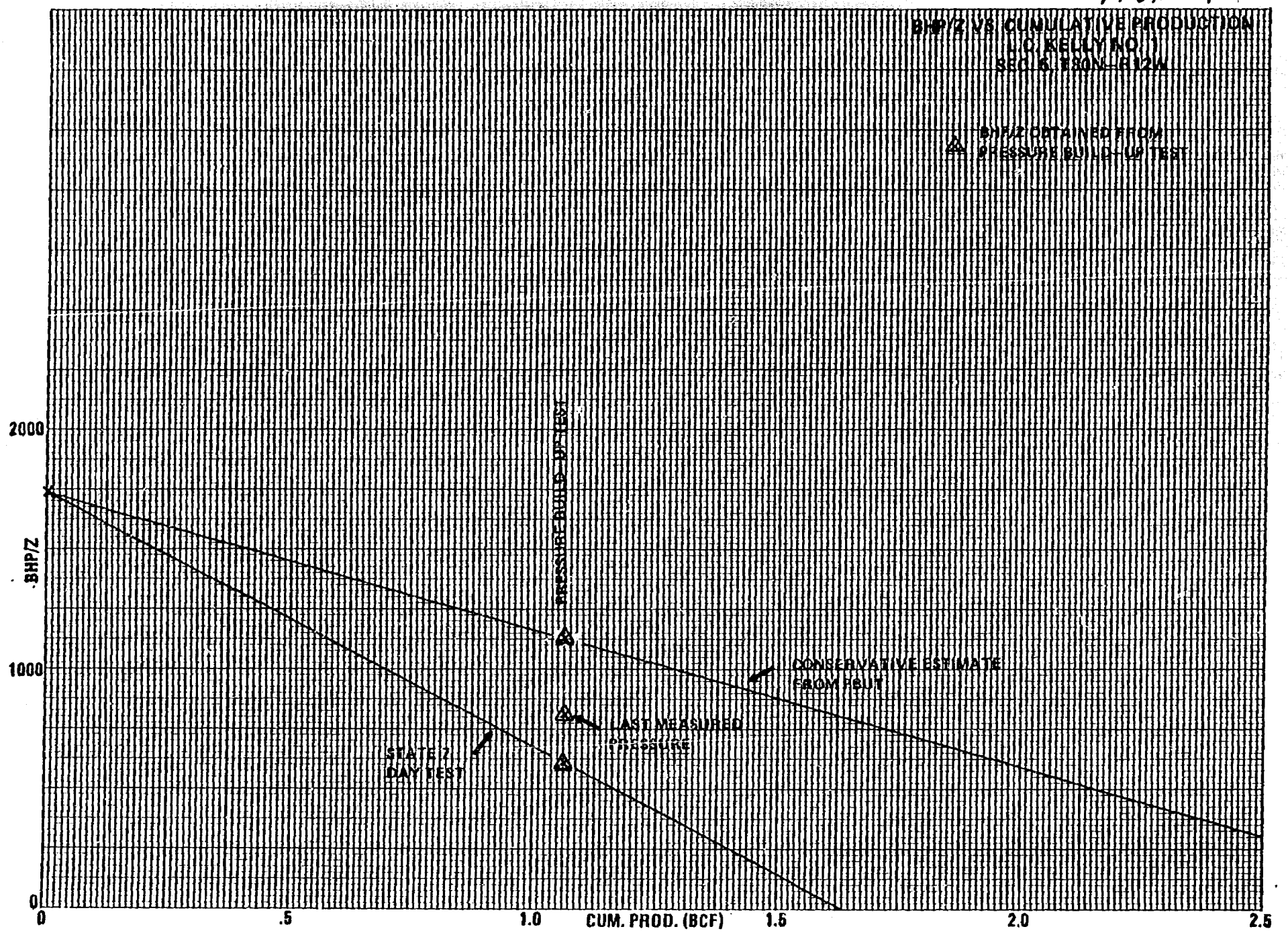
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RADIAL TIGHT GAS RESERVOIR MODEL

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6533 Exhibit No. 3
Submitted by Amoco
Hearing Date 4/30/79

INPUT DATA

NET PAY
WATER SATURATION
POROSITY
SKIN FACTOR
INITIAL PRESSURE
TEMPERATURE
GAS GRAVITY
LINE PRESSURE
WELLBORE RADIUS
DEPTH
TUBING I.D.
PRESSURE – VISCOSITY – COMPRESSIBILITY RELATIONSHIP

VARIABLES

SPACING
PERMEABILITY

MATCH POINT PARAMETERS

PRODUCING TIME
CUMULATIVE PRODUCTION
PRODUCING RATE

FUTURE PERFORMANCE DATA OBTAINED AT VARIOUS TIMES

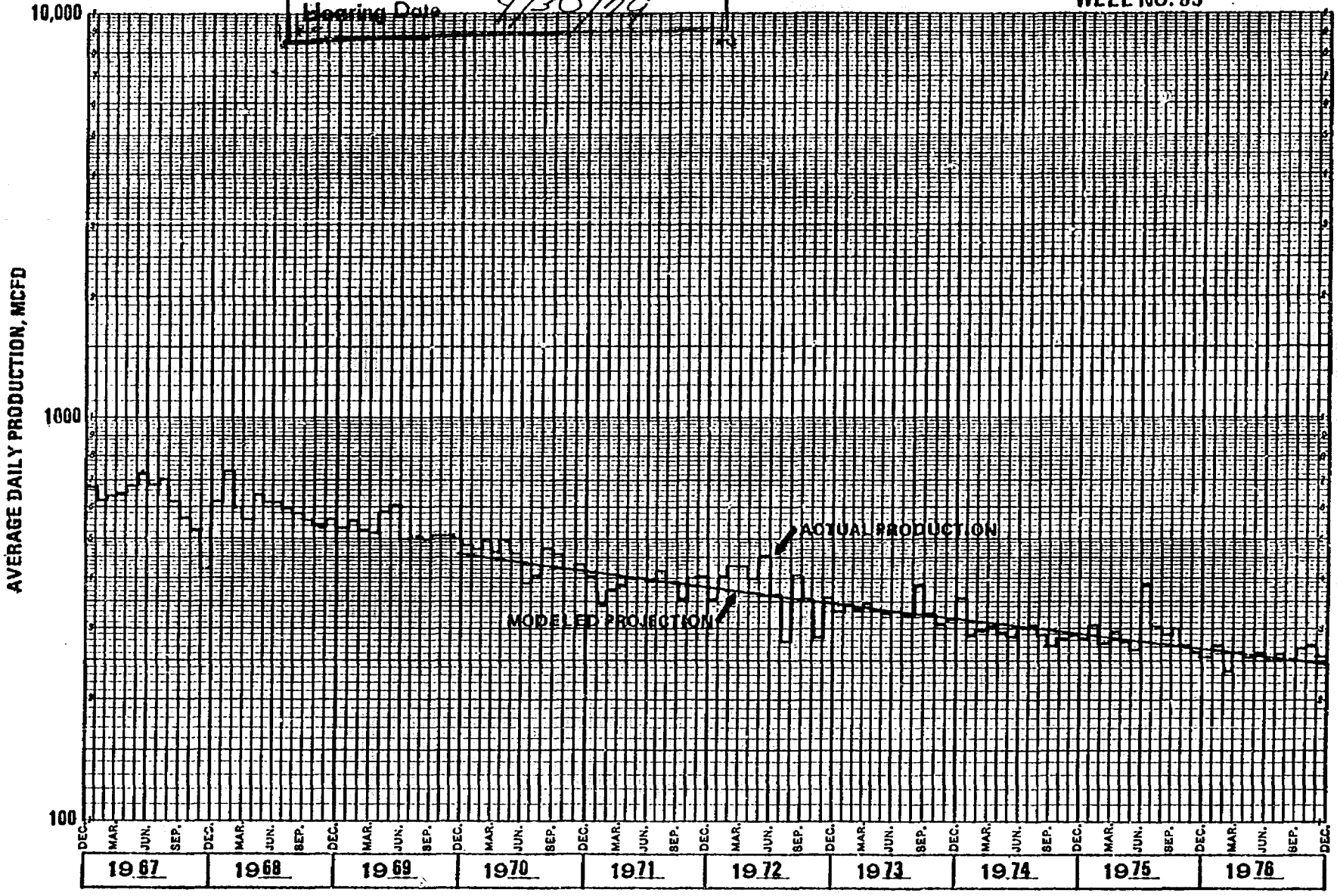
PRODUCING RATES
CUMULATIVE PRODUCTION
RESERVOIR PRESSURE

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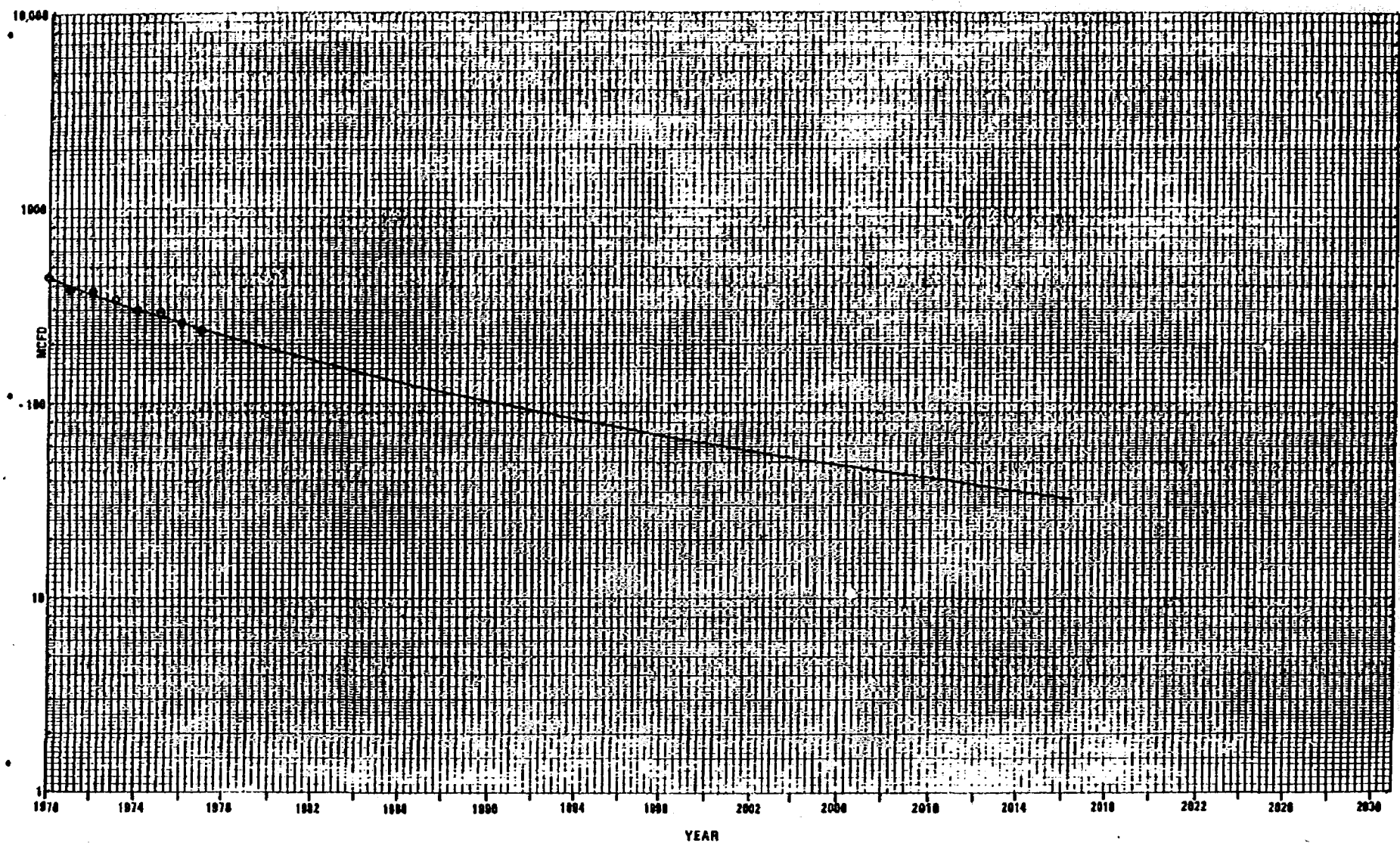
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BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6533 Exhibit No. 4
Submitted by AMOCO
Hearing Date 4/30/79

COMPARISON OF MODELED HISTORY MATCH AND ACTUAL PRODUCTION GALLEGOS CANYON UNIT WELL NO. 93

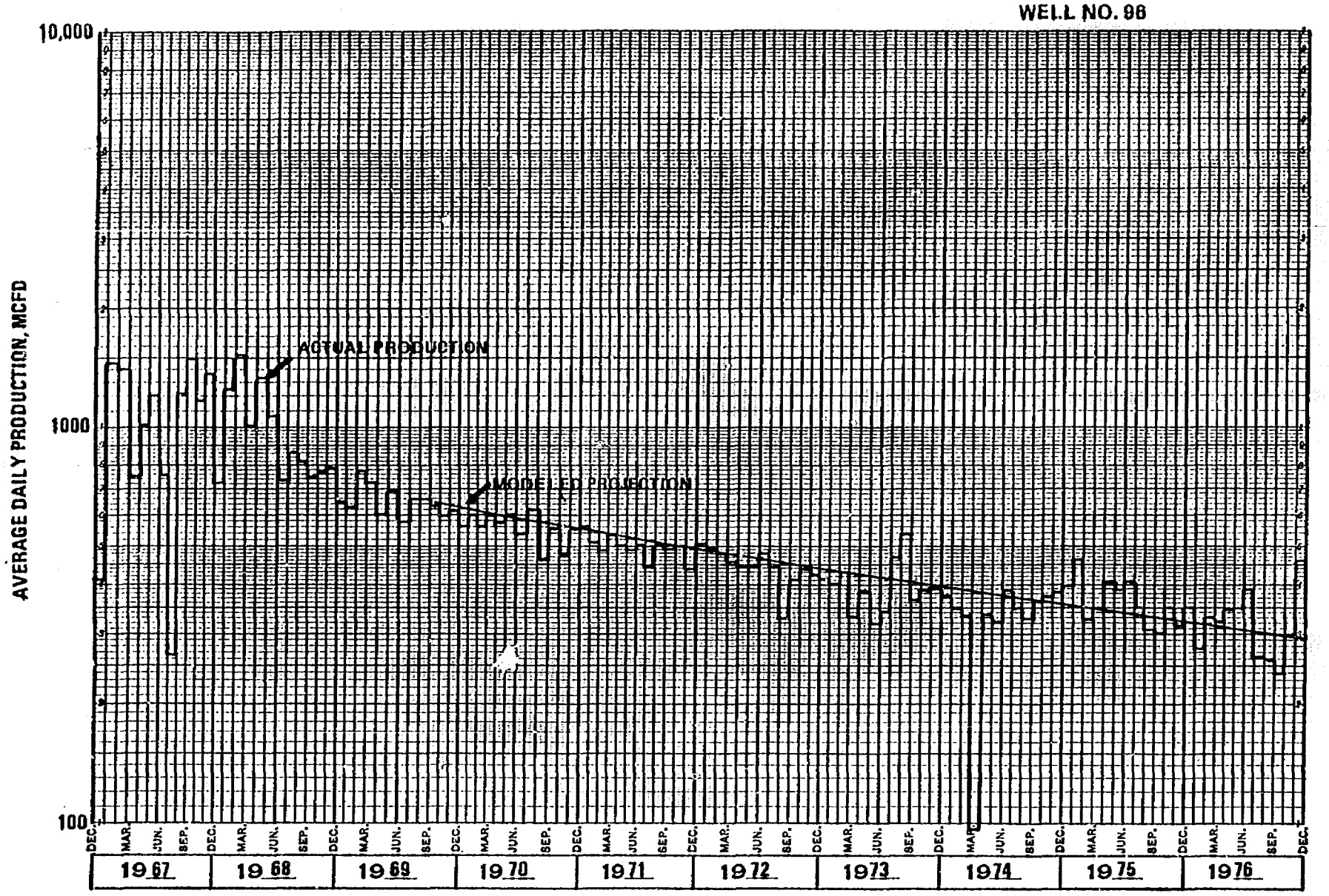


GALLEGOS CANYON UNIT NO. 93
36E–29N–12W

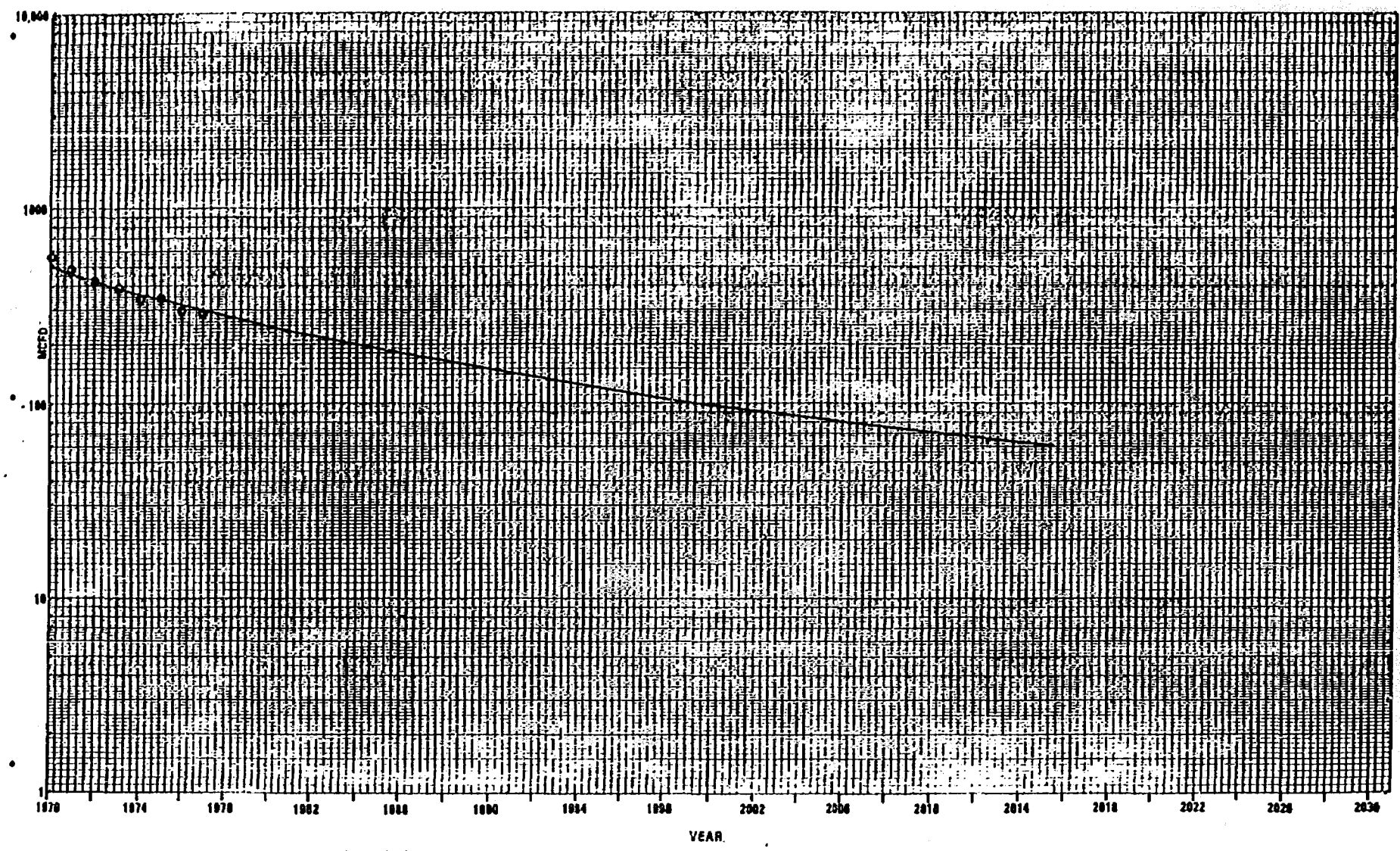


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COMPARISON OF MODELED HISTORY MATCH AND ACTUAL PRODUCTION GALLEGOS CANYON UNIT WELL NO. 98

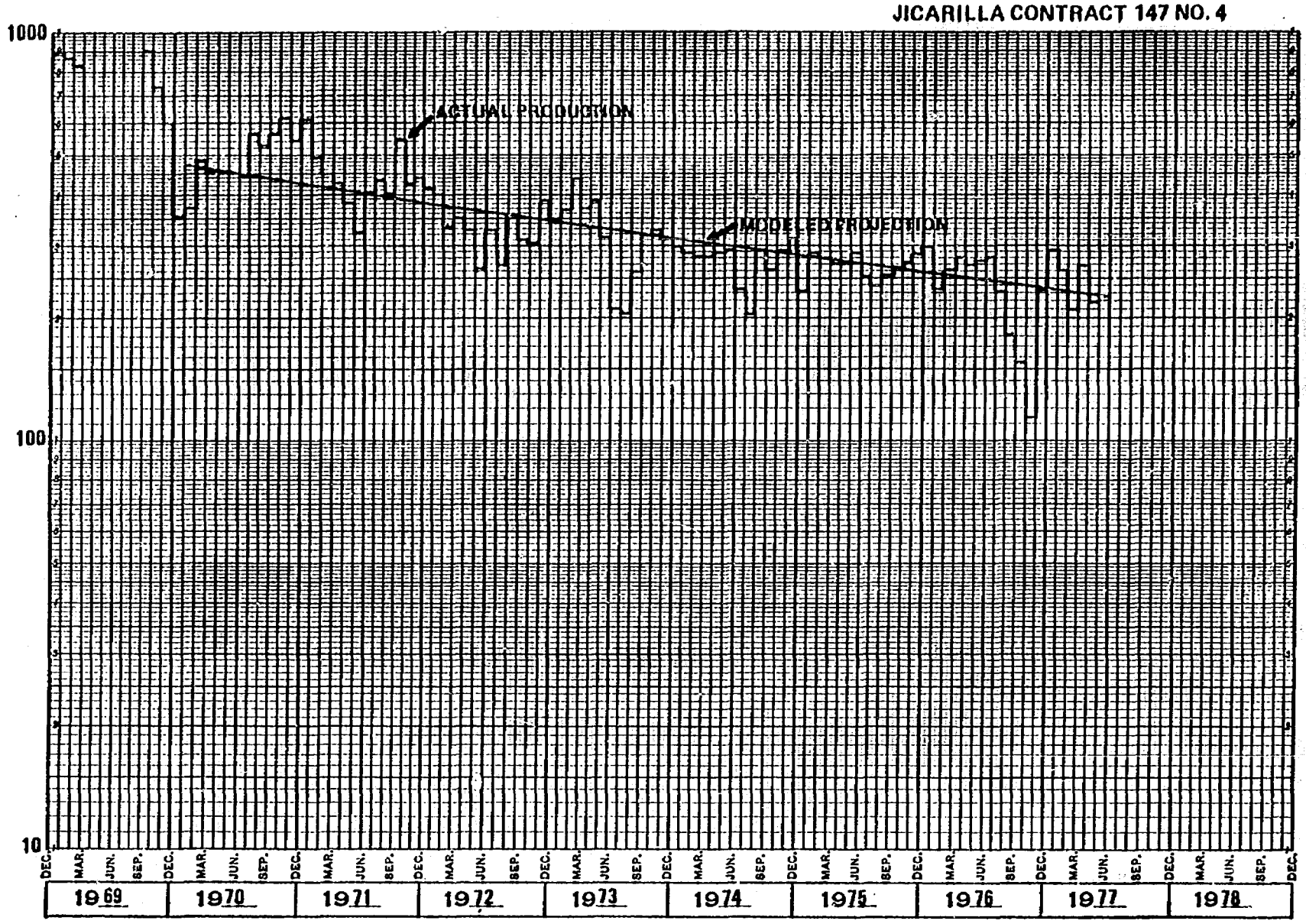


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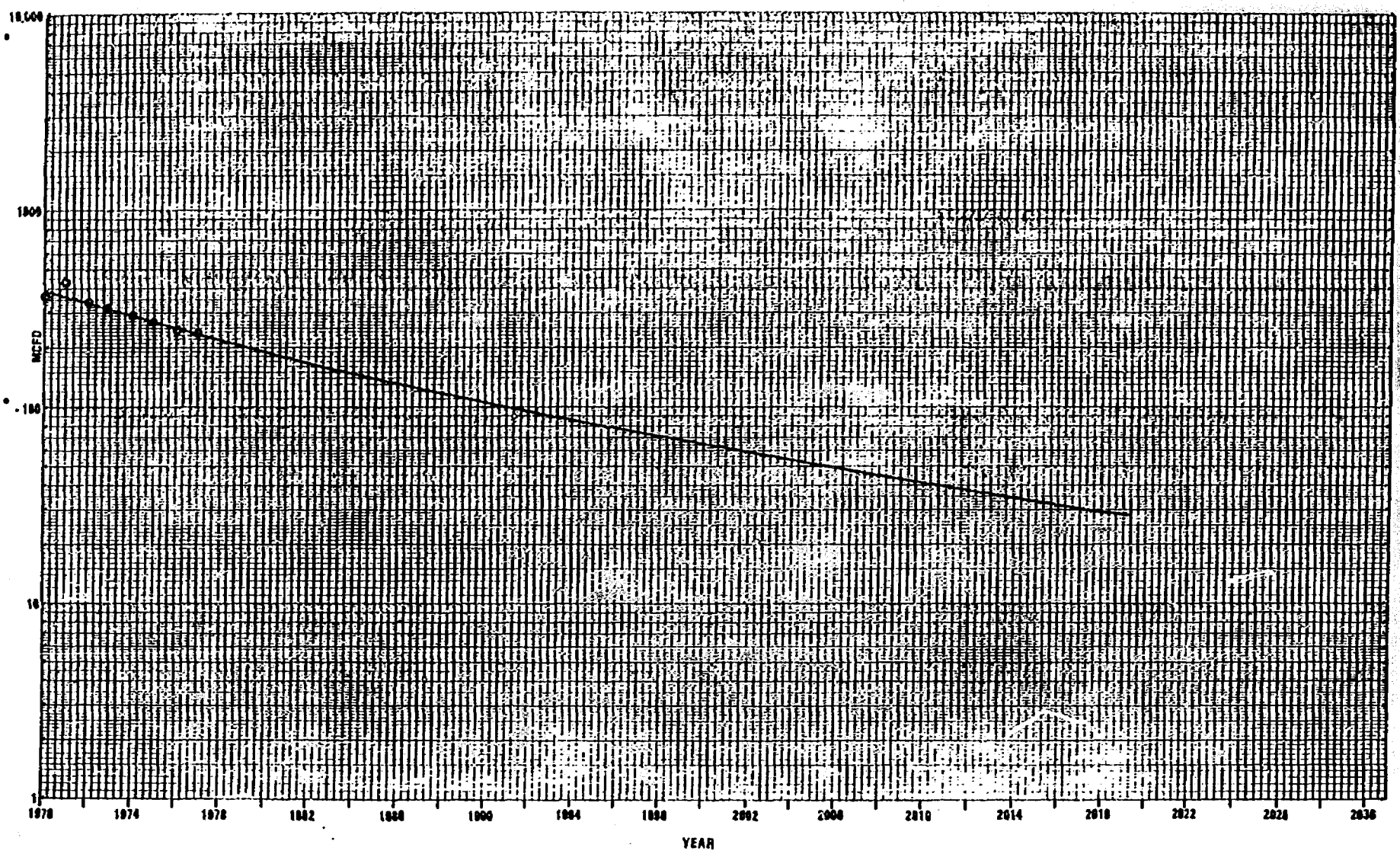


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COMPARISON OF MODELED HISTORY MATCH AND ACTUAL PRODUCTION BASIN DAKOTA JICARILLA CONTRACT 147 NO. 4

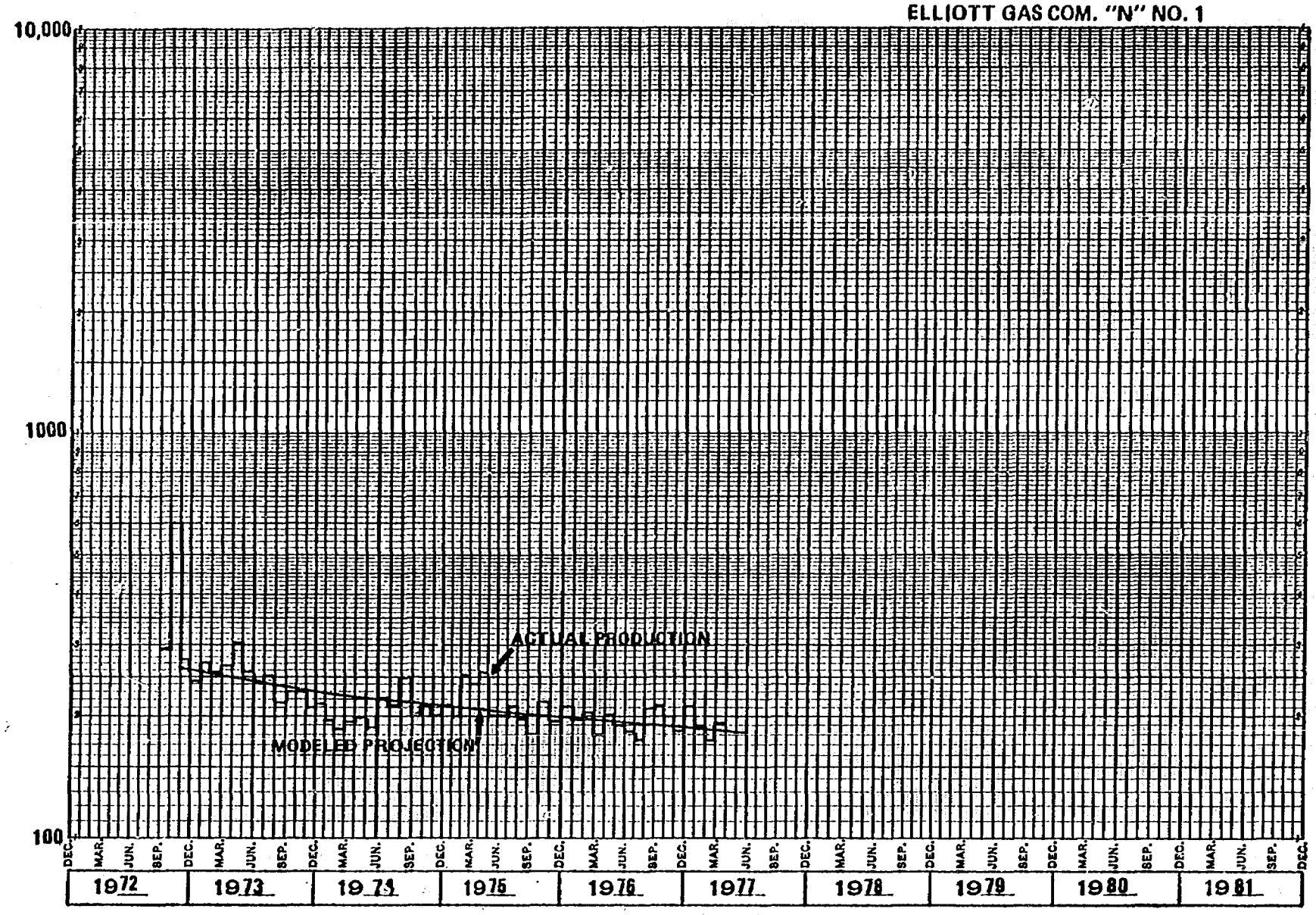


JICARILLA 147–4
5A–26N–5W

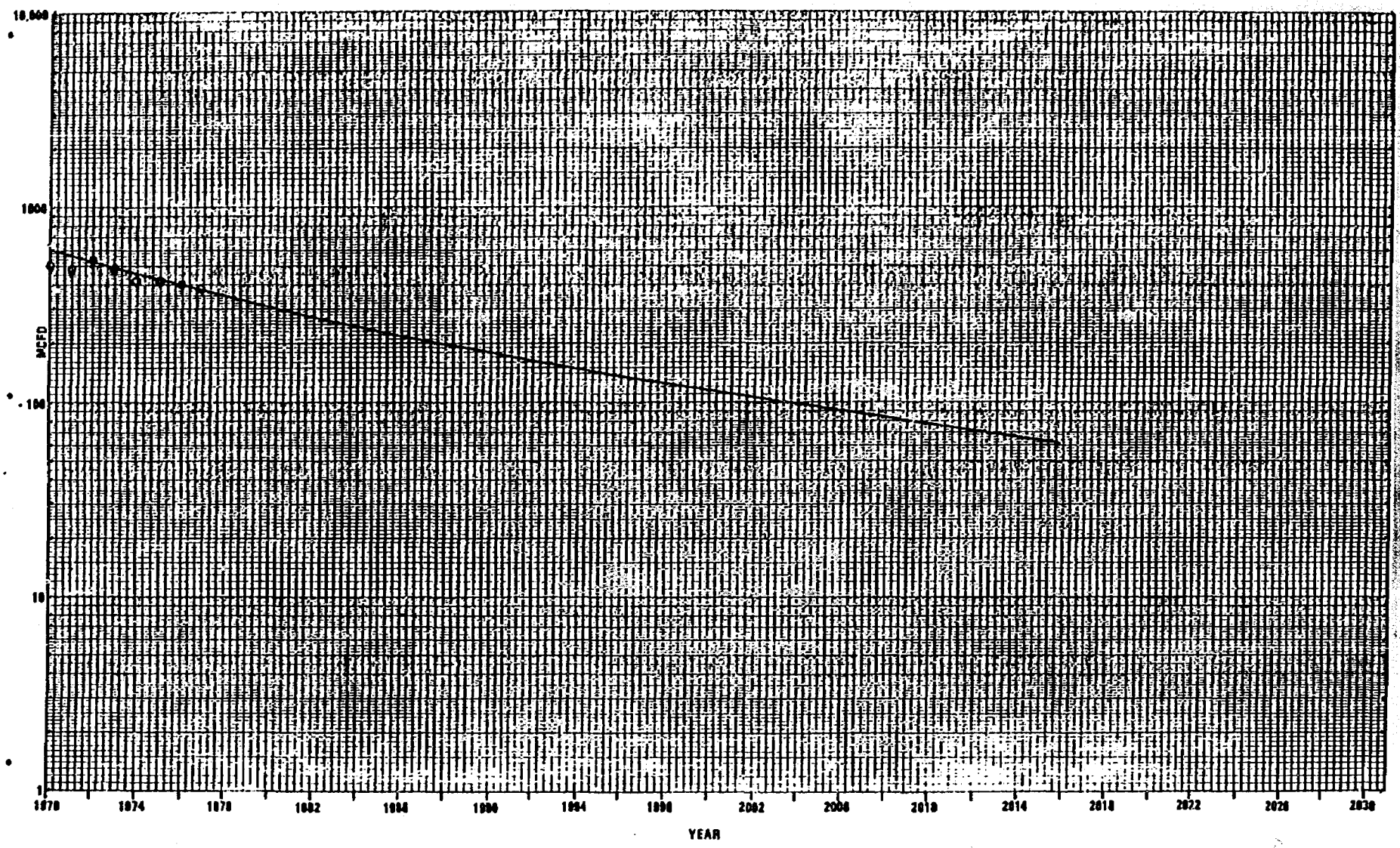


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COMPARISON OF MODELED HISTORY MATCH AND ACTUAL PRODUCTION BASIN DAKOTA ELLIOTT GAS COM. "N" NO. 1



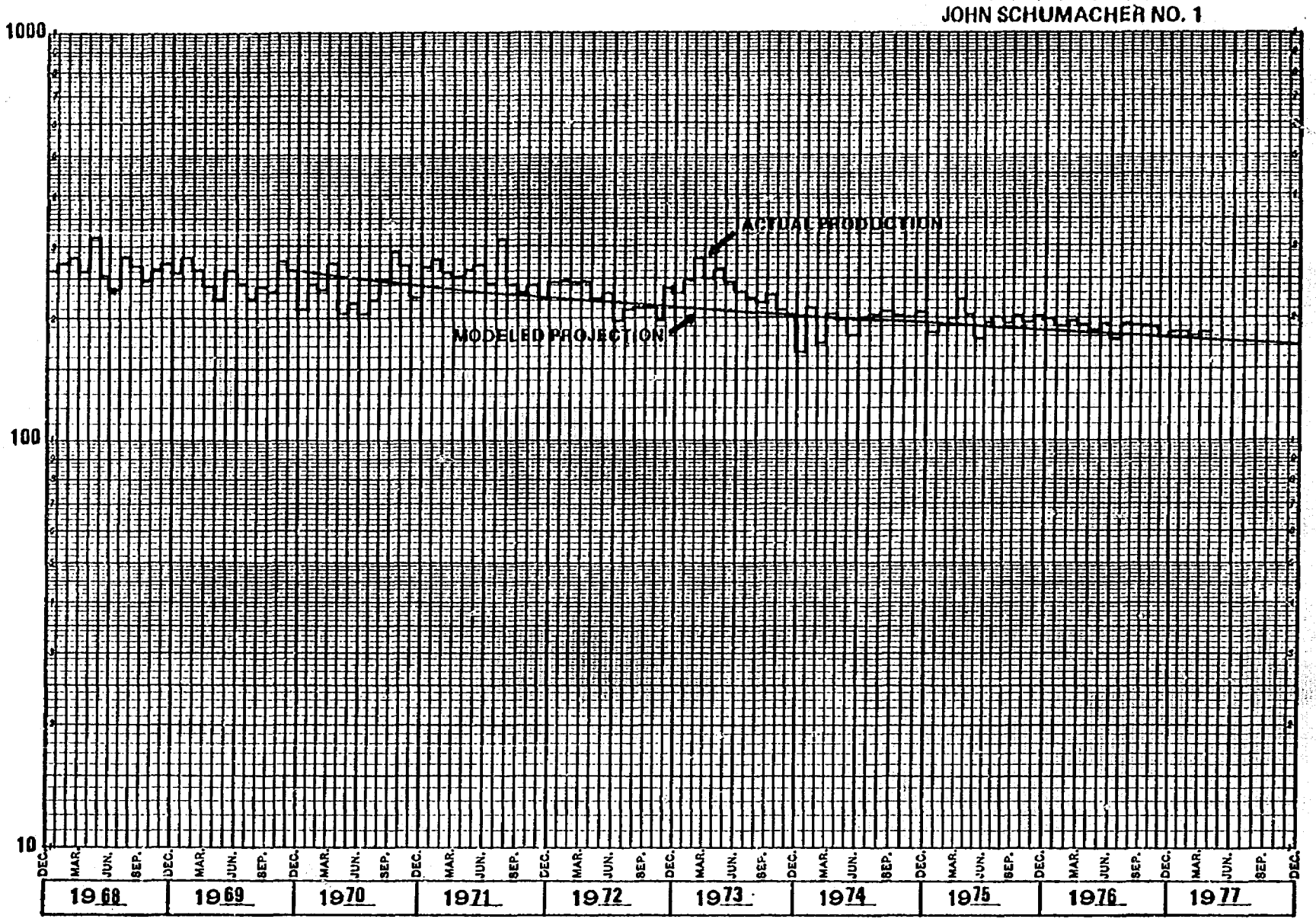
ELLIOTT GAS COM N NO. 1
33I–30N–9W



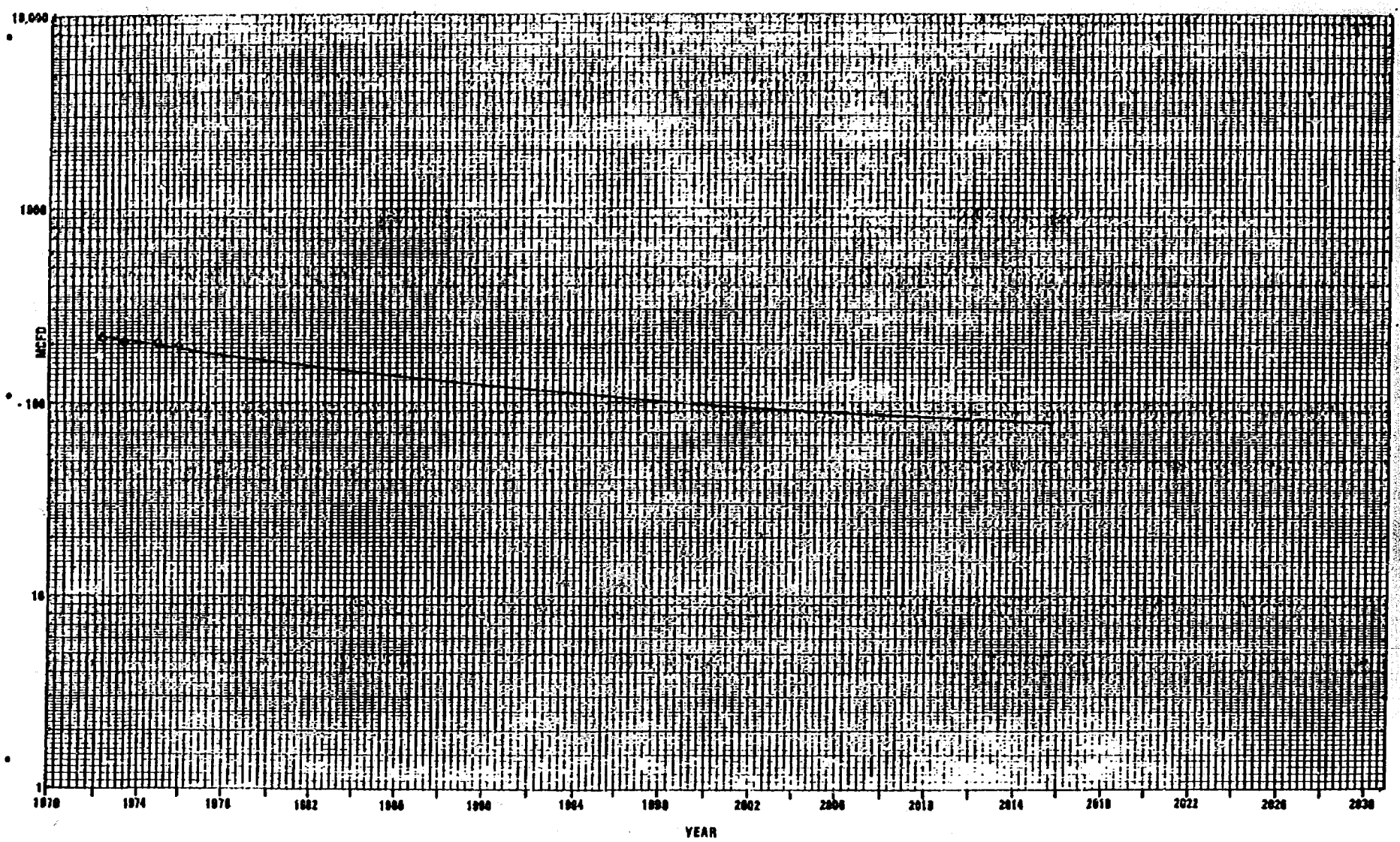
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COMPARISON OF MODELED HISTORY MATCH AND ACTUAL PRODUCTION BASIN DAKOTA JOHN SCHUMACHER NO. 1



SCHUMACHER NO. 1
8G–30N–12W



BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6533 Exhibit No. 5
Submitted by AMOCO
Hearing Date 4/30/79

BASIN DAKOTA FIELD

RESULTS OF MODELED DATA

WELL LIFE	RECOVERY (320 ACRE)	DRAINAGE AREA	RECOVERABLE RESERVES	UNDRAINED AREA	SECOND WELL RECOVERABLE RESERVES	70% OF SECOND WELL, RECOVERABLE RESERVES
101 YEARS	48%	195 ACRES	4.2 BCF	125 ACRES	2.68 BCF	1.88 BCF*
50 YEARS	40%	163 ACRES	3.5 BCF	157 ACRES	3.36 BCF**	2.36 BCF

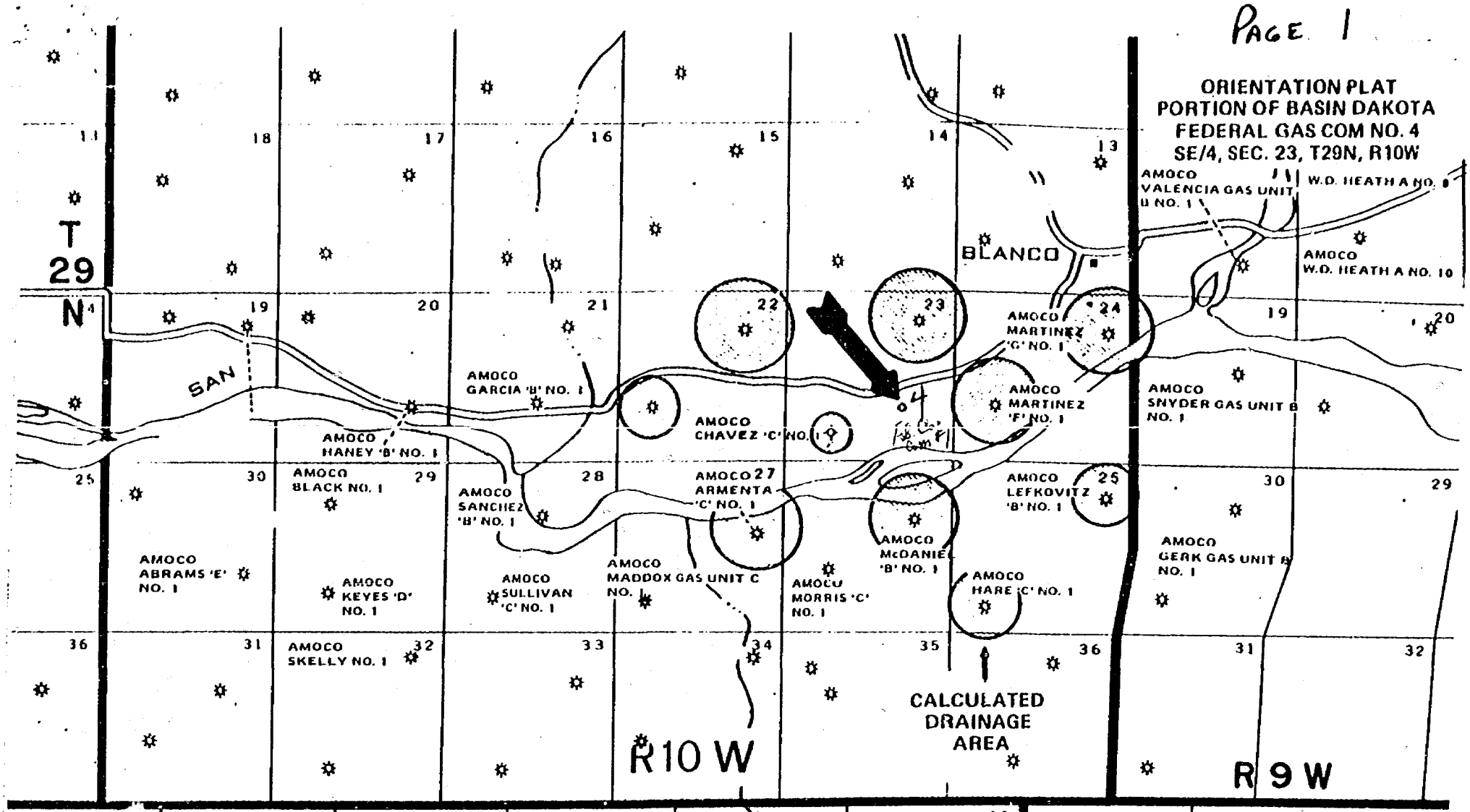
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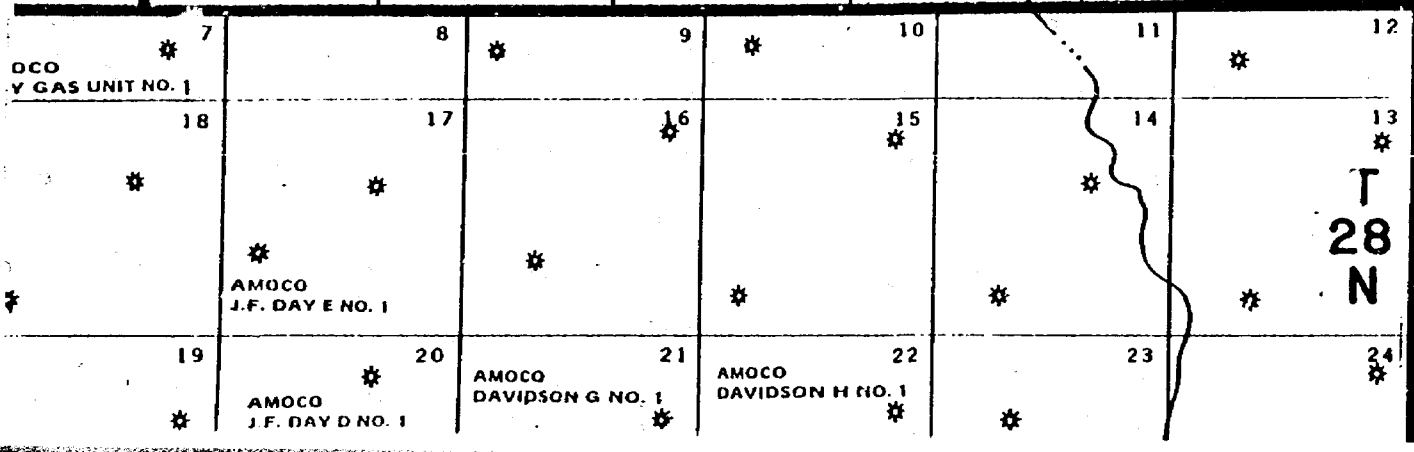
*ASSUMING 1 FOR 1 DRILLING @ 1.88 BCF/WELL ⟶ 4.6 TCF ADDITIONAL RECOVERABLE RESERVES FOR ENTIRE FIELD.

**ASSUMING 1 FOR 1 DRILLING @ 3.36 BCF/WELL ⟶ 8.2 TCF ADDITIONAL RECOVERABLE RESERVES FOR ENTIRE FIELD.

CONCLUSION: THIS SHOWS FIELD RESERVES WILL BE INCREASED BY INFILL DRILLING AT LEAST 4.6 TCF AND POSSIBLY AS MUCH AS 8.2 TCF

ORIENTATION PLAT
PORTION OF BASIN DAKOTA
FEDERAL GAS COM NO. 4
SE/4, SEC. 23, T29N, R10W





BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6533 Exhibit No. 6
Submitted by Amoco
Hearing Date 4/20/79

FEDERAL GAS COM NO. 4

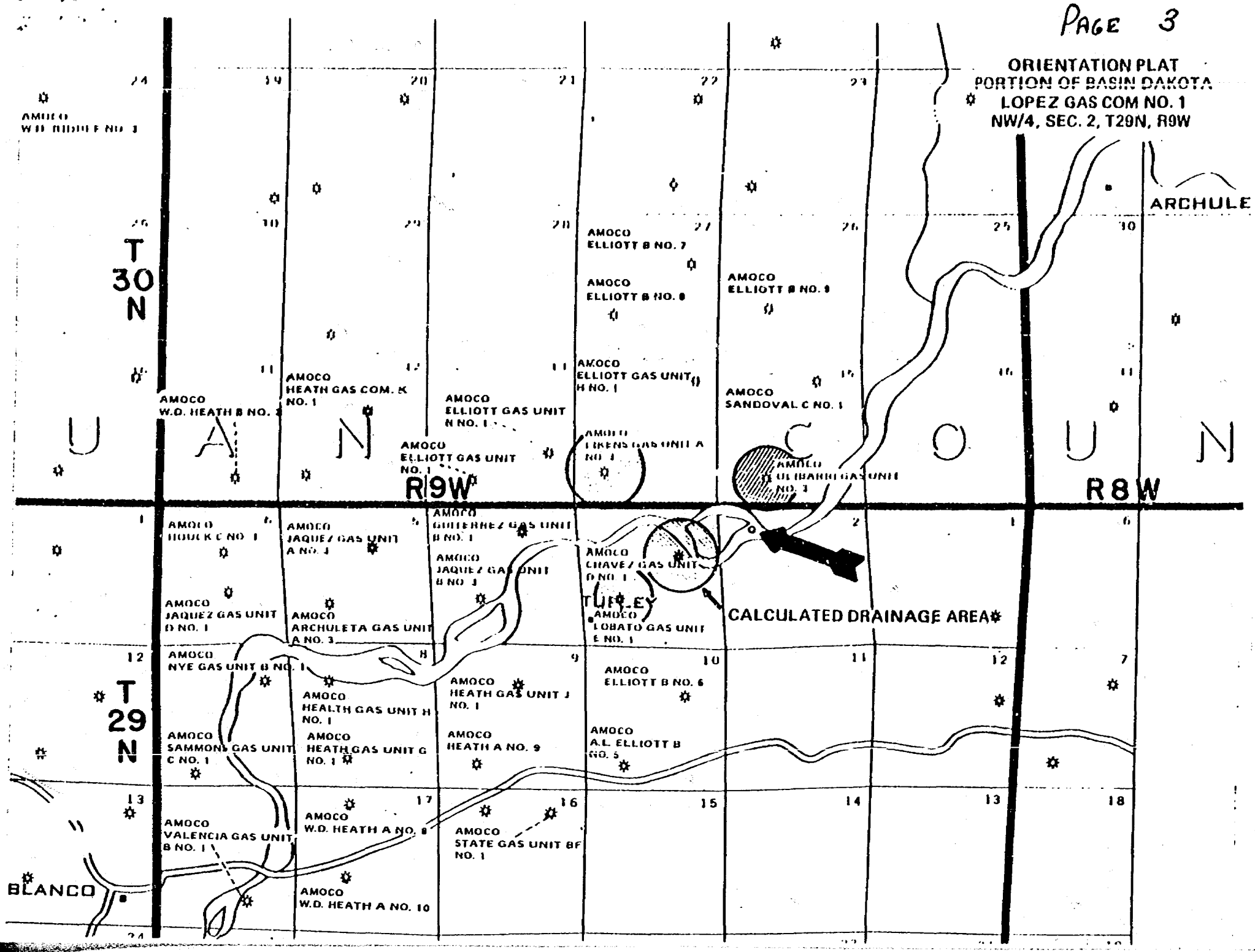
SAN JUAN COUNTY, NEW MEXICO

PERFORATIONS: 6442'–6600'

PRESSURE BOMB SET AT 6450'

TIME (HRS.)	PRESSURE (PSIG)
1	1907
10	2162
20	2257
30	2307
40	2352
50	2384
60	2414
70	2438
80	2455
90	2473
100	2486
110	2500
120	2518
130	2534
140	2552
150	2569

ORIENTATION PLAT
PORTION OF BASIN DAKOTA
LOPEZ GAS COM NO. 1
NW/4, SEC. 2, T29N, R9W



LOPEZ GAS COM NO. 1

SAN JUAN COUNTY, NEW MEXICO

PERFORATIONS: 6616'--6738'

PRESSURE BOMB SET AT 6730'

TIME (HRS.)	PRESSURE (PSIG)
1	1513
10	1873
20	1910
30	1934
40	1960
50	1968
60	1974
70	1979
80	1979
90	1979
100	1982
110	1982

EXHIBIT #1

RULE CHANGES PROPOSED BY EL PASO NATURAL GAS COMPANY
TO ORDER NO. R-1670, AS SUPPLEMENTED BY ORDER NO. R-1670-C,
APPLICABLE TO BASIN DAKOTA GAS POOL.

A. WELL LOCATION AND ACREAGE REQUIREMENTS

Rule 2(A) The inital well drilled on a proration unit shall be located not closer than 790 feet to any outer boundary of the quarter section on which the well is located, and not closer than 130 feet to any quarter-quarter section line or subdivision inner boundary.

Any gas well location approved to be drilled in accordance with the location rules in effect prior to the date of this order will be considered as a standard location.

In the event any such well is completed as an oil well at a location nearer than 330 feet to a governmental quarter-quarter section line, said well shall not be produced unless and until such time as the unorthodox oil well location has been approved by the Division after notice and hearing.

Rule 2(B) The second well drilled on a proration unit shall be located in the quarter section of the unit not containing a well, and shall be located with respect to the unit boundaries as described in Rule 2(A) above.

No Dakota infill well shall be drilled nearer than 920 feet to an existing Dakota well on the same proration unit.

The plats (OCD Form C-102) accompanying the Application for Permit to Drill (OCD Form C-101

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6533 Exhibit No. 1
Submitted by El Paso
Hearing Date 6-30-49

1-1

or Federal Form 9-331-C) for the second well on a proration unit shall have outlined thereon the boundaries of the unit and shall show the location of the first well on the unit as well as the proposed new well.

Rule 2(C) In the event a second well is drilled on any proration unit, both wells shall be produced for so long as it is economically feasible to do so.

Rule 3 The Director of the Division shall have authority to grant an exception to the footage requirements of Rules 2(A) and 2(B), without notice and hearing where an application therefor has been filed in due form and the Director determines that such exception is necessitated by topographical conditions and good cause exists for granting such exception.

Applicants shall furnish all offset operators and all operators within the section in which the subject well is located a copy of the application to the Division and applicant shall include with his application a list of names and addresses of all such operators, together with a stipulation that proper notice has been given said operators at the addresses given. The Director of the Division shall wait at least 20 days before approving any such unorthodox location, and may approve such unorthodox location only in the absence of objection from any offset operator or any operator within the section in which the well is located. In the event such an operator

objects to the unorthodox location, the Division shall consider the matter only after proper notice and hearing.

C. ALLOCATION AND GRANTING OF ALLOWABLES

Rule 9(A) The product obtained by multiplying each proration unit's acreage factor by the calculated deliverability (expressed as MCF per day) for the well(s) on the unit shall be known as the AD Factor for the unit. The acreage factor shall be determined to the second decimal place by dividing the acreage within the proration unit by 320, subject to the acreage tolerances provided in Rule 5(A). The AD Factor shall be computed to the nearest whole number.

Rule 9(B) The monthly allowable to be assigned to each marginal proration unit shall be equal to its latest available monthly production.

Rule 9(C) The pool allowable remaining each month after deducting the total allowable assigned to marginal proration units shall be allocated among the non-marginal units entitled to an allowable in the following manner:

(1) Forty percent (40%) of the pool allowable remaining to be allocated to non-marginal units shall be allocated among such units in the proportion that each unit's "AD Factor" bears to the total "AD Factor" for all non-marginal units in the pool.

(2) Sixty percent (60%) of the pool allowable remaining to be allocated to non-marginal units

shall be allocated among such units in the proportion that each unit's acreage factor bears to the total acreage factor for all non-marginal units in the pool.

Rule 9(D) The current deliverability tests, taken in accordance with the "Gas Well Testing Rules and Procedures-San Juan Basin, New Mexico," shall be used in calculating allowables for the proration units in the pool for the 12-month period beginning April 1 of the following year.

Rule 9(E) When calculating the allowable for a proration unit containing two wells, in accordance with Rule 9 of these rules, the deliverability of both wells shall be added in calculating the AD Factor and the unit allowable may be produced from both wells.

Rule 10(C) The calculated deliverability at the "deliverability pressure" shall be determined in accordance with the provisions of the current "Gas Well Testing Rules and Procedures - San Juan Basin, New Mexico."

No well shall be eligible for reclassification to "Exempt Marginal" status unless it is located on a marginal proration unit.

Rule 10(D) Within ninety (90) days after the second well on the unit is first delivered to a gas transportation facility, both wells on the unit shall have been tested in accordance with "Gas Well Testing Rules and Procedures - San Juan Basin, New Mexico" and the results of the tests filed with the Division's Aztec office and with the gas transportation facility

to which the well is connected. If a test for the current test period has previously been filed for the first well on the unit, the second test will not be required. Both tests will be treated as Initial Tests for purposes of assigning allowables to the unit. This rule shall apply to newly completed wells.

Rule 12 The full production of gas from each well, including drilling gas, shall be charged against the proration unit's allowable regardless of the disposition of the gas; provided, however, that gas used in maintaining the producing ability of the well shall not be charged against the allowable.

D. BALANCING OF PRODUCTION

Rule 14(A) Underproduction: Any non-marginal proration unit which has an underproduced status as of the end of a gas proration period shall be allowed to carry such underproduction forward into the next gas proration period and may produce such underproduction in addition to the allowable assigned during such succeeding period. Any allowable carried forward into a gas proration period and remaining unproduced at the end of such gas proration period shall be cancelled.

Rule 14(B) Production during any one month of a gas proration period in excess of the allowable assigned to a proration unit for such month shall be applied against the underproduction carried into such period in determining the amount of allowable, if any, to be cancelled.

Rule 15(A) Overproduction: Any proration unit which has an overproduced status as of the end of a gas proration period shall carry such overproduction forward into the next gas proration period. Said overproduction shall be made up during the succeeding gas proration period. Any unit which has not made up the overproduction carried into a gas proration period by the end of said period shall not be produced until such overproduction is made up.

Rule 15(B) If, during any month, it is discovered that a proration unit is overproduced in an amount exceeding six times its average monthly allowable for the preceding twelve months (or, in the case of a newly connected proration unit, six times its average monthly allowable for the months available), it shall not be produced that month nor each succeeding month until it is overproduced in an amount six times or less its average monthly allowable, as determined hereinabove.

Rule 15(C) Allowable assigned to a proration unit during any one month of a gas proration period in excess of the production for the same month shall be applied against the overproduction chargeable to such unit in determining the amount of overproduction which must be made up pursuant to the provisions of Rules 15 (A) or 15 (B) above.

Rule 15(D) The Director of the Division shall have authority to permit a proration unit which is subject to shut-in, pursuant to Rules 15 (A) or 15 (B)

above, to produce up to 500 MCF of gas per month upon proper showing to the Director that complete shut-in would cause undue hardship, provided however, such permission shall be rescinded for any proration unit produced in excess of the monthly rate authorized by the Director.

Rule 15(E) The Division may allow overproduction to be made up at a lesser rate than permitted under Rules 15 (A), 15 (B), or 15 (D) above upon a showing at public hearing that the same is necessary to avoid material damage to the unit well(s).

Rule 15(F) Any allowable accruing to a proration unit at the end of a gas proration period due to the cancellation of underage in the pool and the redistribution thereof shall be applied against the unit's overproduction.

Rule 15(G) The Director of the Division shall have authority to grant a pool-wide moratorium of up to three months on the shutting in of gas wells in a pool during periods of high-demand emergency upon proper showing that such emergency exists, and that a significant number of the wells in the pool are subject to shut-in pursuant to the provisions of Rules 15 (A) or 15 (B) above. No moratorium beyond the aforementioned three months shall be granted except after notice and hearing.

E. CLASSIFICATION OF UNITS

Rule 16(A) The proration period (as defined in Rule 13) shall be divided into four classification periods of three months each, commencing on April 1, July 1,

October 1, and January 1. After the production data is available for the last month of each classification period, any unit which had an underproduced status at the beginning of the proration period shall be classified marginal if its highest single month's production during the classification period is less than its average monthly allowable during said classification period; provided however, that the operator of any unit so classified, or other interested party, shall have 15 days after receipt of notification of marginal classification in which to submit satisfactory evidence to the Division that the unit is not of marginal character and should not be so classified.

Rule 16(B) The Director may reclassify a marginal or non-marginal proration unit at any time the unit's production data, deliverability data, or other evidence as to the unit's producing ability justifies such reclassification.

Rule 17 A proration unit which is classified as marginal shall not be permitted to accumulate underproduction, and any underproduction accrued to the unit prior to its classification as marginal shall be cancelled.

Rule 18 If, at the end of a proration period, a marginal proration unit has produced more than the total allowable for the period assigned to a non-marginal unit of like deliverability and acreage, the marginal unit shall be reclassified non-marginal

and its allowable and net status adjusted accordingly. (If the unit has been classified as marginal for one proration period only, or a portion of one proration period only, any underproduction cancelled as the result of such classification of one proration period only, any underproduction cancelled as the result of such classification shall be reinstated upon reclassification back to non-marginal status. All uncompensated-for overproduction accruing to the unit while marginal shall be chargeable upon reclassification to non-marginal.)

Rule 19 A proration unit containing a well which has been reworked or recompleted shall be classified non-marginal as of the date of reconnection of the well to a pipeline until such time as production data, deliverability data, or other evidence as to the unit's producing ability indicates that the unit should be classified marginal.

Rule 20 All proration units not classified marginal shall be classified non-marginal.

F. REPORTING OF PRODUCTION

Rule 21(A) The monthly gas production from each well shall be metered separately and the gas production therefrom shall be reported to the Division on Form C-115 in accordance with Rule 1115 of the Division's Rules and Regulations, so as to reach the Division on or before the 24th day of the month next succeeding the month in which the gas

reported was produced. The operator shall show on such report what disposition has been made of the gas produced. The sum of the production from both wells on the proration unit shall also be reported for multiple-well units.

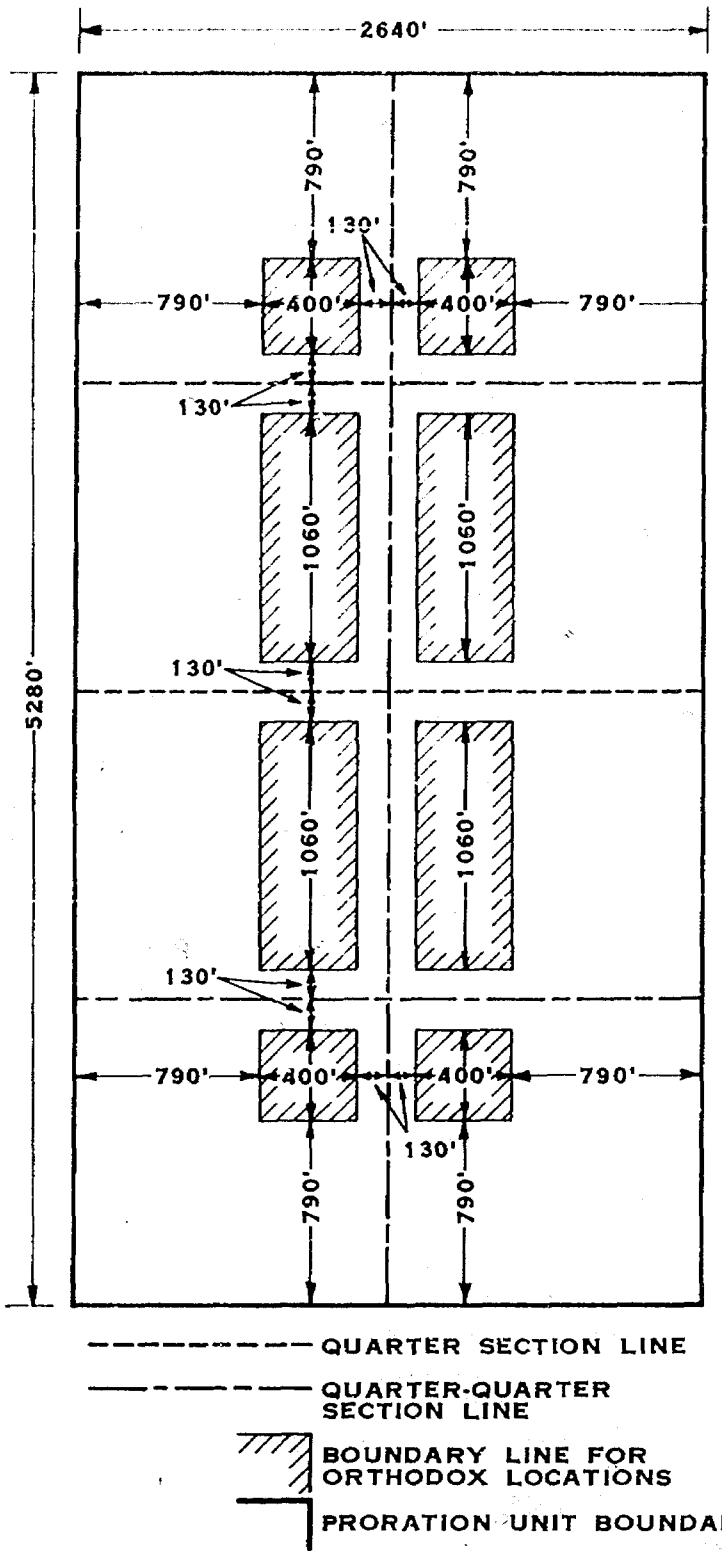
G. GENERAL

Rule 22 No gas, either dry gas or casinghead gas, produced from the Basin-Dakota Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Division after notice and hearing.

Rule 23 Failure to comply with the provisions of this order or the rules contained herein shall result in the cancellation of allowable assigned to the affected proration unit. No further allowable shall be assigned to the affected unit until all rules and regulations are complied with. The Division Director shall notify the operator of the unit and the purchaser, in writing, of the date of allowable cancellation and the reason therefor.

1-10

BASIN DAKOTA GAS POOL
ORTHODOX WELL LOCATIONS
UNDER EXISTING RULES
320 ACRE PRORATION UNIT



QUARTER SECTION LINE

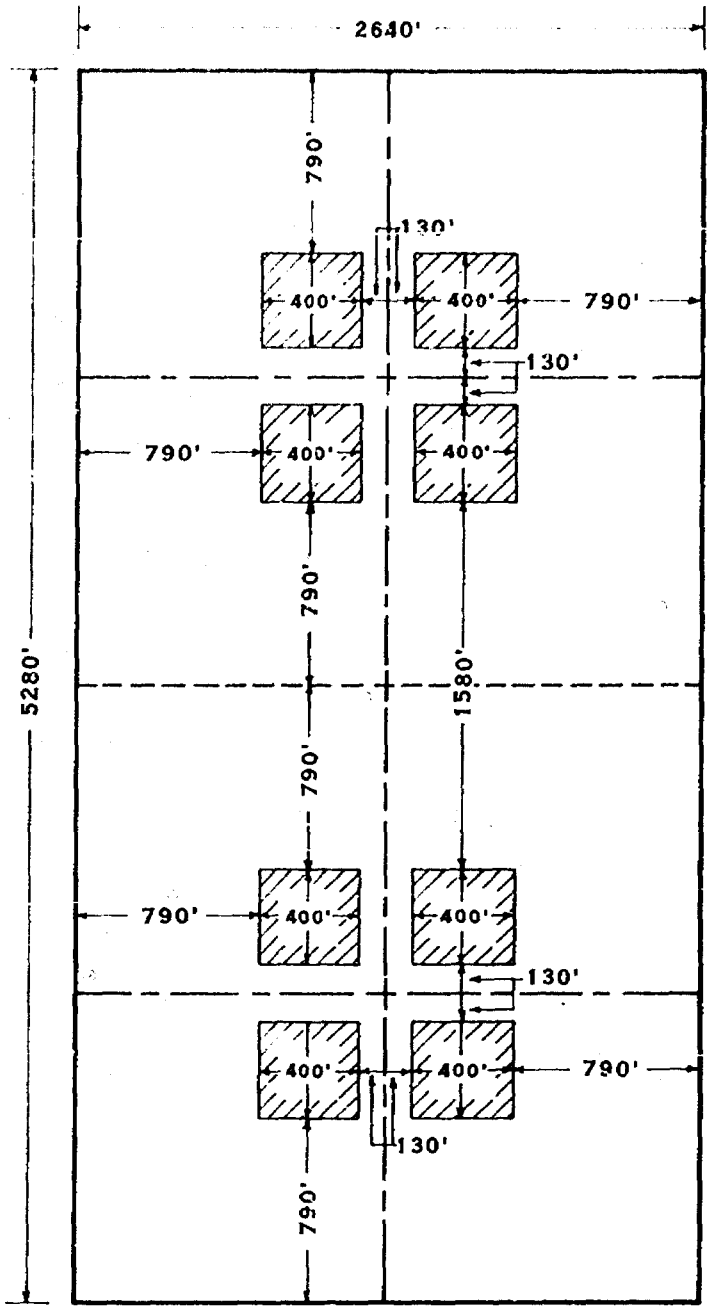
QUARTER-QUARTER SECTION LINE

BOUNDARY LINE FOR ORTHODOX LOCATIONS

PRORATION UNIT BOUNDARY

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6533 Exhibit No. 2
Submitted by El Paso
Hearing Date 4-30-79

BASIN DAKOTA GAS POOL
ORTHODOX WELL LOCATIONS
FOR PROPOSED INFILL DRILLING
320 ACRE PRORATION UNIT



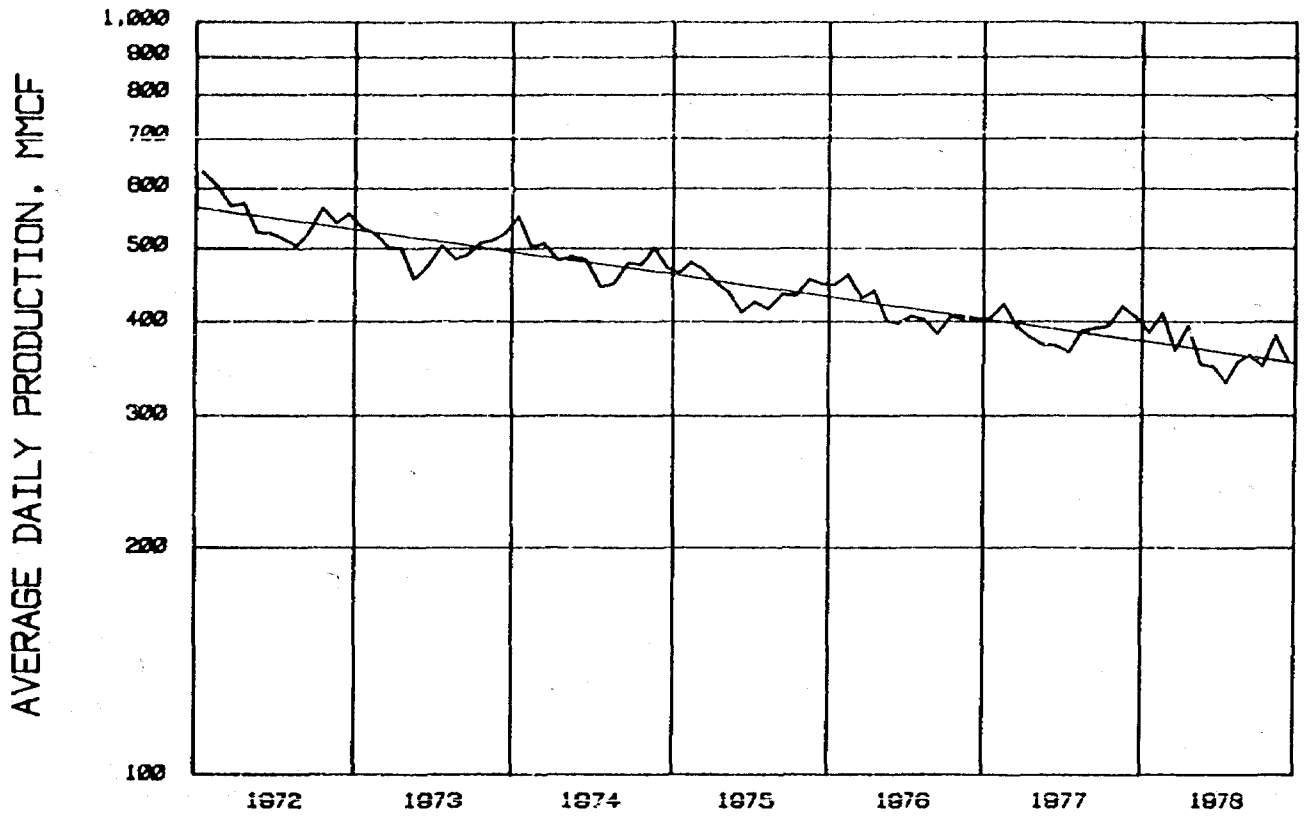
BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. _____ Exhibit No. _____
Submitted by _____
Hearing Date _____

EPNG EXHIBIT 2
PAGE 2

#5

BASIN DAKOTA

AVERAGE DAILY PRODUCTION BY MONTH



DECLINE RATE = .58%/MONTH

ECONOMIC LIMIT = 4.8 MMCF/DAY
TO BE REACHED IN THE YEAR 2042

FUTURE PRODUCTION
AS OF 1/1/72 = 3.0 TCF

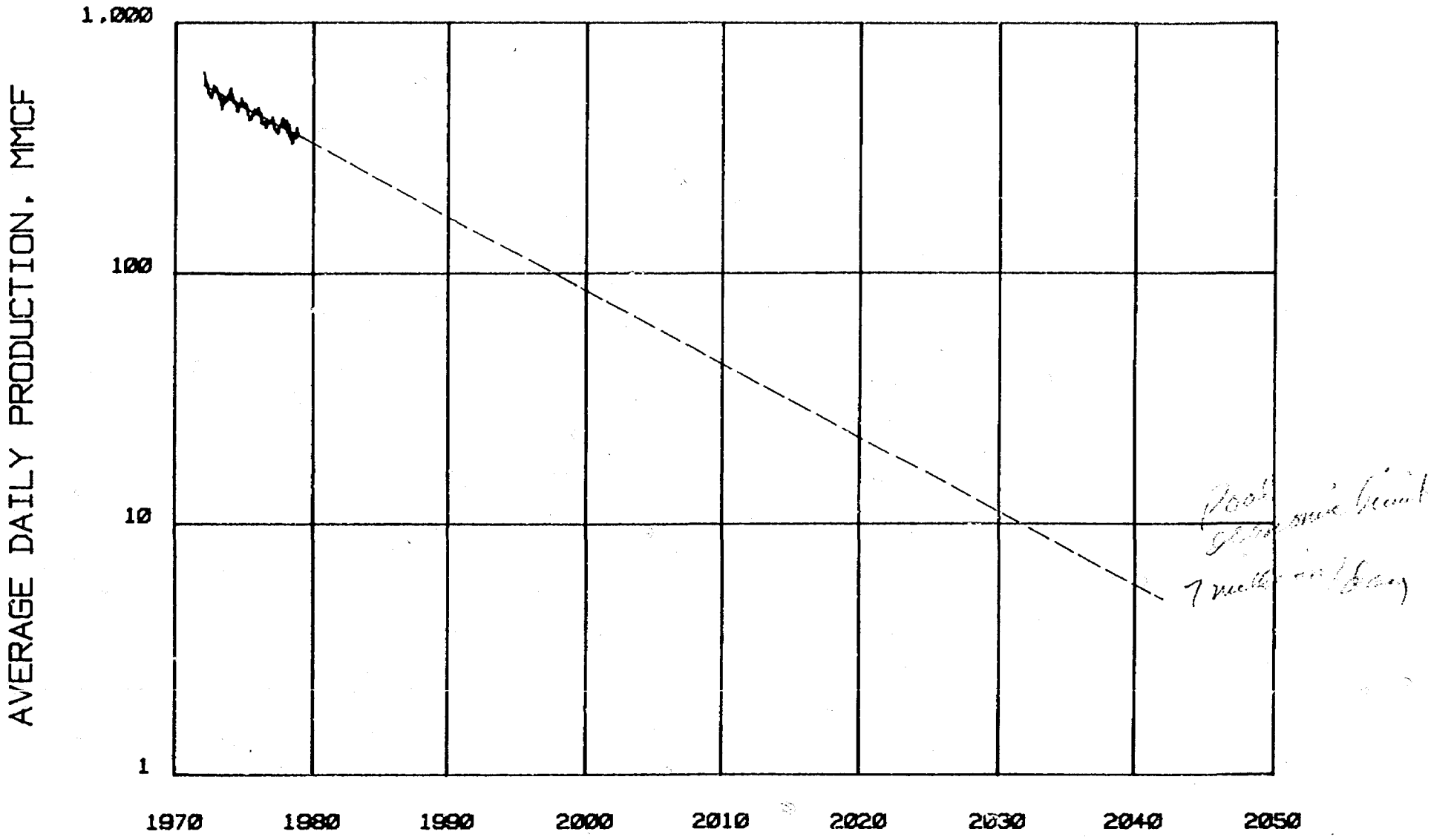
CUMULATIVE PRODUCTION
AS OF 1/1/72 = 1.8 TCF

ULTIMATE PRODUCTION = 4.8 TCF

#6

PROJECTED DECLINE

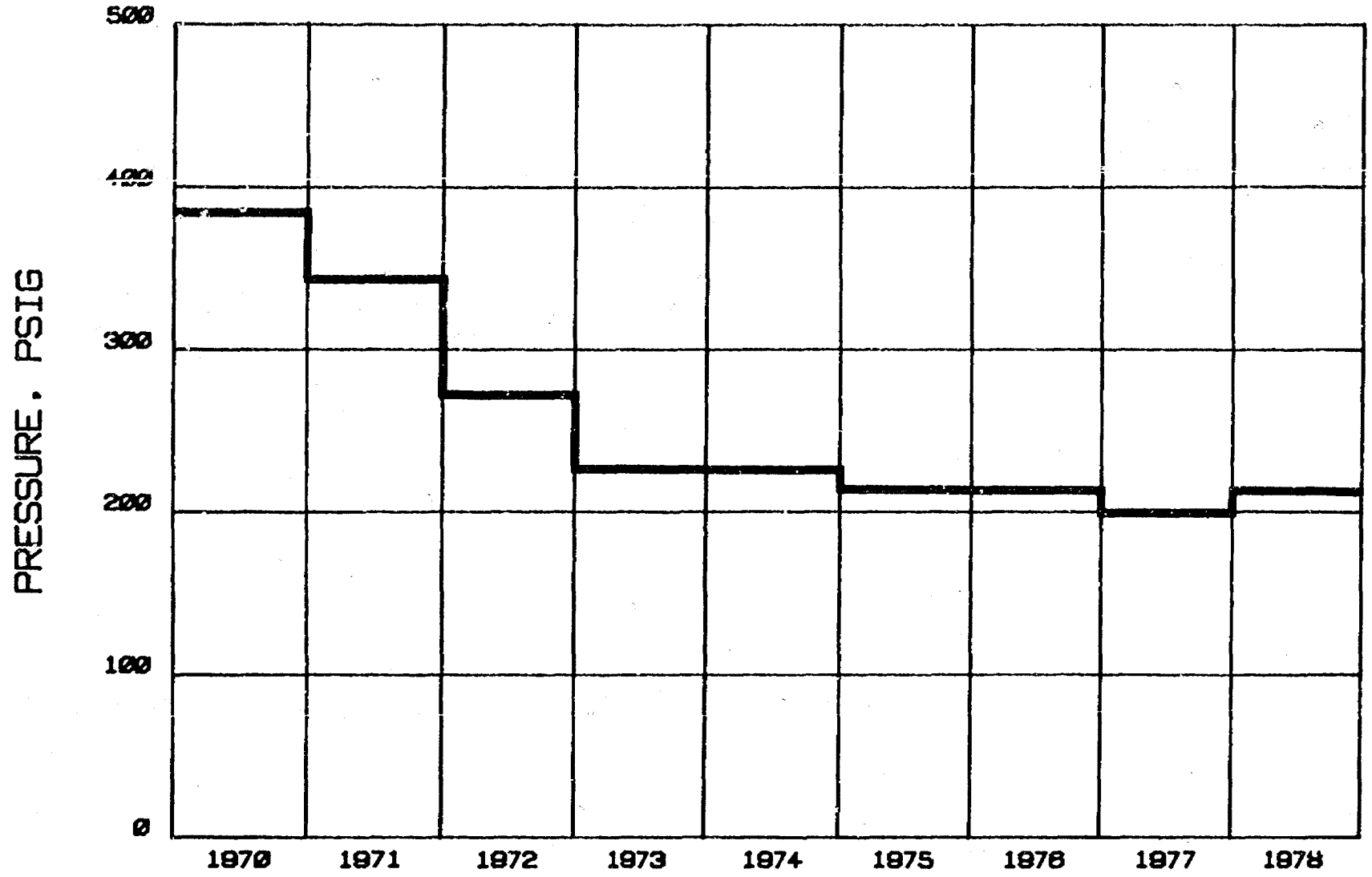
BASIN DAKOTA PRODUCTION



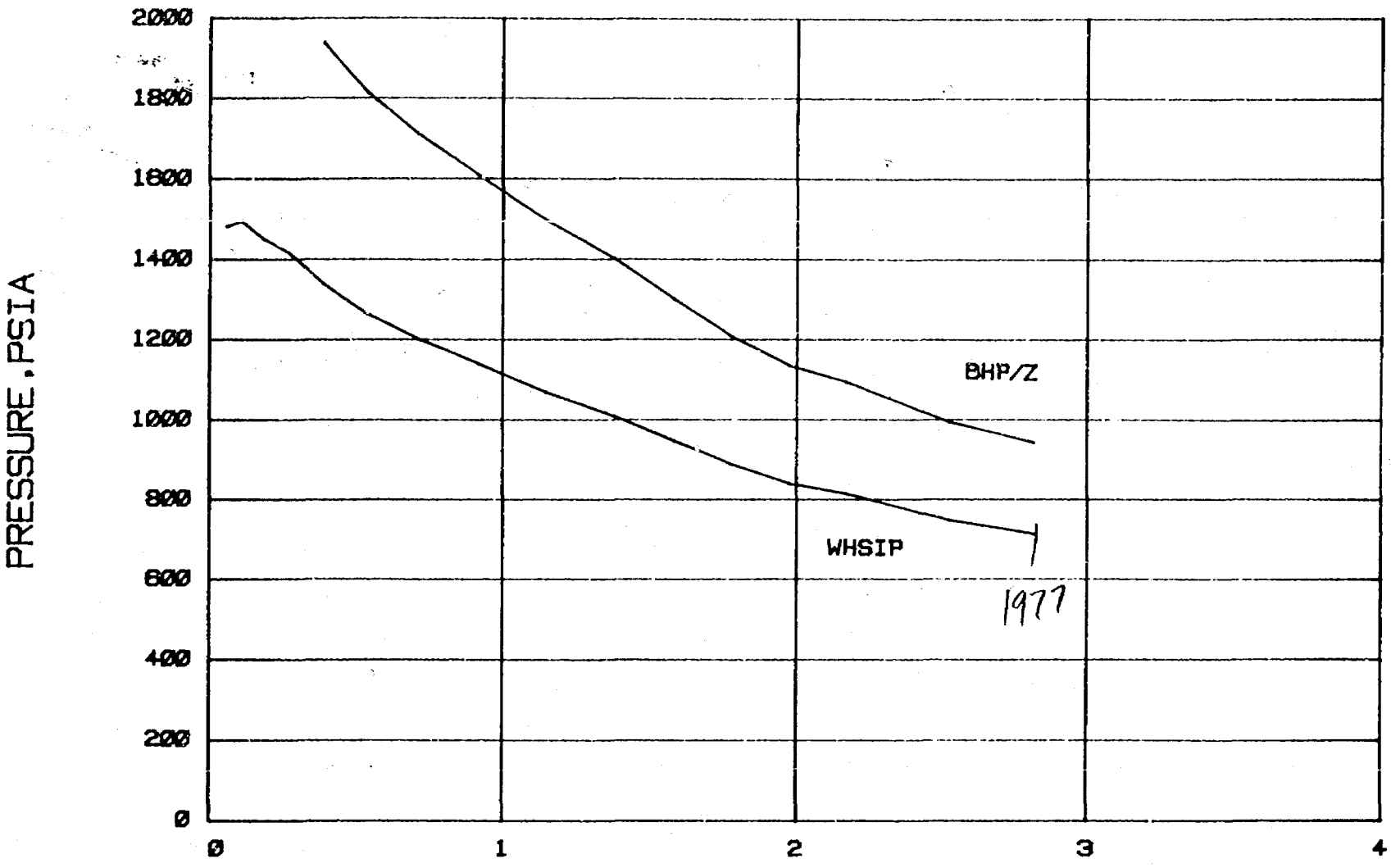
#7

BASIN DAKOTA

AVERAGE LINE PRESSURE



BASIN DAKOTA

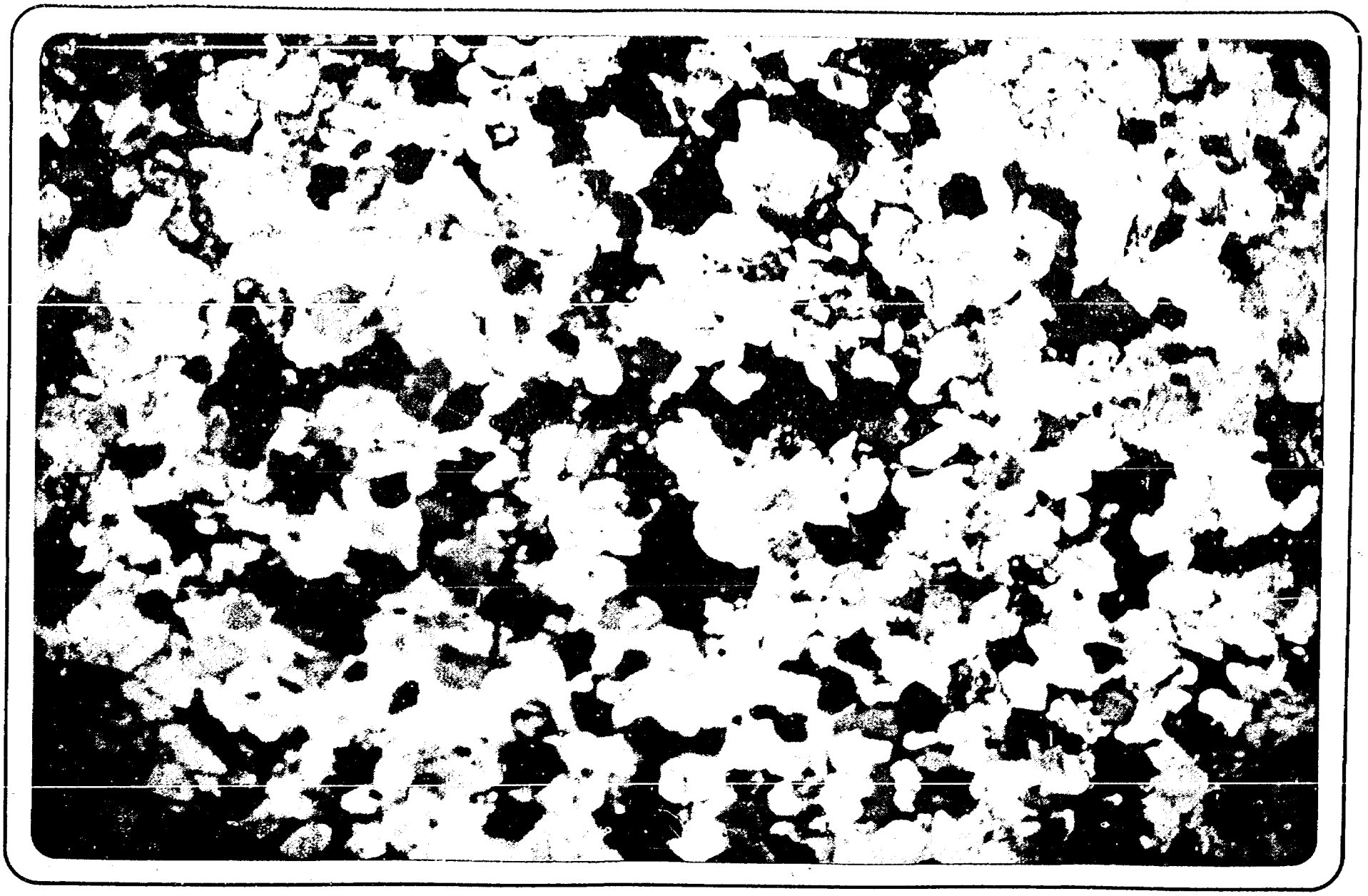


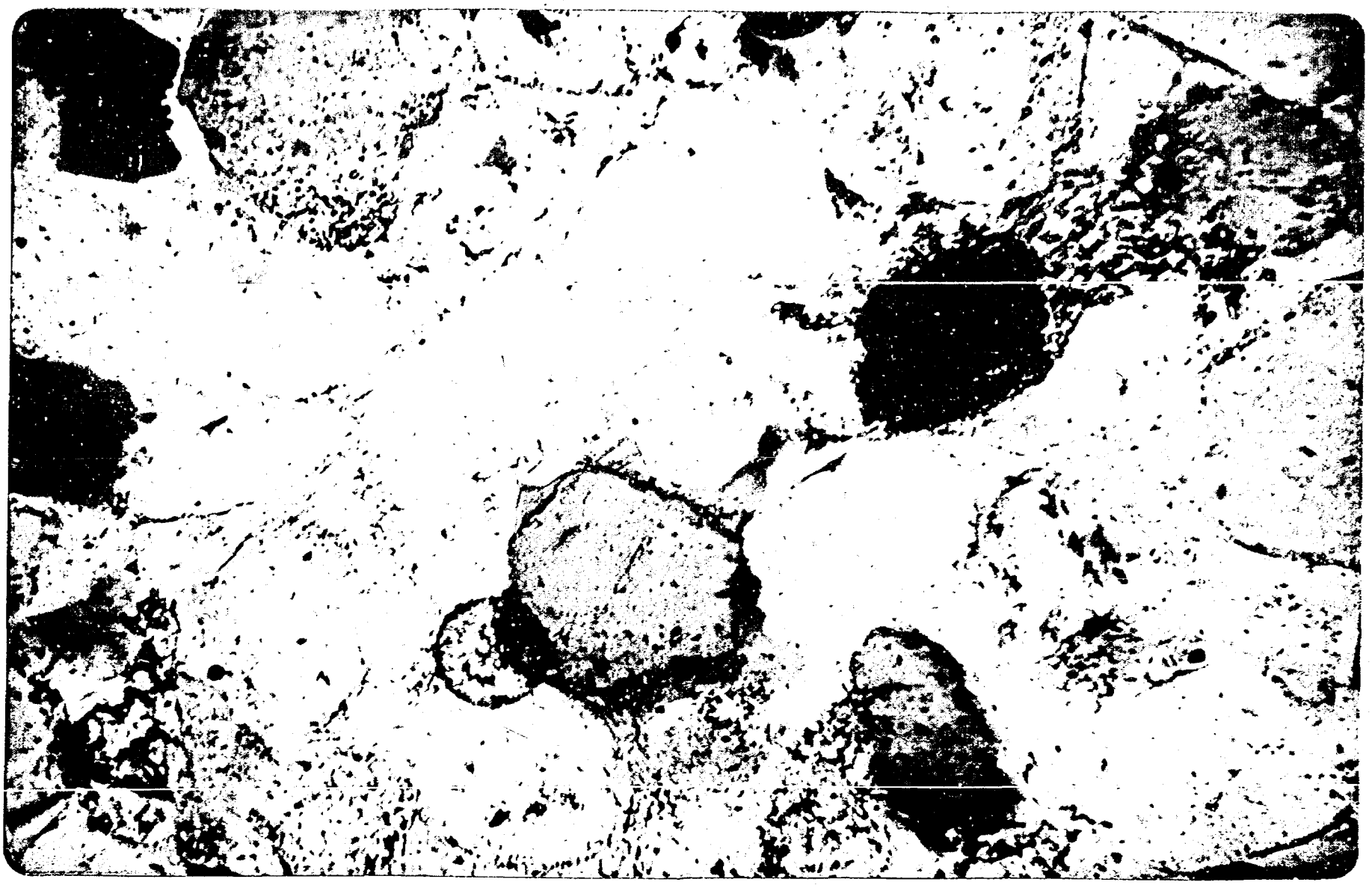
REVIEW of CORE DATA

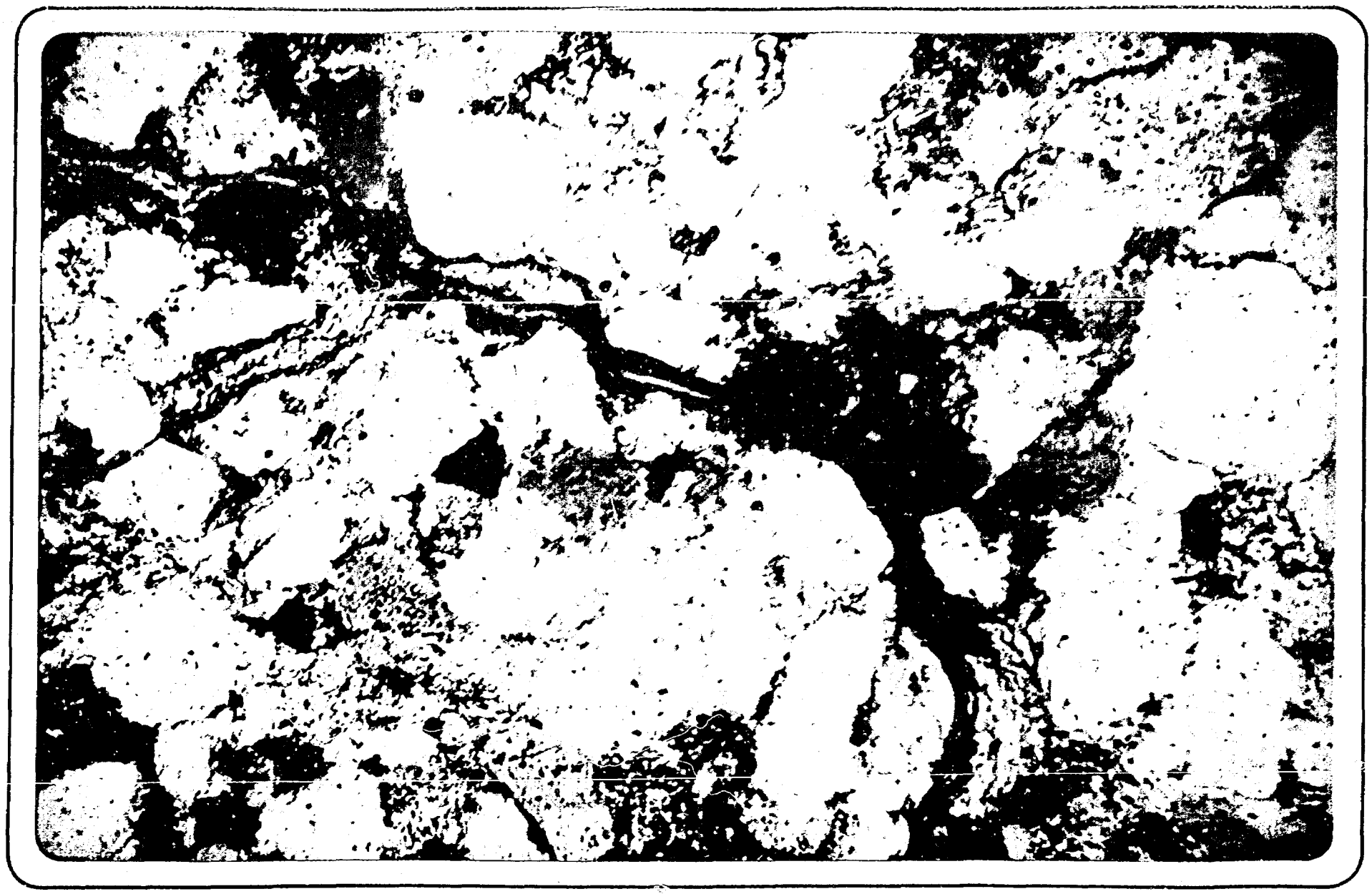
(1) Porosity Range (%)	(2) Number of Samples in Range	(3) Number of Samples With k>0.01 md	(4) Weighted Average Permeability, md
0– 2	16	2	0.030
2– 4	96	40	0.062
4– 6	306	191	0.056
6– 8	253	178	0.076
8–10	155	119	0.099
10–12	117	98	0.100
12–14	70	67	0.229
14–16	42	42	0.242
>16 (20% used)	17	17	0.424
	---	---	---
TOTAL	1,056	752	0.092

	Average Porosity (%)
Total percent porosity of 1,056 samples with Φ >2% is 8,151	7.72
Total percent porosity of 654 samples with Φ >6% is 6,333	9.68
Total percent porosity of 752 permeable samples with Φ >2% is 6,311...	8.39
Total percent porosity of 521 permeable samples with Φ >6% is 5,236...	10.05

THE TABLE SHOWS THAT THE GAS IN PLACE COULD BE 56% MORE THAN THE ORIGINAL ESTIMATE OF 10 TCF.

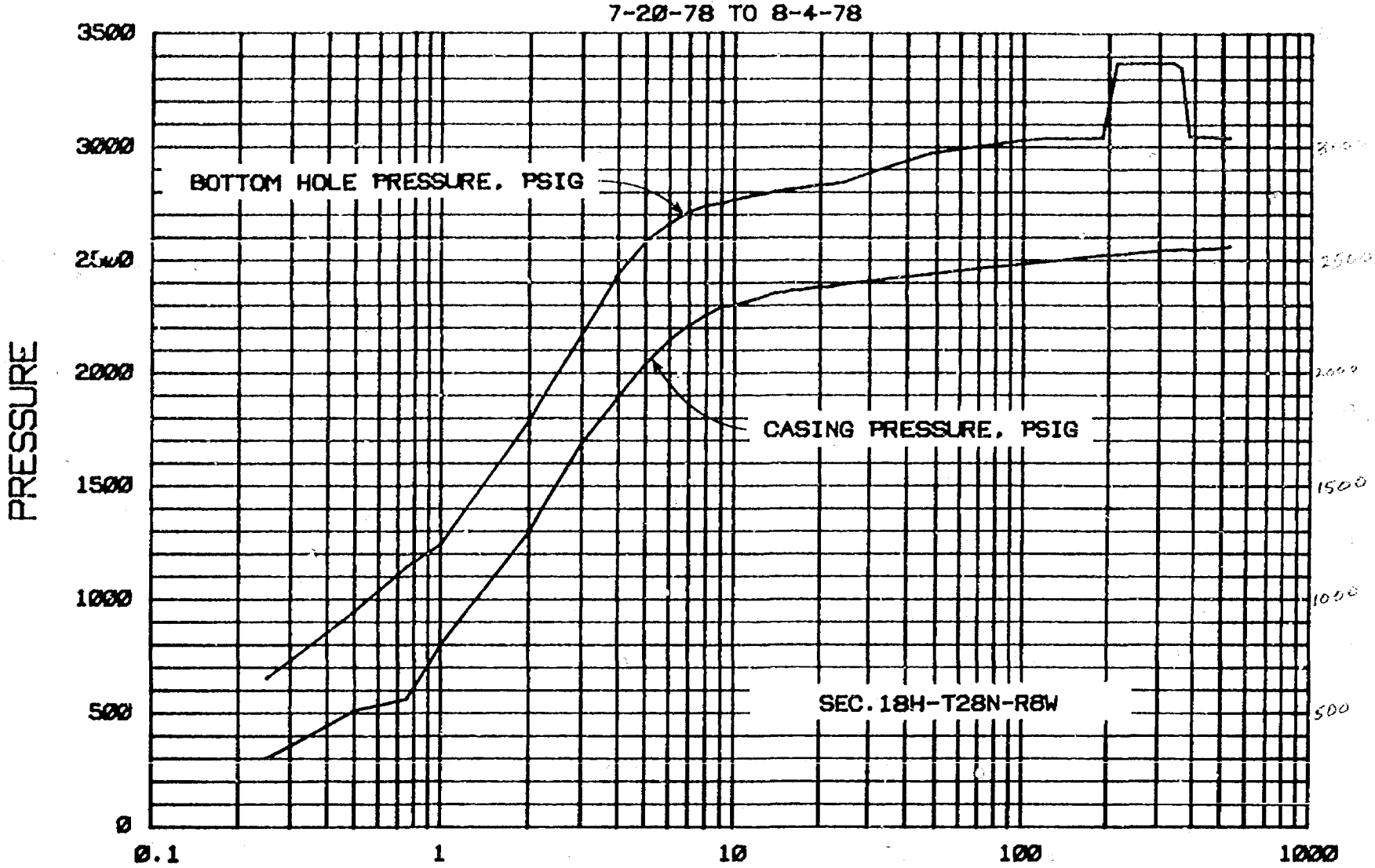


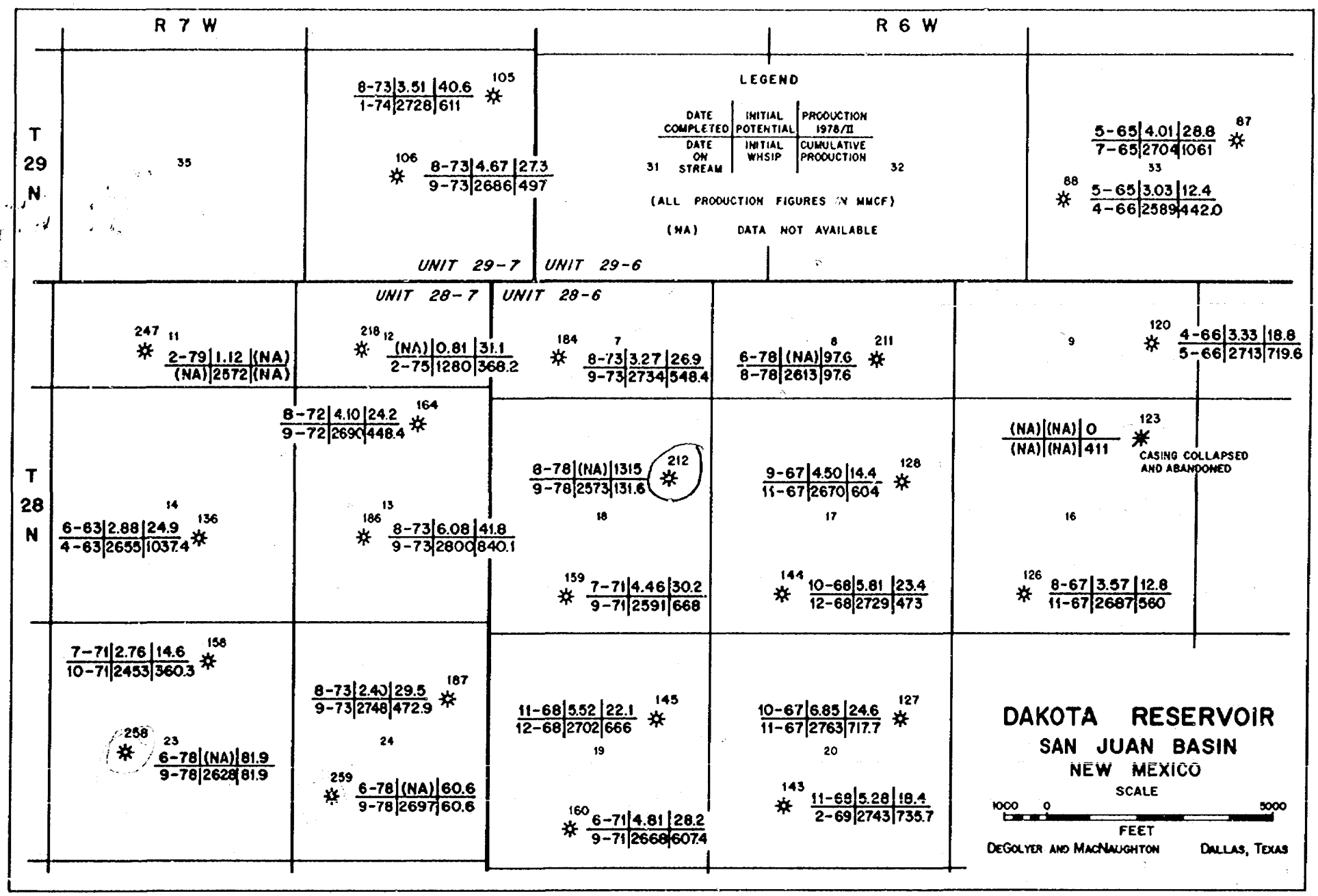




SAN JUAN 28-6 UNIT #212
PRESSURE BUILD-UP AFTER FRAC

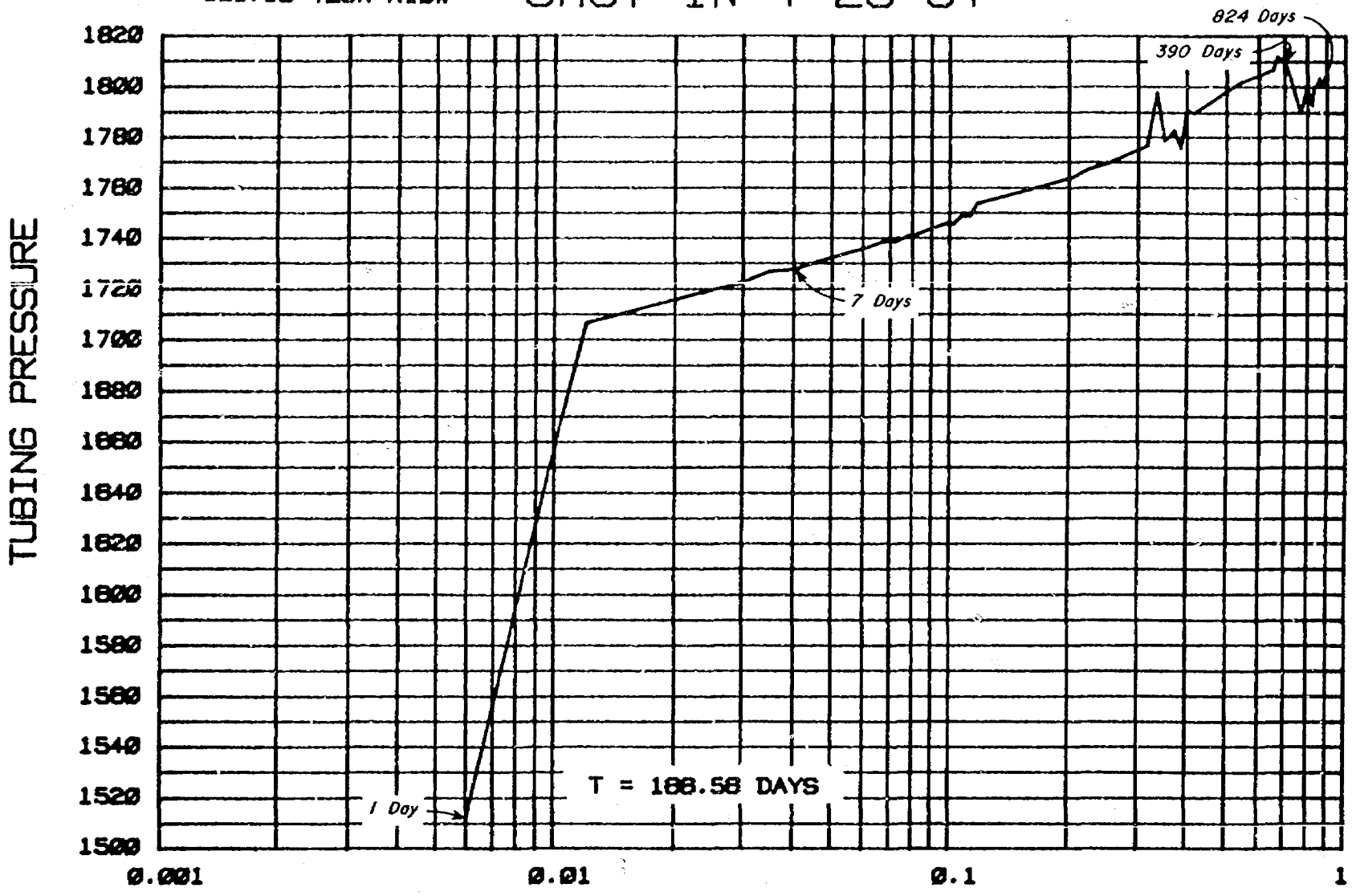
7-20-78 TO 8-4-78




R 7 W
R 6 W
T 29 N
T 28 N
LEGEND
DATE COMPLETED | INITIAL POTENTIAL | PRODUCTION 1978/II
DATE ON STREAM | INITIAL WHSIP | CUMULATIVE PRODUCTION
(ALL PRODUCTION FIGURES IN MMCF)
(NA) DATA NOT AVAILABLE
UNIT 29-7
UNIT 29-6
UNIT 28-7
UNIT 28-6
8-73 | 3.51 | 40.6
1-74 | 2728 | 611
105
106
8-73 | 4.67 | 27.3
9-73 | 2686 | 497
5-65 | 4.01 | 28.6
7-65 | 2704 | 1061
87
88
5-65 | 3.03 | 12.4
4-66 | 2589 | 442.0
247
11
2-79 | 1.12 | (NA)
(NA) | 2572 | (NA)
218
12
(NA) | 0.81 | 31.1
2-75 | 1280 | 368.2
184
7
8-73 | 3.27 | 26.9
9-73 | 2734 | 548.4
6-78 | (NA) | 97.6
8-78 | 2613 | 97.6
8
211
9
120
4-66 | 3.33 | 18.8
5-66 | 2713 | 719.6
8-72 | 4.10 | 24.2
9-72 | 2690 | 448.4
164
14
6-63 | 2.88 | 24.9
4-63 | 2655 | 1037.4
136
13
186
8-73 | 6.08 | 41.8
9-73 | 2800 | 840.1
8-78 | (NA) | 1315
9-78 | 2573 | 131.6
212
18
9-67 | 4.50 | 14.4
11-67 | 2670 | 604
128
17
(NA) | (NA) | 0
(NA) | (NA) | 411
123
CASING COLLAPSED AND ABANDONED
16
159
7-71 | 4.46 | 30.2
9-71 | 2591 | 668
144
10-68 | 5.81 | 23.4
12-68 | 2729 | 473
126
8-67 | 3.57 | 12.8
11-67 | 2687 | 560
7-71 | 2.76 | 14.6
10-71 | 2453 | 360.3
158
258
23
6-78 | (NA) | 81.9
9-78 | 2628 | 81.9
8-73 | 2.40 | 29.5
9-73 | 2748 | 472.9
187
24
259
6-78 | (NA) | 60.6
9-78 | 2697 | 60.6
11-68 | 5.52 | 22.1
12-68 | 2702 | 666
145
19
160
6-71 | 4.81 | 28.2
9-71 | 2668 | 607.4
10-67 | 6.85 | 24.6
11-67 | 2763 | 717.7
127
20
143
11-68 | 5.28 | 18.4
2-69 | 2743 | 735.7
DAKOTA RESERVOIR
SAN JUAN BASIN
NEW MEXICO
SCALE
1000 0 5000
FEET
DeGOLYER AND MacNAUGHTON DALLAS, TEXAS

HUERFANO #117 - BASIN DAKOTA

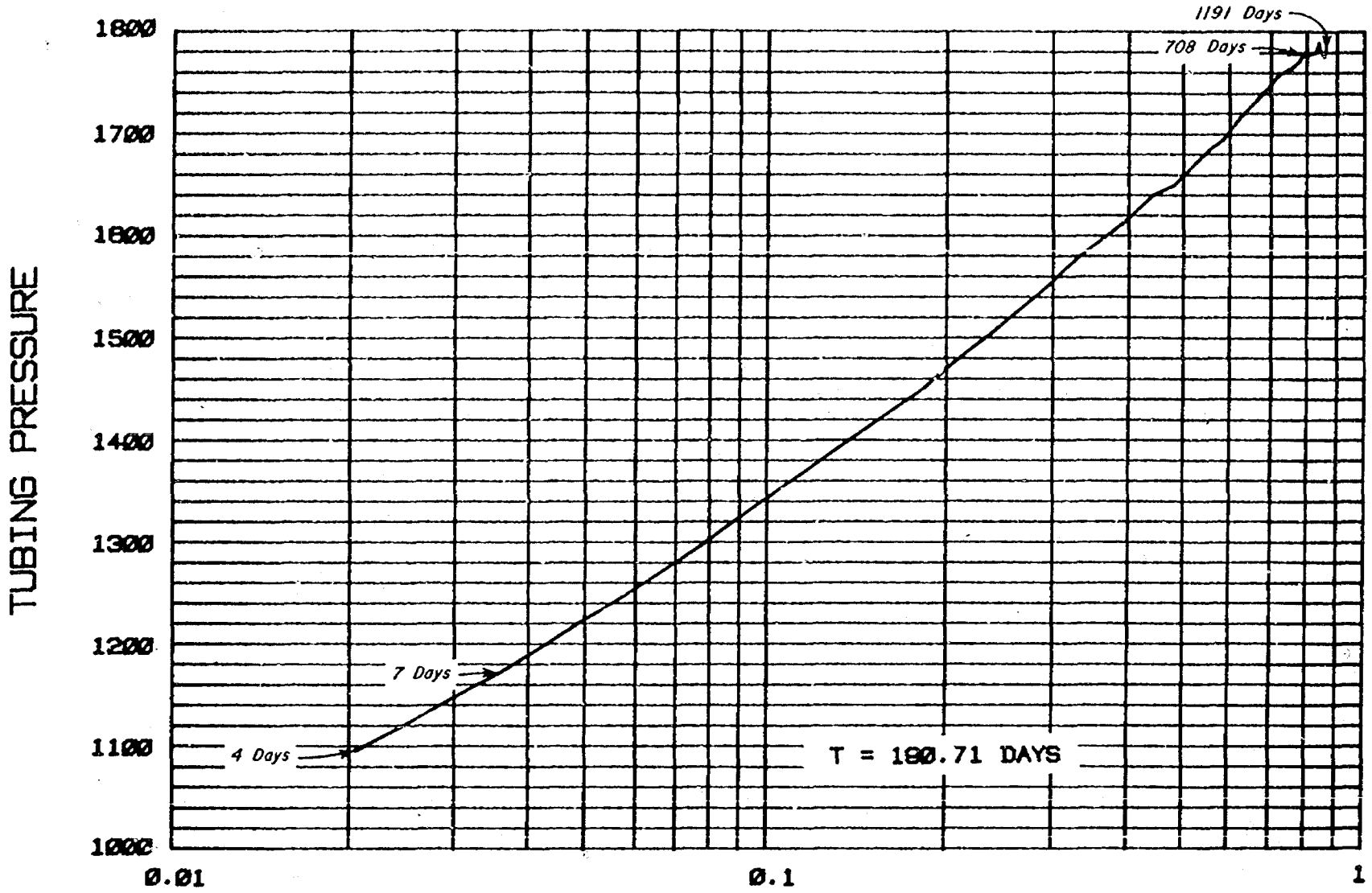
SEC. 18-T26N-R10W SHUT IN 4-23-64



HUERFANO #125 - BASIN DAKOTA

SHUT IN 4-22-63

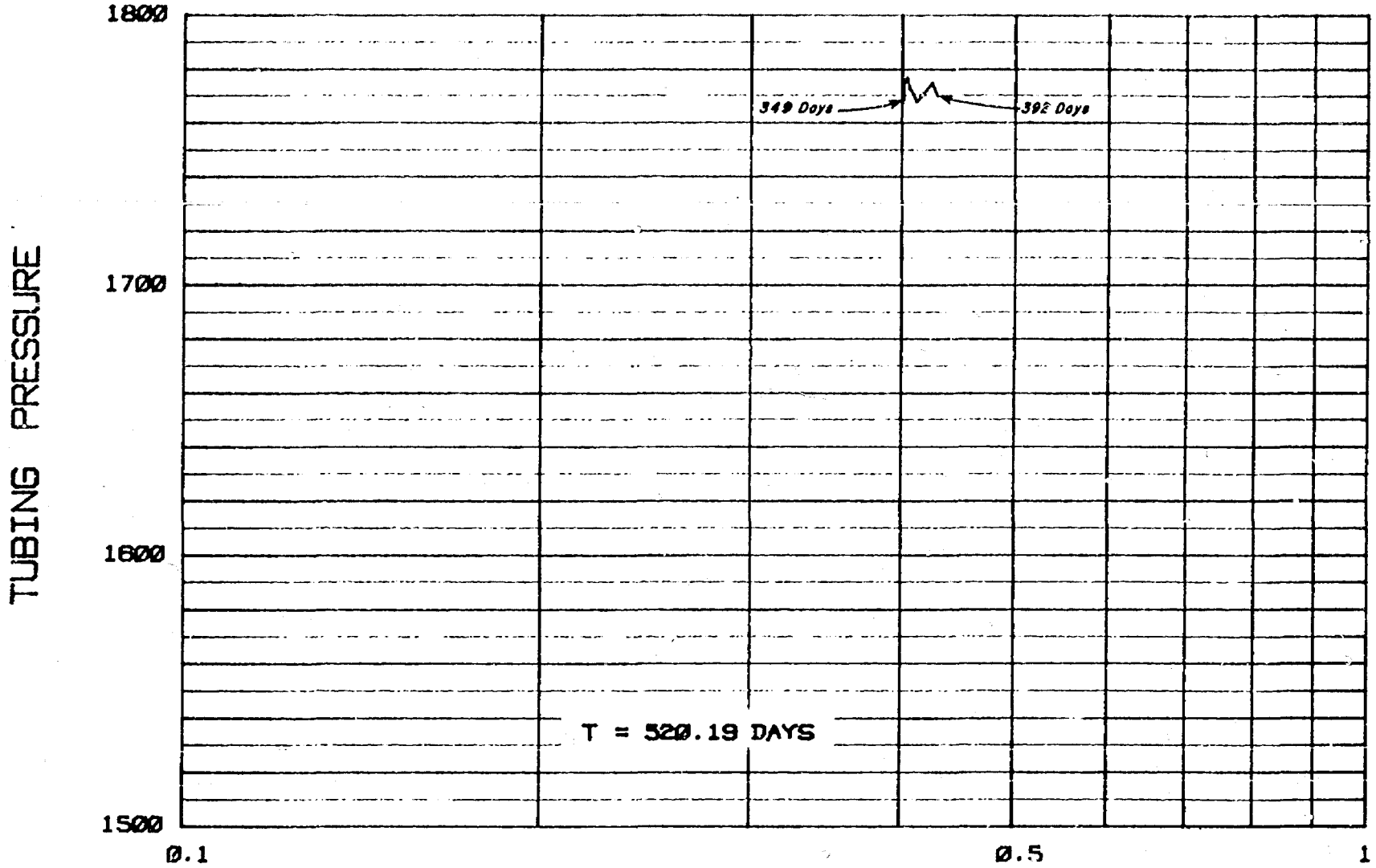
SEC.30-T28N-R8W

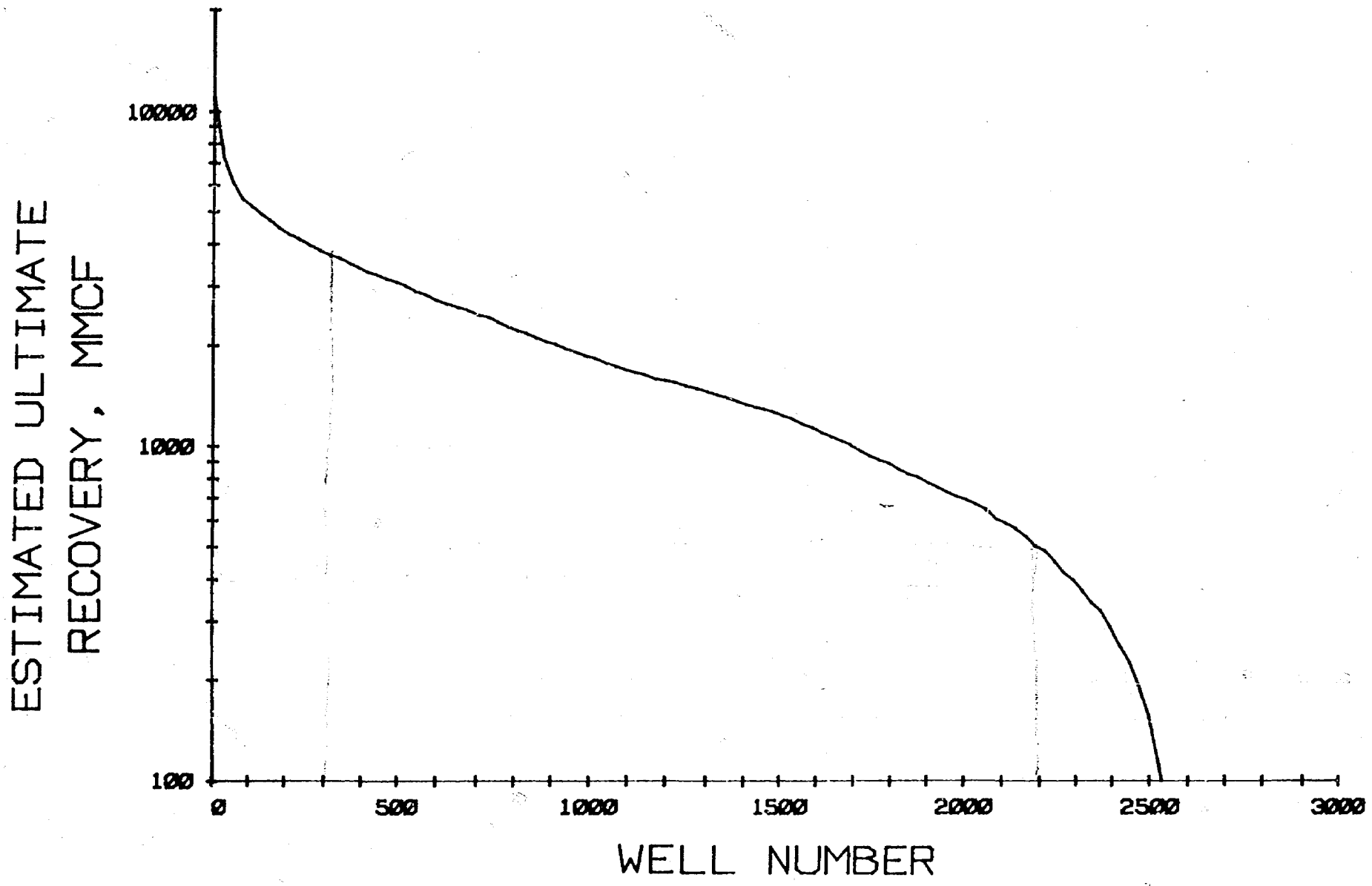


HUERFANO #121 - BASIN DAKOTA

SEC.27-T26N-R10W

SHUT IN 8-6-65




BASIN DAKOTA
ESTIMATED ULTIMATE RECOVERY, MMCF
100000
1000
100
0
500
1000
1500
2000
2500
3000
WELL NUMBER

PAYOUT SCHEDULE FOR AN INFILL WELL

IN THE

BASIN DAKOTA

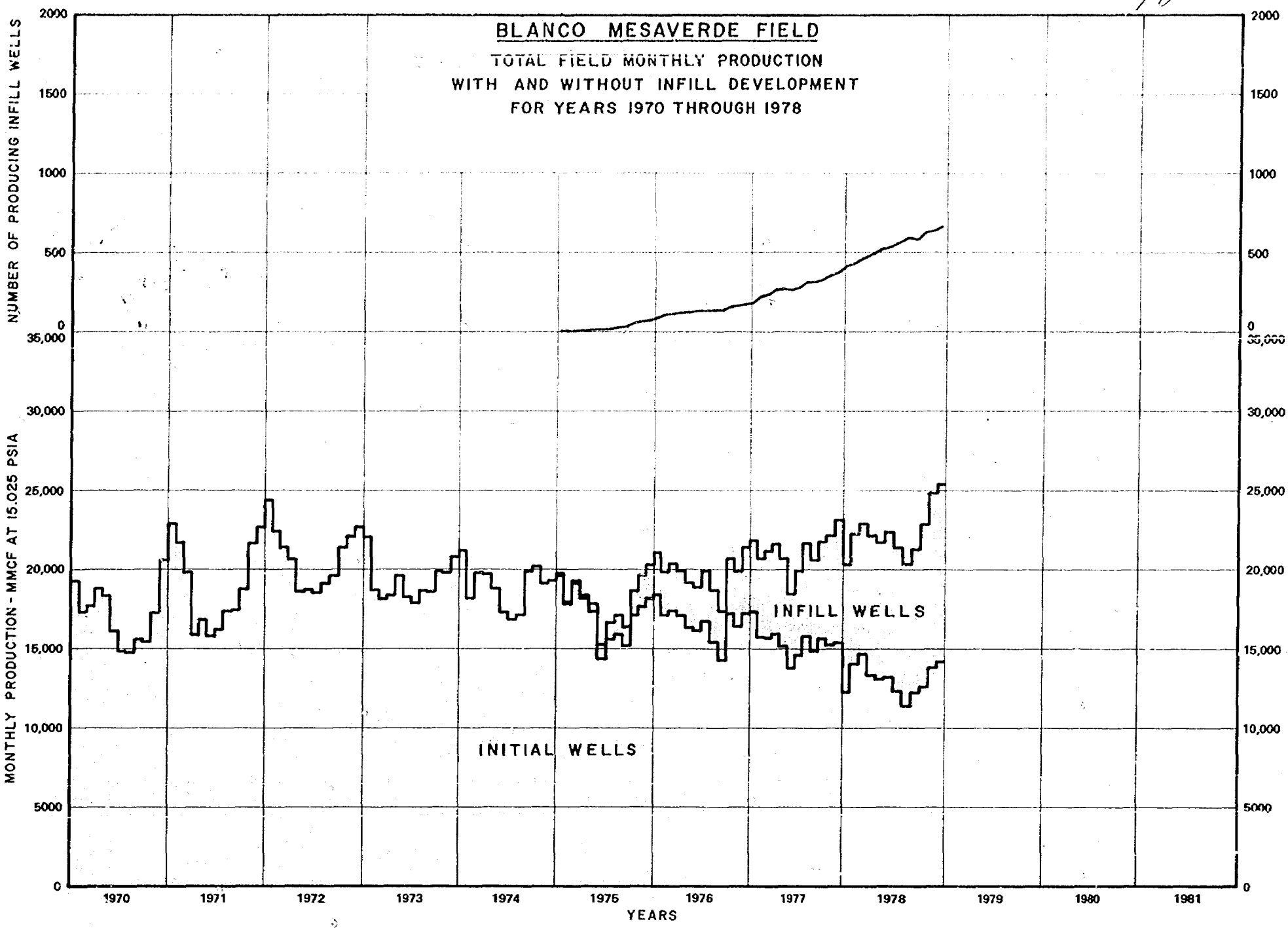
Allowable (Mcf/day)	PAYOUT TIME (MONTHS) Eastside Well	Westside Well
100	57.2	53.2
200	27.8	25.8
300	18.5	17.2

INITIAL WELL COSTS

Drilled With Gas (Eastside Well)	$ 285,800
Drilled With Mud (Westside Well)	$ 265,600
Access to Location	$ 5,800
MONTHLY OPERATING COST	$ 200
PRICE OF GAS (NGPA SECTION 103 PRICE)	$ 2/Mcf
ROYALTY (12.5%)	$ 0.25/Mcf

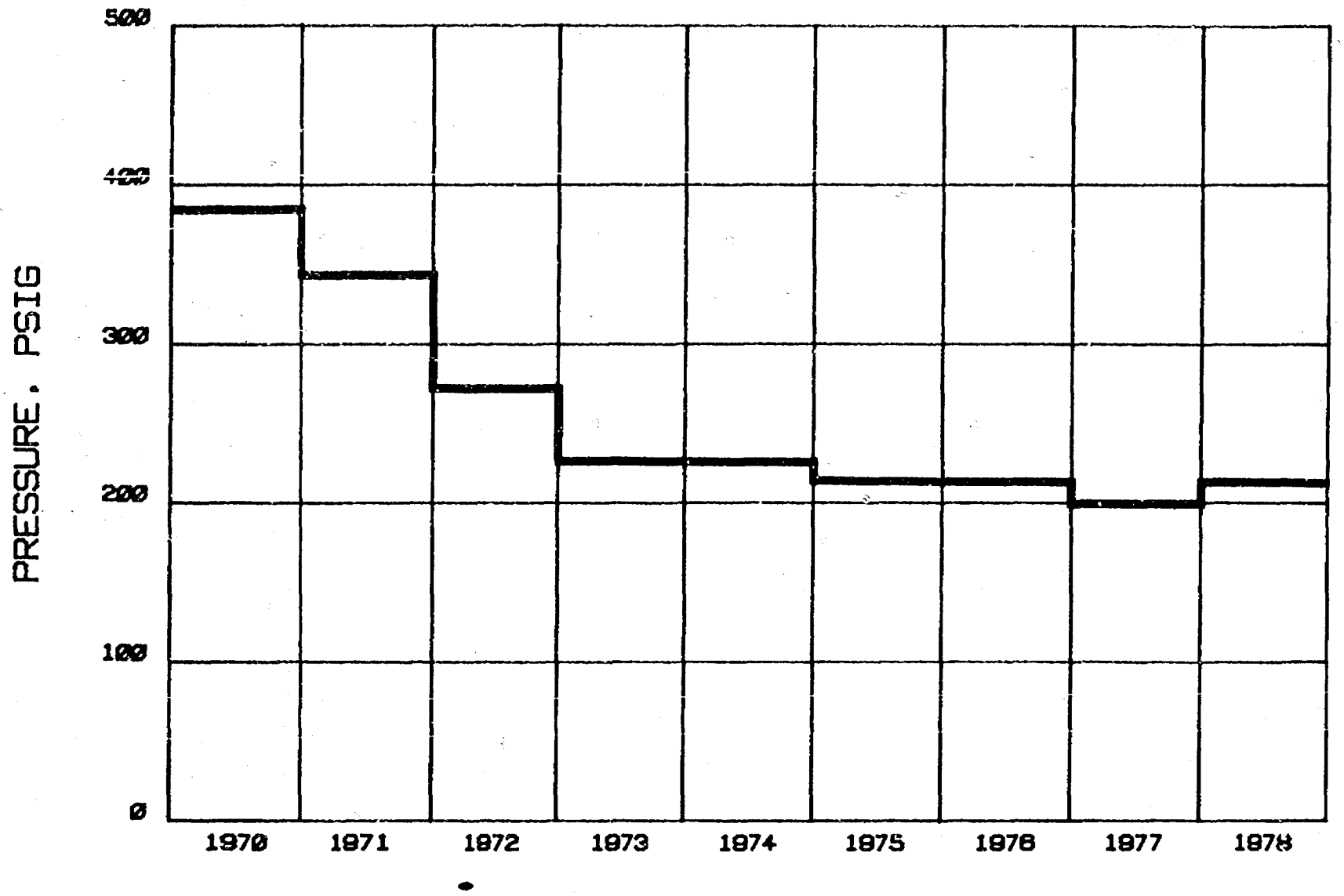
BLANCO MESAVERDE FIELD

TOTAL FIELD MONTHLY PRODUCTION
WITH AND WITHOUT INFILL DEVELOPMENT
FOR YEARS 1970 THROUGH 1978

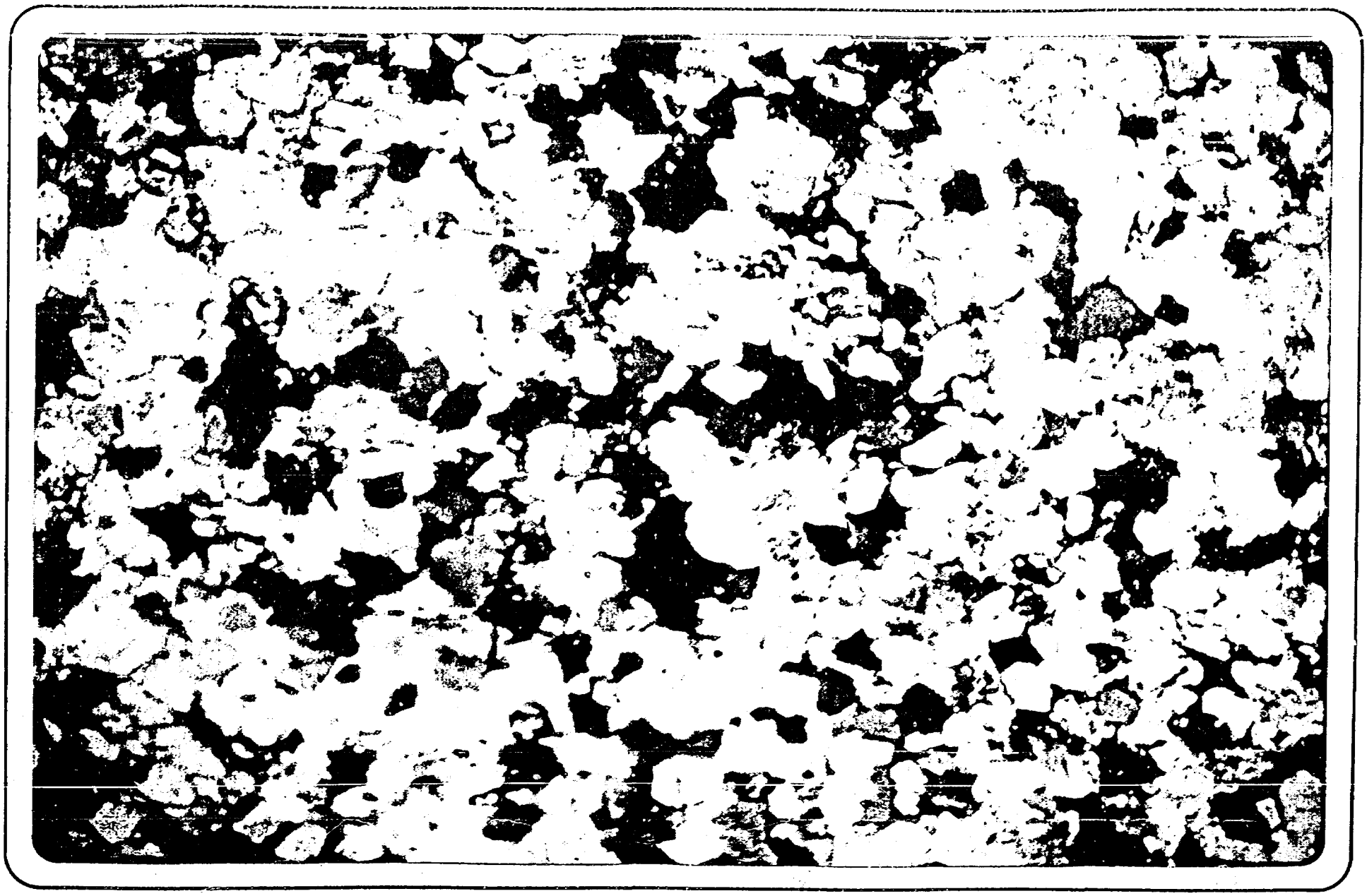


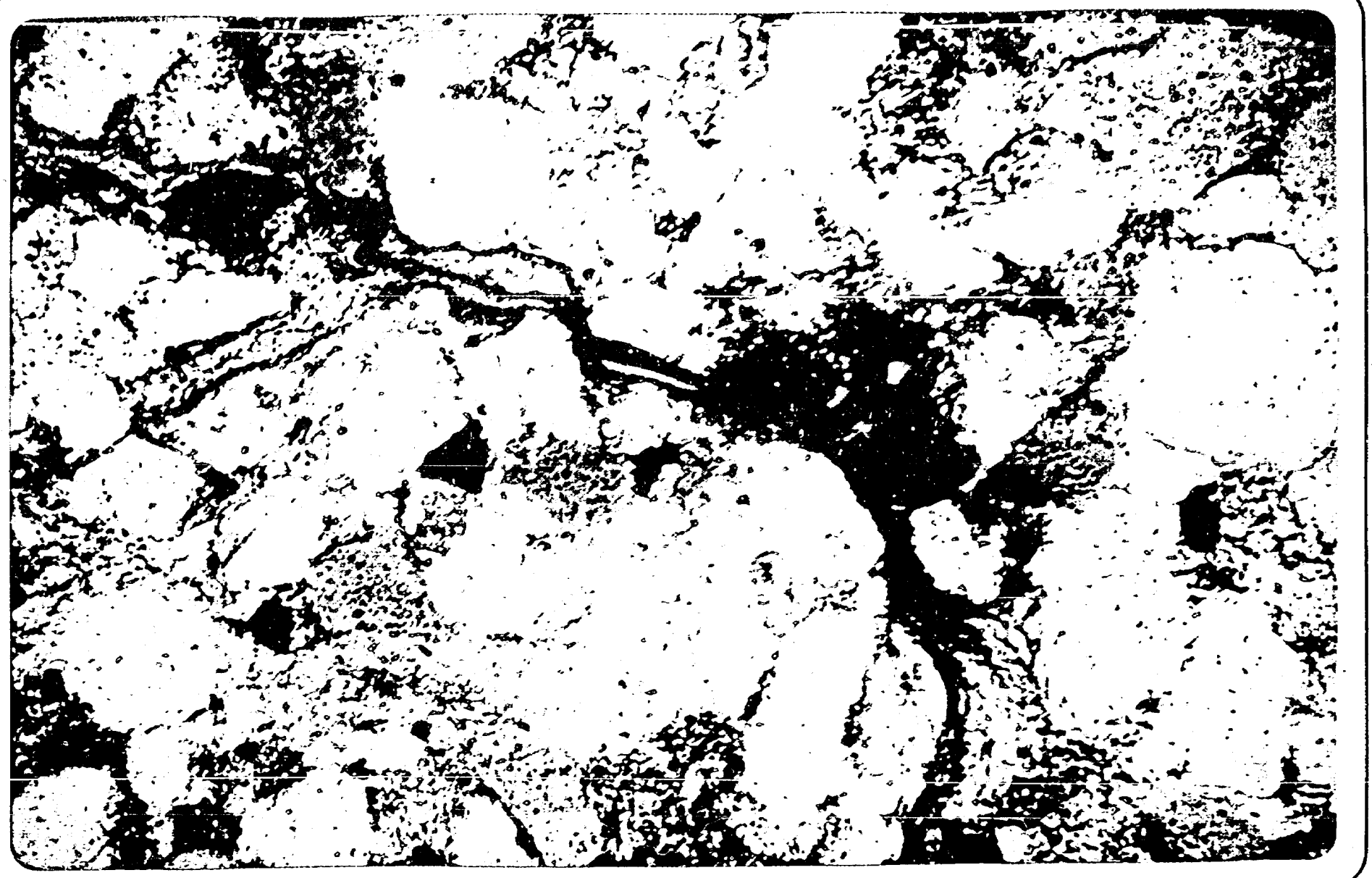
BASIN DAKOTA

AVERAGE LINE PRESSURE



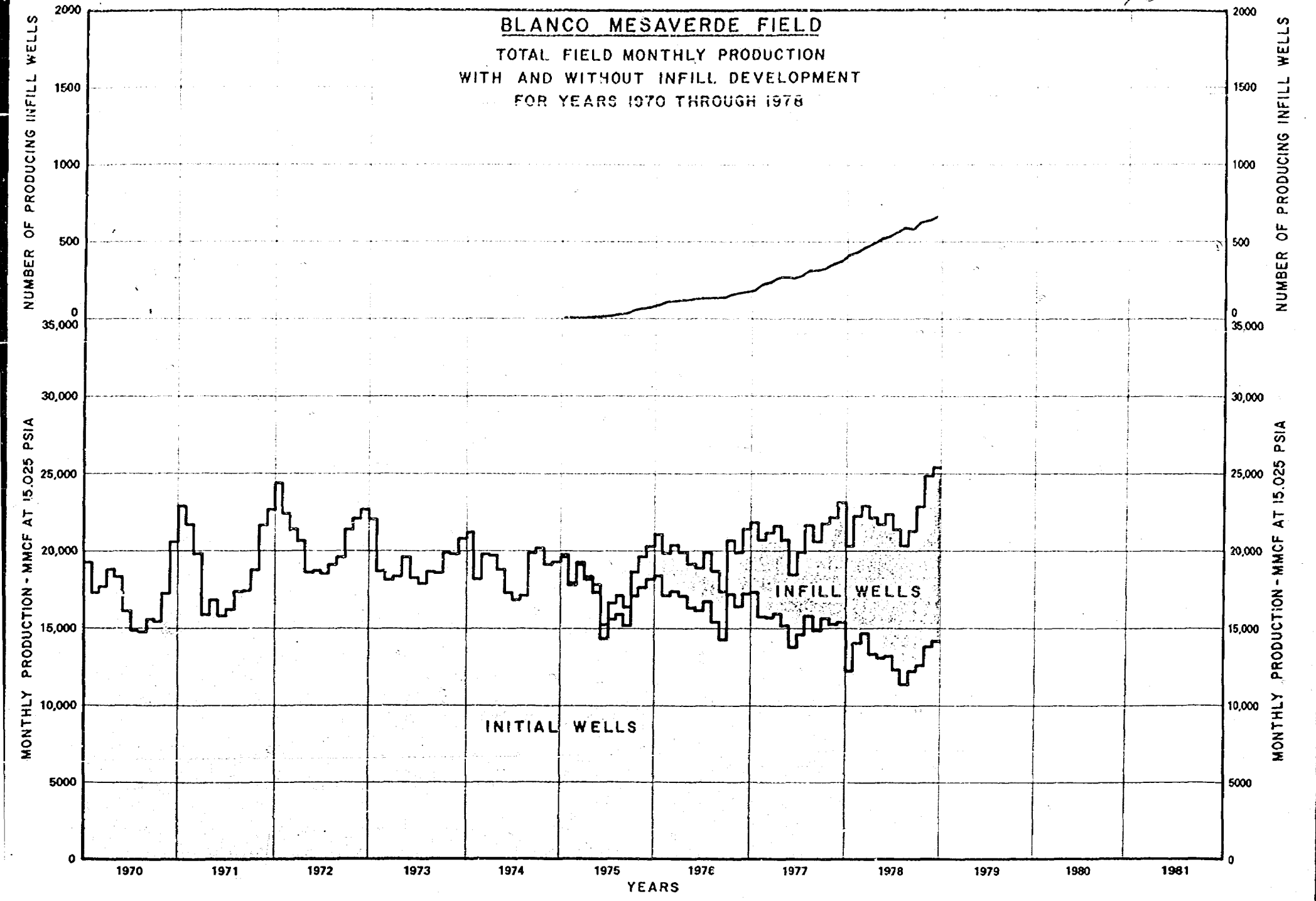






BLANCO MESAVERDE FIELD

TOTAL FIELD MONTHLY PRODUCTION
WITH AND WITHOUT INFILL DEVELOPMENT
FOR YEARS 1970 THROUGH 1978

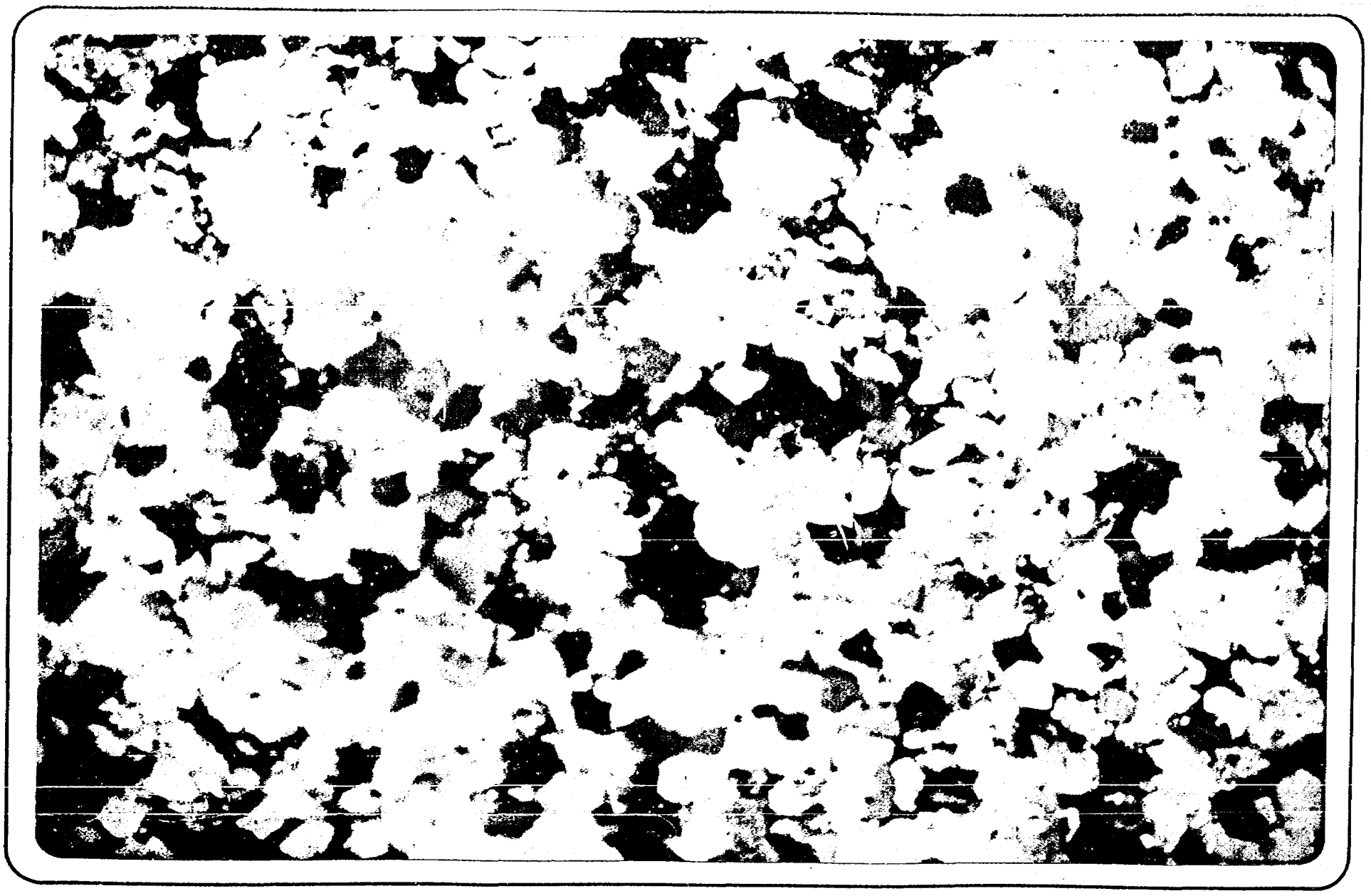


REVIEW of CORE DATA

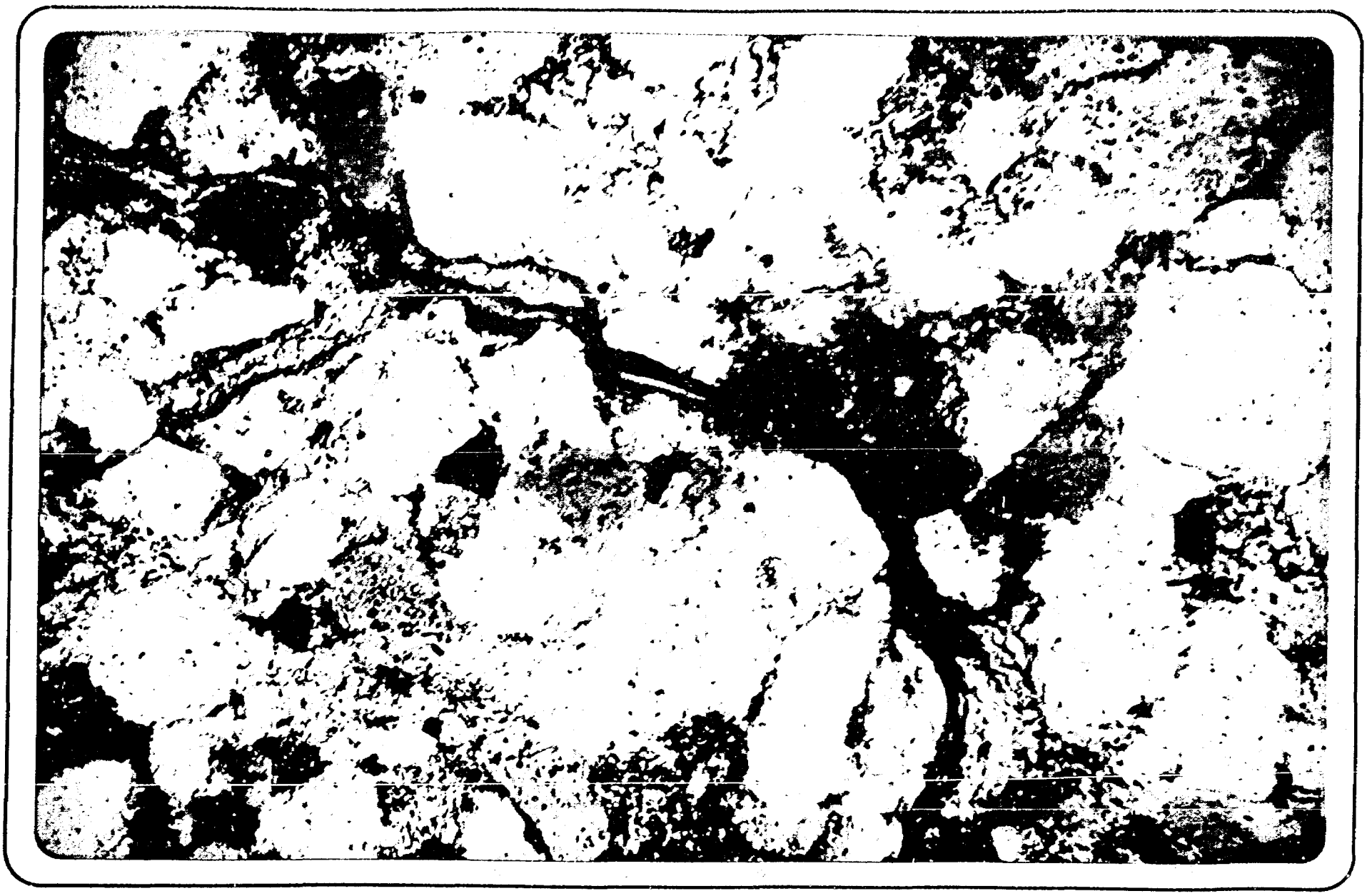
(1) Porosity Range (%)	(2) Number of Samples in Range	(3) Number of Samples With k>0.01 md	(4) Weighted Average Permeability, md
0– 2	16	2	0.030
2– 4	96	40	0.062
4– 6	306	191	0.056
6– 8	253	178	0.076
8–10	155	119	0.099
10–12	117	98	0.100
12–14	70	67	0.229
14–16	42	42	0.242
>16 (20% used)	17	17	0.424
TOTAL	1,056	752	0.092

	Average Porosity (%)
Total percent porosity of 1,056 samples with Φ >2% is 8,151	7.72
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Total percent porosity of 752 permeable samples with Φ >2% is 6,311...	8.39
Total percent porosity of 521 permeable samples with Φ >6% is 5,236...	10.05

THE TABLE SHOWS THAT THE GAS IN PLACE COULD BE 56% MORE THAN THE ORIGINAL ESTIMATE OF 10 TCF.

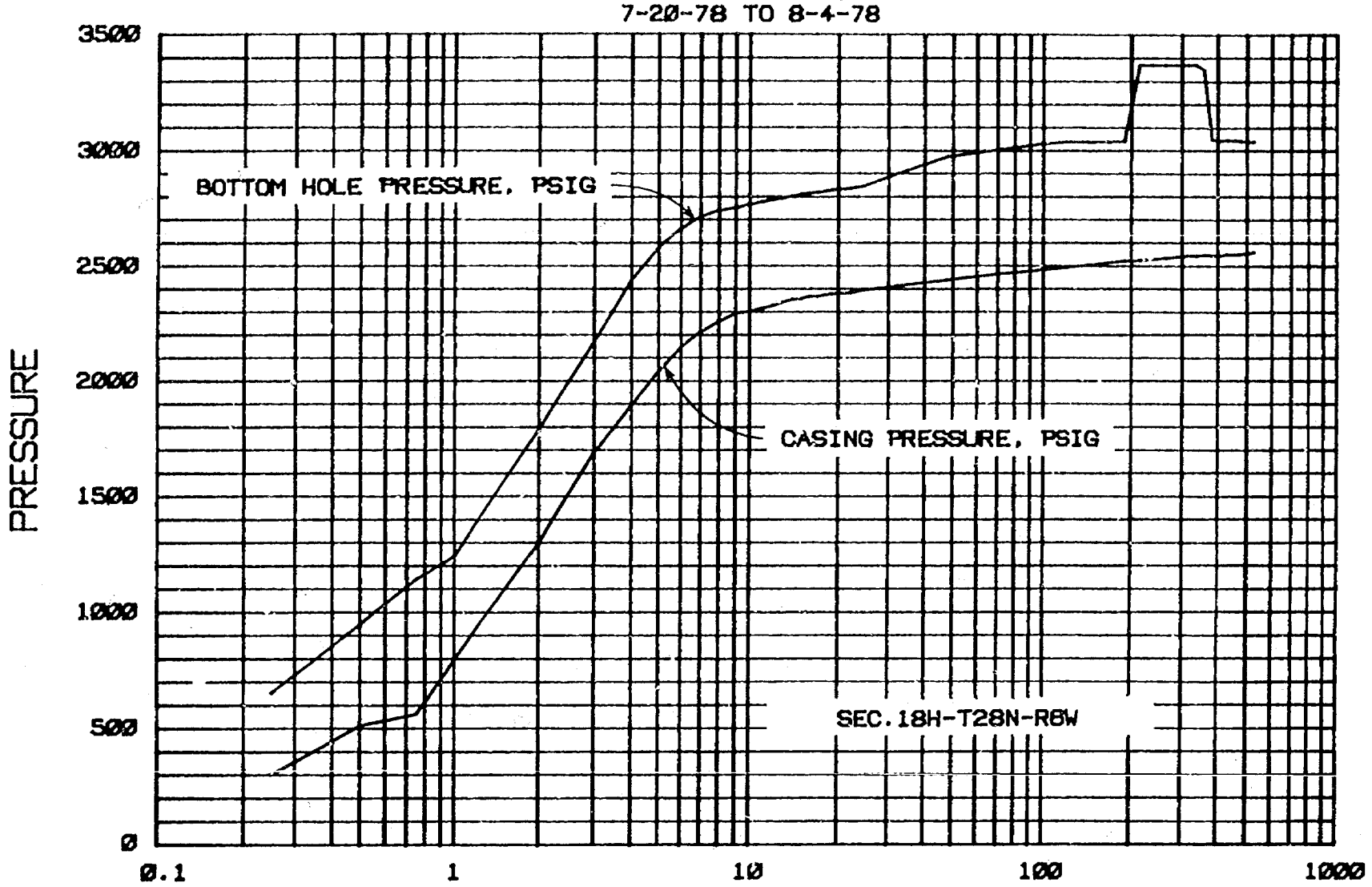






SAN JUAN 28-6 UNIT #212
PRESSURE BUILD-UP AFTER FRAC

7-20-78 TO 8-4-78



R 7 W

R 6 W

T 29 N

T 28 N

LEGEND

DATE COMPLETED	INITIAL POTENTIAL	PRODUCTION 1978/II
DATE ON STREAM	INITIAL WHSIP	CUMULATIVE PRODUCTION

(ALL PRODUCTION FIGURES IN MMCF)

(NA) DATA NOT AVAILABLE

UNIT 29-7 | UNIT 29-6

UNIT 28-7 | UNIT 28-6

105: 8-73 | 3.51 | 40.6 / 1-74 | 2728 | 611

106: 8-73 | 4.67 | 27.3 / 9-73 | 2686 | 497

31 | 35 | 32

87: 5-65 | 4.01 | 28.8 / 7-65 | 2704 | 1061

33

88: 5-65 | 3.03 | 12.4 / 4-66 | 2589 | 442.0

247: 2-79 | 1.12 | (NA) / (NA) | 2572 | (NA)

11

218: 12 (NA) | 0.61 | 31.1 / 2-75 | 1280 | 368.2

184: 7 8-73 | 3.27 | 26.9 / 9-73 | 2734 | 548.4

8 6-78 | (NA) | 97.6 / 8-78 | 2613 | 97.6 211

9

120: 4-66 | 3.33 | 18.8 / 5-66 | 2713 | 719.6

8-72 | 4.10 | 24.2 / 9-72 | 2690 | 448.4 164

14 6-63 | 2.88 | 24.9 / 4-63 | 2655 | 1037.4 136

13 186: 8-73 | 6.08 | 41.8 / 9-73 | 2800 | 840.1

8-78 | (NA) | 1315 / 9-78 | 2573 | 131.6 212

18

9-67 | 4.50 | 14.4 / 11-67 | 2670 | 604 128

17

(NA) | (NA) | 0 / (NA) | (NA) | 411 123

CASING COLLAPSED AND ABANDONED

16

159: 7-71 | 4.46 | 30.2 / 9-71 | 2591 | 668

144: 10-68 | 5.81 | 23.4 / 12-68 | 2729 | 473

126: 8-67 | 3.57 | 12.8 / 11-67 | 2687 | 560

7-71 | 2.76 | 14.6 / 10-71 | 2453 | 360.3 158

8-73 | 2.40 | 29.5 / 9-73 | 2748 | 472.9 187

258: 23 6-78 | (NA) | 81.9 / 9-78 | 2628 | 81.9

24

259: 6-78 | (NA) | 60.6 / 9-78 | 2697 | 60.6

11-68 | 5.52 | 22.1 / 12-68 | 2702 | 666 145

19

10-67 | 6.85 | 24.6 / 11-67 | 2763 | 717.7 127

20

143: 11-68 | 5.28 | 18.4 / 2-69 | 2743 | 735.7

160: 6-71 | 4.81 | 28.2 / 9-71 | 2668 | 607.4

DAKOTA RESERVOIR

SAN JUAN BASIN

NEW MEXICO

SCALE

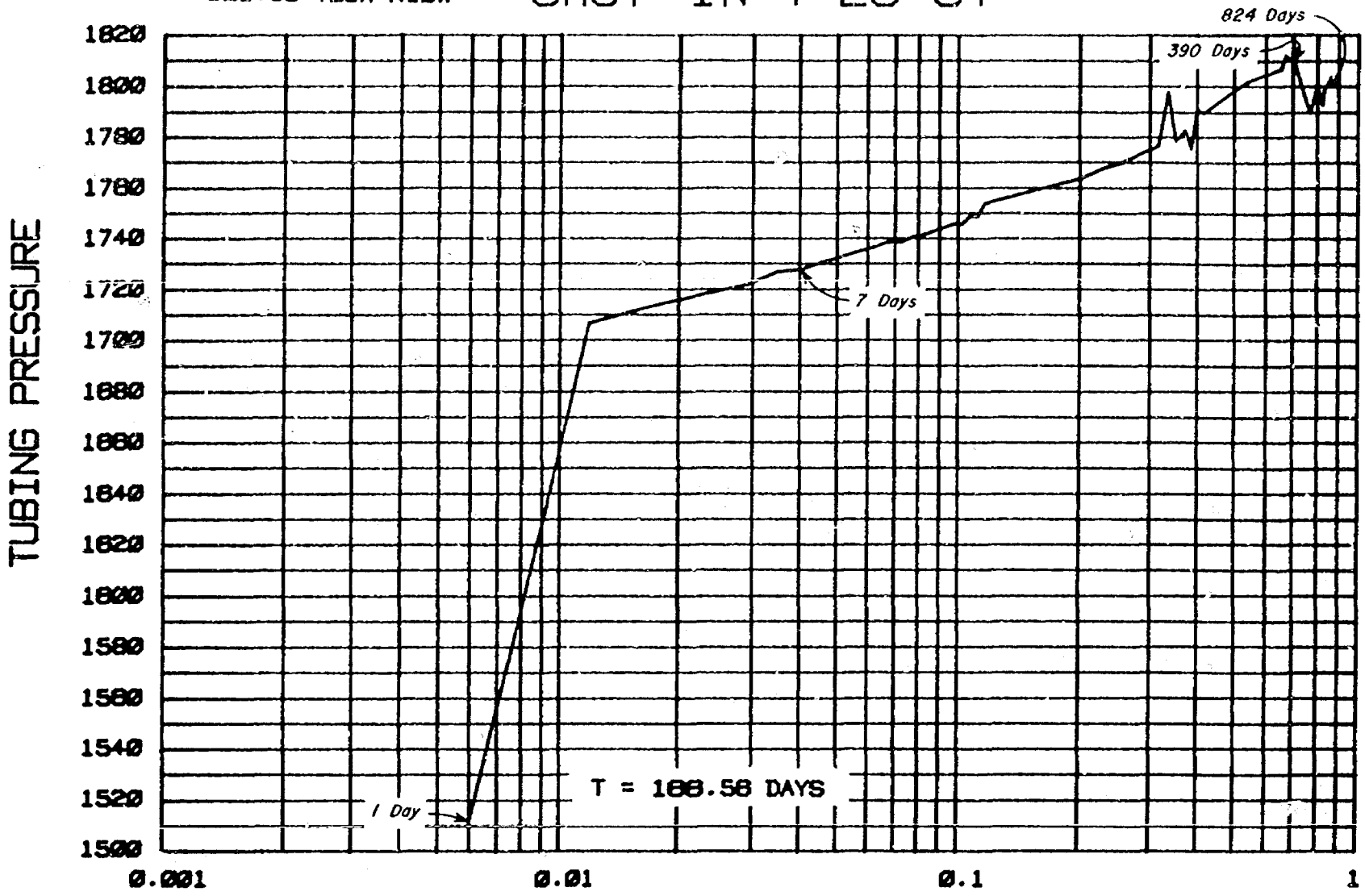
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FEET

DeGOLYER AND MacNAUGHTON DALLAS, TEXAS

HUERFANO #117 - BASIN DAKOTA

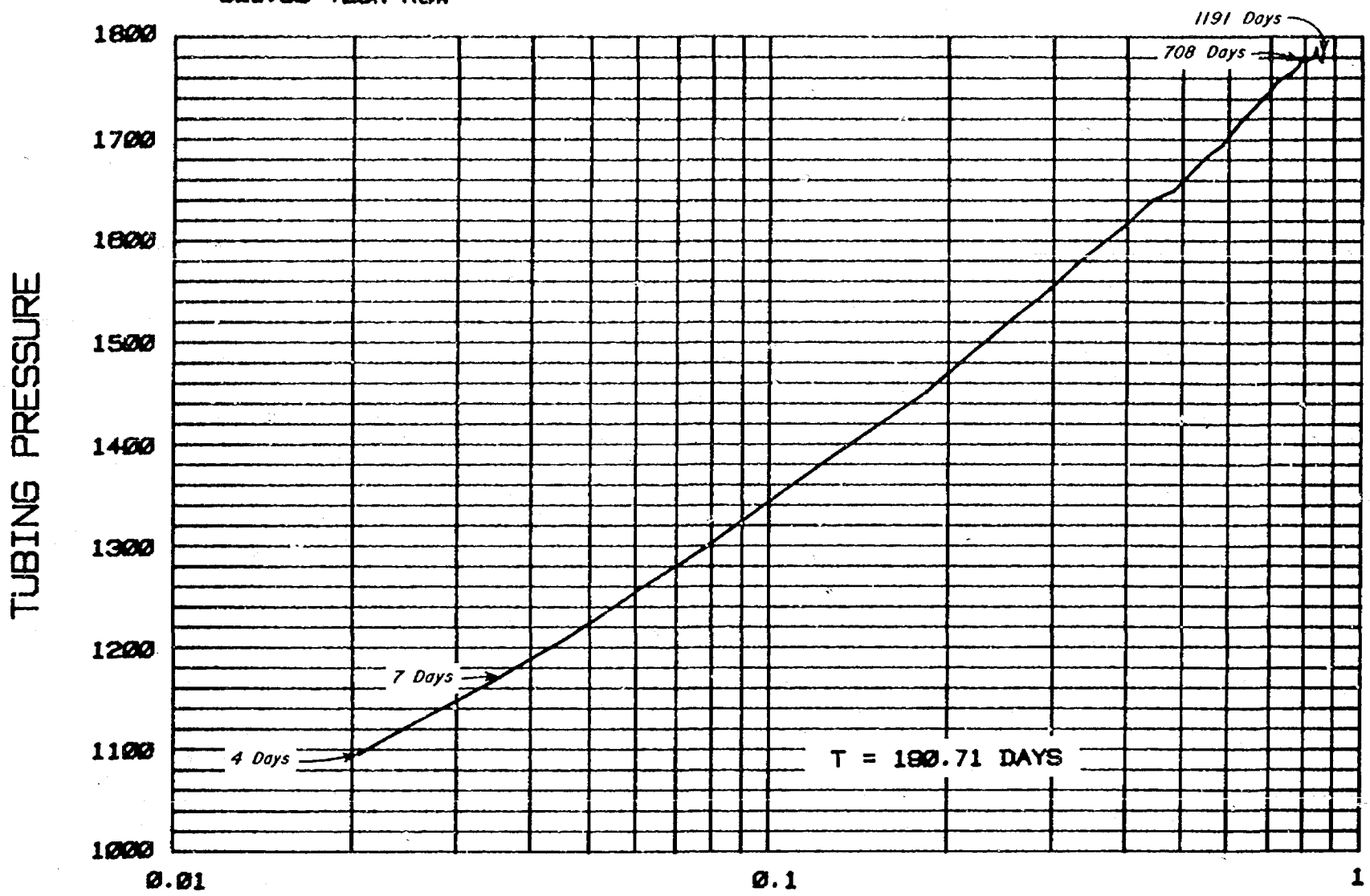
SEC. 18-T28N-R10W SHUT IN 4-23-64



HUERFANO #125 - BASIN DAKOTA

SHUT IN 4-22-63

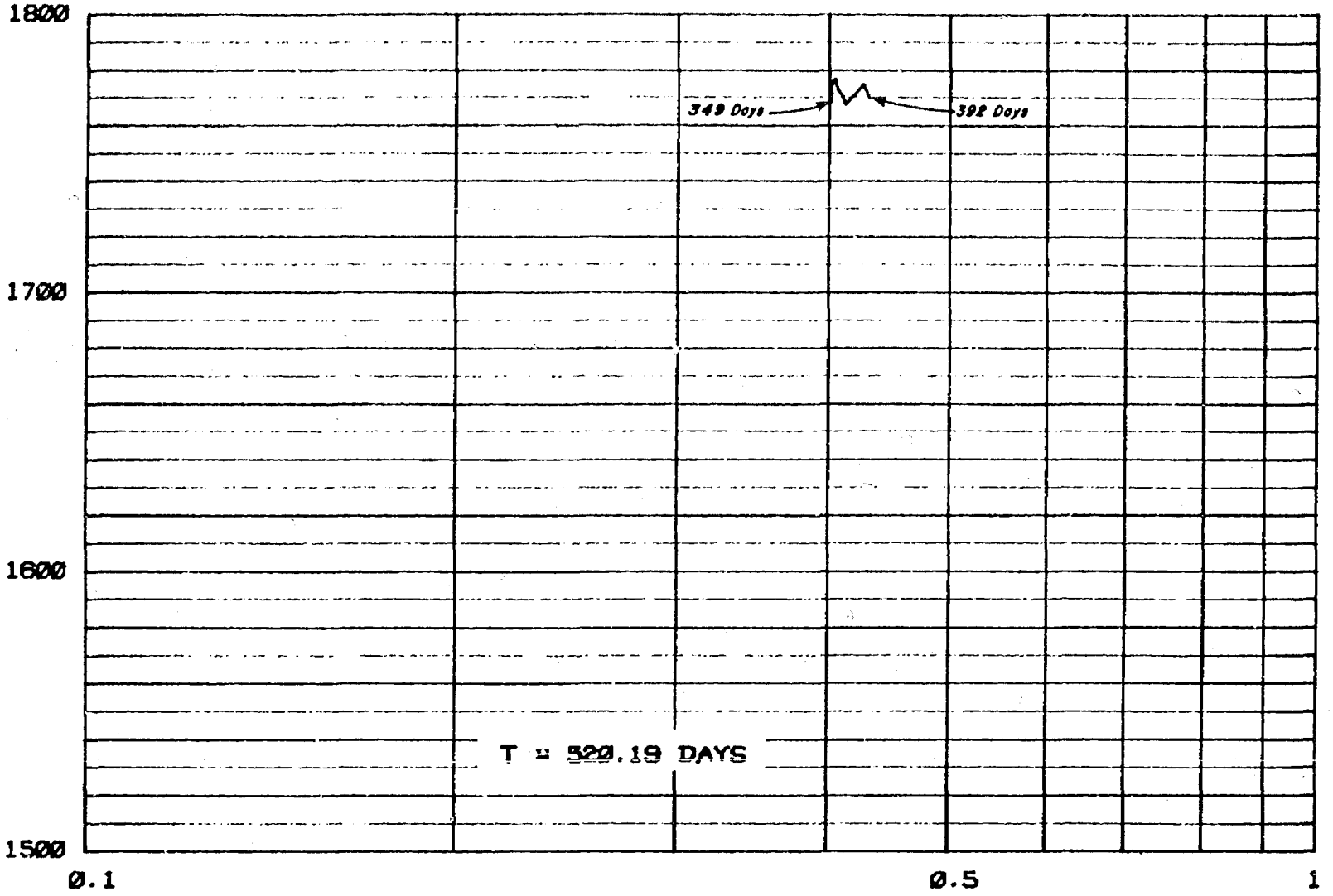
SEC.30-T28N-R8W



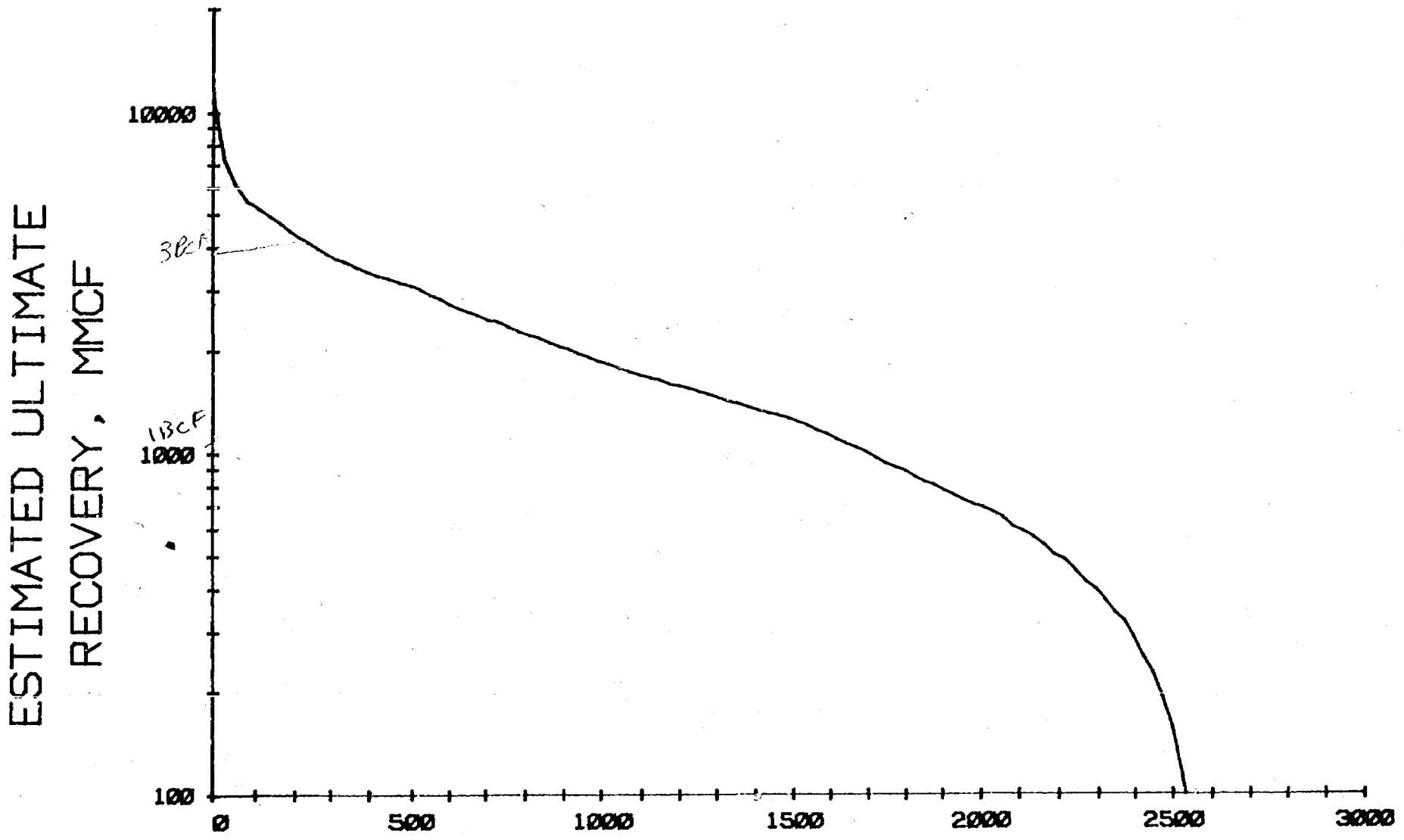
HUERFANO #121 - BASIN DAKOTA

SEC.27-T28N-R10W

SHUT IN 8-6-65



BASIN DAKOTA



PAYOUT SCHEDULE FOR AN INFILL WELL

IN THE

BASIN DAKOTA

Allowable (Mcf/day)	PAYOUT TIME (MONTHS) Eastside Well	Westside Well
100	57.2	53.2
200	27.8	25.8
300	18.5	17.2

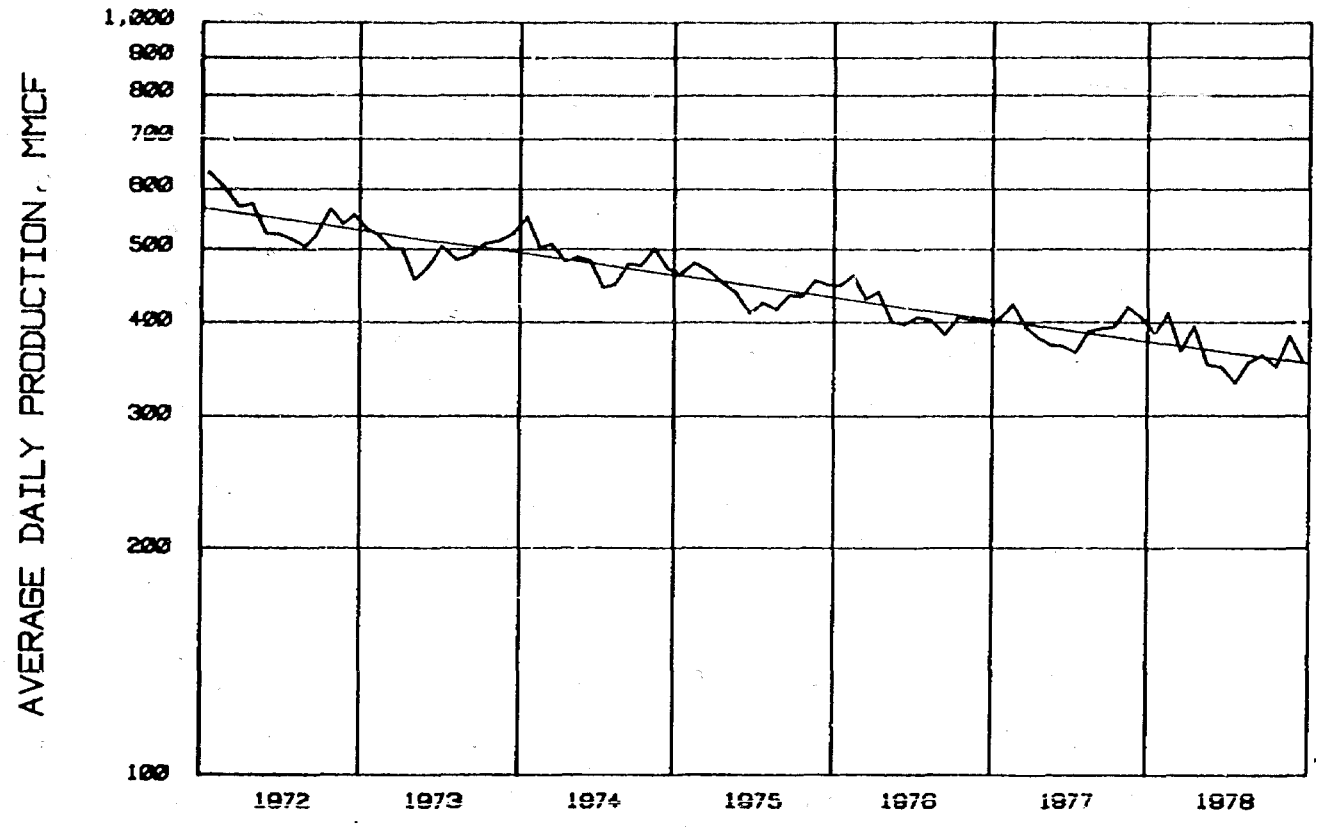
INITIAL WELL COSTS

Drilled With Gas (Eastside Well)	$ 285,800
Drilled With Mud (Westside Well)	$ 265,600
Access to Location	$ 5,800
MONTHLY OPERATING COST	$ 200
PRICE OF GAS (NGPA SECTION 103 PRICE)	$ 2/Mcf
ROYALTY (12.5%)	$ 0.25/Mcf

5

BASIN DAKOTA

AVERAGE DAILY PRODUCTION BY MONTH



DECLINE RATE = .58%/MONTH

ECONOMIC LIMIT = 4.8 MMCF/DAY
TO BE REACHED IN THE YEAR 2042

FUTURE PRODUCTION
AS OF 1/1/72 = 3.0 TCF

CUMULATIVE PRODUCTION
AS OF 1/1/72 = 1.8 TCF

ULTIMATE PRODUCTION = 4.8 TCF

320

EXHIBIT NO. 1

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6533 Exhibit No. 1
Submitted by Southland Royalty Co.
Hearing Date April 5, 1979

PRESSURE DATA

SOUTHLAND ROYALTY COMPANY

CASE NO. 6533

OIL CONSERVATION DIVISION STATE OF NEW MEXICO

OPERATOR	LEASE	WELL NO.	LOCATION	COMPLETION DATE	INITIAL SHUT-IN WELLHEAD PRESSURE (psig)	TIME BETWEEN WELLS (yrs)	PRESSURE CHANGE (psig)	RECENT SHUT-IN WELLHEAD PRESSURE (psig)	DATE
Southland Royalty Company	Culpepper Martin	17	SE-33-32N-12W	10-25-78	1583	12	+5		
Southland Royalty Company	Culpepper Martin	3	SW-33-32N-12W	5-23-66	1578			780	5-16-77
Southland Royalty Company	Day State	2	NW-32-32N-11W	10-25-78	2005	10	+43		
Southland Royalty Company	Lawson	2	NE-31-32N-11W	10-21-68	1962			565	5-25-77
Southland Royalty Company	Grenier A	8	NW-35-30N-10W	11-13-78	1811	14	-214		
Southland Royalty Company	Grenier A	4	SW-26-30N-10W	4-29-64	2025			626	5-17-77
Southland Royalty Company	Nye	3-A	SE-1-30N-11W	4-12-78	1636	14	-360		
Southland Royalty Company	Nye	11	NW-1-30N-11W	6-19-64	1996			557	7-3-77
Southland Royalty Company	Jicarilla 101	1-A	SE-1-26N-4W	1-9-79	1569	9	-252		
Southland Royalty Company	Jicarilla 101	3	SW-1-26N-4W	1-19-70	1821			993	5-16-77
Supron Energy Corporation	Jicarilla G	10-A	SE-12-26N-5W	1-31-79	2357	8	+22		
Supron Energy Corporation	Jicarilla G	10	NE-12-26N-5W	12-19-70	2335			724	4-17-77

EXHIBIT NO. 1

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6533 Exhibit No. 1
Submitted by Southland Royalty Co.
Hearing Date April 30, 1979

PRESSURE DATA

SOUTHLAND ROYALTY COMPANY

CASE NO. 6533

OIL CONSERVATION DIVISION STATE OF NEW MEXICO

OPERATOR	LEASE	WELL NO.	LOCATION	COMPLETION DATE	INITIAL SHUT-IN WELLHEAD PRESSURE (psig)	TIME BETWEEN WELLS (yrs)	PRESSURE CHANGE (psig)	RECENT SHUT-IN WELLHEAD PRESSURE (psig)	DATE
Southland Royalty Company	Culpepper Martin	17	SE-33-32N-12W	10-25-78	1583	12	+5		
Southland Royalty Company	Culpepper Martin	3	SW-33-32N-12W	5-23-66	1578			780	5-16-77
Southland Royalty Company	Day State	2	NW-32-32N-11W	10-25-78	2005	10	+43		
Southland Royalty Company	Lawson	2	NE-31-32N-11W	10-21-68	1962			565	5-25-77
Southland Royalty Company	Grenier A	8	NW-35-30N-10W	11-13-78	1811	14	-214		
Southland Royalty Company	Grenier A	4	SW-26-30N-10W	4-29-64	2025			626	5-17-77
Southland Royalty Company	Nye	3-A	SE-1-30N-11W	4-12-78	1636	14	-360		
Southland Royalty Company	Nye	11	NW-1-30N-11W	6-19-64	1996			557	7-3-77
Southland Royalty Company	Jicarilla 101	1-A	SE-1-26N-4W	1-9-79	1569	9	-252		
Southland Royalty Company	Jicarilla 101	3	SW-1-26N-4W	1-19-70	1821			993	5-16-77
Supron Energy Corporation	Jicarilla G	10-A	SE-12-26N-5W	1-31-79	2357	8	+22		
Supron Energy Corporation	Jicarilla G	10	NE-12-26N-5W	12-19-70	2335			724	4-17-77

EXHIBIT NO. 1

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 6533 Exhibit No. 1
Submitted by Southland Royalty Co.
Hearing Date Dec. 5, 1979

PRESSURE DATA

SOUTHLAND ROYALTY COMPANY

CASE NO. 6533

OIL CONSERVATION DIVISION STATE OF NEW MEXICO

OPERATOR	LEASE	WELL NO.	LOCATION	COMPLETION DATE	INITIAL SHUT-IN WELLHEAD PRESSURE (psig)	TIME BETWEEN WELLS (yrs)	PRESSURE CHANGE (psig)	RECENT SHUT-IN WELLHEAD PRESSURE (psig)	DATE
Southland Royalty Company	Culpepper Martin	17	SE-33-32N-12W	10-25-78	1583	12	+5		
Southland Royalty Company	Culpepper Martin	3	SW-33-32N-12W	5-23-66	1578			780	5-16-77
Southland Royalty Company	Day State	2	NW-32-32N-11W	10-25-78	2005	10	+43		
Southland Royalty Company	Lawson	2	NE-31-32N-11W	10-21-68	1962			565	5-25-77
Southland Royalty Company	Grenier A	8	NW-35-30N-10W	11-13-78	1811	14	-214		
Southland Royalty Company	Grenier A	4	SW-26-30N-10W	4-29-64	2025			626	5-17-77
Southland Royalty Company	Nye	3-A	SE-1-30N-11W	4-12-78	1636	14	-360		
Southland Royalty Company	Nye	11	NW-1-30N-11W	6-19-64	1996			557	7-3-77
Southland Royalty Company	Jicarilla 101	1-A	SE-1-26N-4W	1-9-79	1569	9	-252		
Southland Royalty Company	Jicarilla 101	3	SW-1-26N-4W	1-19-70	1821			993	5-16-77
Supron Energy Corporation	Jicarilla G	10-A	SE-12-26N-5W	1-31-79	2357	8	+22		
Supron Energy Corporation	Jicarilla G	10	NE-12-26N-5W	12-19-70	2335			724	4-17-77

EXHIBIT #1

RULE CHANGES PROPOSED BY EL PASO NATURAL GAS COMPANY
TO ORDER NO. R-1670, AS SUPPLEMENTED BY ORDER NO. R-1670-C,
APPLICABLE TO BASIN DAKOTA GAS POOL.

A. WELL LOCATION AND ACREAGE REQUIREMENTS

Rule 2(A) The inital well drilled on a proration unit shall be located not closer than 790 feet to any outer boundary of the quarter section on which the well is located, and not closer than 130 feet to any quarter-quarter section line or subdivision inner boundary.

Any gas well location approved to be drilled in accordance with the location rules in effect prior to the date of this order will be considered as a standard location.

In the event any such well is completed as an oil well at a location nearer than 330 feet to a governmental quarter-quarter section line, said well shall not be produced unless and until such time as the unorthodox oil well location has been approved by the Division after notice and hearing.

Rule 2(B) The second well drilled on a proration unit shall be located in the quarter section of the unit not containing a well, and shall be located with respect to the unit boundaries as described in Rule 2(A) above.

No Dakota infill well shall be drilled nearer than 920 feet to an existing Dakota well on the same proration unit.

The plats (OCD Form C-102) accompanying the Application for Permit to Drill (OCD Form C-101

El Paso Exhibit 1

or Federal Form 9-331-C) for the second well on a proration unit shall have outlined thereon the boundaries of the unit and shall show the location of the first well on the unit as well as the proposed new well.

Rule 2(C) In the event a second well is drilled on any proration unit, both wells shall be produced for so long as it is economically feasible to do so.

Rule 3 The Director of the Division shall have authority to grant an exception to the footage requirements of Rules 2(A) and 2(B), without notice and hearing where an application therefor has been filed in due form and the Director determines that such exception is necessitated by topographical conditions and good cause exists for granting such exception.

Applicants shall furnish all offset operators and all operators within the section in which the subject well is located a copy of the application to the Division and applicant shall include with his application a list of names and addresses of all such operators, together with a stipulation that proper notice has been given said operators at the addresses given. The Director of the Division shall wait at least 20 days before approving any such unorthodox location, and may approve such unorthodox location only in the absence of objection from any offset operator or any operator within the section in which the well is located. In the event such an operator

objects to the unorthodox location, the Division shall consider the matter only after proper notice and hearing.

C. ALLOCATION AND GRANTING OF ALLOWABLES

Rule 9(A) The product obtained by multiplying each proration unit's acreage factor by the calculated deliverability (expressed as MCF per day) for the well(s) on the unit shall be known as the AD Factor for the unit. The acreage factor shall be determined to the second decimal place by dividing the acreage within the proration unit by 320, subject to the acreage tolerances provided in Rule 5(A). The AD Factor shall be computed to the nearest whole number.

Rule 9(B) The monthly allowable to be assigned to each marginal proration unit shall be equal to its latest available monthly production.

Rule 9(C) The pool allowable remaining each month after deducting the total allowable assigned to marginal proration units shall be allocated among the non-marginal units entitled to an allowable in the following manner:

(1) Forty percent (40%) of the pool allowable remaining to be allocated to non-marginal units shall be allocated among such units in the proportion that each unit's "AD Factor" bears to the total "AD Factor" for all non-marginal units in the pool.

(2) Sixty percent (60%) of the pool allowable remaining to be allocated to non-marginal units

shall be allocated among such units in the proportion that each unit's acreage factor bears to the total acreage factor for all non-marginal units in the pool.

Rule 9(D) The current deliverabili'y tests, taken in accordance with the "Gas Well Testing Rules and Procedures-San Juan Basin, New Mexico," shall be used in calculating allowables for the proration units in the pool for the 12-month period beginning April 1 of the following year.

Rule 9(E) When calculating the allowable for a proration unit containing two wells, in accordance with Rule 9 of these rules, the deliverability of both wells shall be added in calculating the AD Factor and the unit allowable may be produced from both wells.

Rule 10(C) The calculated deliverability at the "deliverability pressure" shall be determined in accordance with the provisions of the current "Gas Well Testing Rules and Procedures - San Juan Basin, New Mexico."

No well shall be eligible for reclassification to "Exempt Marginal" status unless it is located on a marginal proration unit.

Rule 10(D) Within ninety (90) days after the second well on the unit is first delivered to a gas transportation facility, both wells on the unit shall have been tested in accordance with "Gas Well Testing Rules and Procedures - San Juan Basin, New Mexico" and the results of the tests filed with the Division's Aztec office and with the gas transportation facility

to which the well is connected. If a test for the current test period has previously been filed for the first well on the unit, the second test will not be required. Both tests will be treated as Initial Tests for purposes of assigning allowables to the unit. This rule shall apply to newly completed wells.

Rule 12 The full production of gas from each well, including drilling gas, shall be charged against the proration unit's allowable regardless of the disposition of the gas; provided, however, that gas used in maintaining the producing ability of the well shall not be charged against the allowable.

D. BALANCING OF PRODUCTION

Rule 14(A) Underproduction: Any non-marginal proration unit which has an underproduced status as of the end of a gas proration period shall be allowed to carry such underproduction forward into the next gas proration period and may produce such underproduction in addition to the allowable assigned during such succeeding period. Any allowable carried forward into a gas proration period and remaining unproduced at the end of such gas proration period shall be cancelled.

Rule 14(B) Production during any one month of a gas proration period in excess of the allowable assigned to a proration unit for such month shall be applied against the underproduction carried into such period in determining the amount of allowable, if any, to be cancelled.

Rule 15(A) Overproduction: Any proration unit which has an overproduced status as of the end of a gas proration period shall carry such overproduction forward into the next gas proration period. Said overproduction shall be made up during the succeeding gas proration period. Any unit which has not made up the overproduction carried into a gas proration period by the end of said period shall not be produced until such overproduction is made up.

Rule 15(B) If, during any month, it is discovered that a proration unit is overproduced in an amount exceeding six times its average monthly allowable for the preceding twelve months (or, in the case of a newly connected proration unit, six times its average monthly allowable for the months available), it shall not be produced that month nor each succeeding month until it is overproduced in an amount six times or less its average monthly allowable, as determined hereinabove.

Rule 15(C) Allowable assigned to a proration unit during any one month of a gas proration period in excess of the production for the same month shall be applied against the overproduction chargeable to such unit in determining the amount of overproduction which must be made up pursuant to the provisions of Rules 15 (A) or 15 (B) above.

Rule 15(D) The Director of the Division shall have authority to permit a proration unit which is subject to shut-in, pursuant to Rules 15 (A) or 15 (B)

above, to produce up to 500 MCF of gas per month upon proper showing to the Director that complete shut-in would cause undue hardship, provided however, such permission shall be rescinded for any proration unit produced in excess of the monthly rate authorized by the Director.

Rule 15(E) The Division may allow overproduction to be made up at a lesser rate than permitted under Rules 15 (A), 15 (B), or 15 (D) above upon a showing at public hearing that the same is necessary to avoid material damage to the unit well(s).

Rule 15(F) Any allowable accruing to a proration unit at the end of a gas proration period due to the cancellation of underage in the pool and the redistribution thereof shall be applied against the unit's overproduction.

Rule 15(G) The Director of the Division shall have authority to grant a pool-wide moratorium of up to three months on the shutting in of gas wells in a pool during periods of high-demand emergency upon proper showing that such emergency exists, and that a significant number of the wells in the pool are subject to shut-in pursuant to the provisions of Rules 15 (A) or 15 (B) above. No moratorium beyond the aforementioned three months shall be granted except after notice and hearing.

E. CLASSIFICATION OF UNITS

Rule 16(A) The proration period (as defined in Rule 13) shall be divided into four classification periods of three months each, commencing on April 1, July 1,

October 1, and January 1. After the production data is available for the last month of each classification period, any unit which had an underproduced status at the beginning of the proration period shall be classified marginal if its highest single month's production during the classification period is less than its average monthly allowable during said classification period; provided however, that the operator of any unit so classified, or other interested party, shall have 15 days after receipt of notification of marginal classification in which to submit satisfactory evidence to the Division that the unit is not of marginal character and should not be so classified.

Rule 16(B) The Director may reclassify a marginal or non-marginal proration unit at any time the unit's production data, deliverability data, or other evidence as to the unit's producing ability justifies such reclassification.

Rule 17 A proration unit which is classified as marginal shall not be permitted to accumulate underproduction, and any underproduction accrued to the unit prior to its classification as marginal shall be cancelled.

Rule 18 If, at the end of a proration period, a marginal proration unit has produced more than the total allowable for the period assigned to a non-marginal unit of like deliverability and acreage, the marginal unit shall be reclassified non-marginal

and its allowable and net status adjusted accordingly. (If the unit has been classified as marginal for one proration period only, or a portion of one proration period only, any underproduction cancelled as the result of such classification of one proration period only, any underproduction cancelled as the result of such classification shall be reinstated upon reclassification back to non-marginal status. All uncompensated-for overproduction accruing to the unit while marginal shall be chargeable upon reclassification to non-marginal.)

Rule 19 A proration unit containing a well which has been reworked or recompleted shall be classified non-marginal as of the date of reconnection of the well to a pipeline until such time as production data, deliverability data, or other evidence as to the unit's producing ability indicates that the unit should be classified marginal.

Rule 20 All proration units not classified marginal shall be classified non-marginal.

F. REPORTING OF PRODUCTION

Rule 21(A) The monthly gas production from each well shall be metered separately and the gas production therefrom shall be reported to the Division on Form C-115 in accordance with Rule 1115 of the Division's Rules and Regulations, so as to reach the Division on or before the 24th day of the month next succeeding the month in which the gas

reported was produced. The operator shall show on such report what disposition has been made of the gas produced. The sum of the production from both wells on the proration unit shall also be reported for multiple-well units.

G. GENERAL

Rule 22 No gas, either dry gas or casinghead gas, produced from the Basin-Dakota Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Division after notice and hearing.

Rule 23 Failure to comply with the provisions of this order or the rules contained herein shall result in the cancellation of allowable assigned to the affected proration unit. No further allowable shall be assigned to the affected unit until all rules and regulations are complied with. The Division Director shall notify the operator of the unit and the purchaser, in writing, of the date of allowable cancellation and the reason therefor.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

Case No. 6533
Order No. _____

APPLICATION OF EL PASO NATURAL
GAS COMPANY FOR THE AMENDMENT OF
ORDER NOS. R-1670 and R-1670-C,
BASIN-DAKOTA POOL, SAN JUAN AND
RIO ARRIBA COUNTIES, NEW MEXICO,
TO PERMIT THE OPTIONAL DRILLING
AND PRODUCTION OF A SECOND WELL ON
PRORATION UNITS IN SAID POOL, TO
ESTABLISH WELL LOCATION REQUIREMENTS,
AND TO PROVIDE THAT THE DELIVERABILITIES
OF BOTH WELLS ON THE UNIT WOULD BE
ADDITIVE FOR ALLOWABLE PURPOSES.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9:00 a.m. on April 30, 1979, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this _____ day of _____, 1979, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the "Dakota Producing Interval" in San Juan and Rio Arriba Counties, New Mexico, was created and defined by Commission Order Nos. R-1287, dated November 21, 1958, and R-1287-A, dated March 2, 1959.

(3) That the Basin-Dakota Gas Pool, located in San Juan and Rio Arriba Counties, New Mexico, was created by Commission Order No. R-1670-C, dated November 4, 1960.

(4) That the Basin-Dakota Gas Pool is governed by special rules and regulations, promulgated by the Commission in Order Nos. R-1670 and R-1670-C, as amended, which provide for 320-acre proration units and for the assignment of allowable to each proration unit in the pool based on the amount of acreage in the unit and the deliverability of the unit well.

(5) That the applicant, El Paso Natural Gas Company, seeks an order amending said Order Nos. R-1670 and R-1670-C, as amended, to permit the optional drilling of an additional well on each 320-acre proration unit in the Basin-Dakota Gas Pool; to determine the deliverability of each proration unit upon which an additional well is drilled by adding the deliverabilities of the two wells; to permit the production of the allowable assigned to a proration unit containing two wells from both wells in any proportion; to consider both wells on a proration unit as one well for purposes of balancing underproduction or overproduction; to report the production of each well on the unit as well as the total unit production; and to compare the unit production against the unit allowable for determining whether a unit should be classified marginal or non-marginal.

(6) That the Basin-Dakota Gas Pool has been developed for approximately 18 years on 320-acre proration units.

(7) That to change the unit size now in said pool would disturb the equities under many of the existing proration units.

(8) That the provisions set forth in Order No. R-1670-C, as amended, relative to acreage dedication and vertical and horizontal limits shall continue to be applicable.

(9) That the proration unit size in the Basin-Dakota Gas Pool should continue to be 320 acres.

(10) That Section 70-2-11, New Mexico Statutes Annotated, 1978, empowers the Commission to prevent waste of hydrocarbons and to protect the correlative rights of the owners of each interest in said hydrocarbons.

(11) That Section 70-2-6, New Mexico Statutes Annotated, 1978, confers jurisdiction on the Commission over all matters relating to the conservation of oil and gas.

(12) That "waste" is defined by Section 70-2-3, New Mexico Statutes Annotated, 1978.

(13) That the producing formation of the Basin-Dakota Gas Pool is comprised of various sands of low permeability and porosity which are not being efficiently and effectively drained by existing wells in the various proration units in the pool, and which can be more efficiently and effectively drained by the drilling of additional wells pursuant to the rule changes proposed by the applicant.

(14) That the infill drilling of a second well on an established proration unit in the Basin-Dakota Gas Pool is necessary to effectively and efficiently drain a portion of the reservoir covered by the proration unit which cannot be effectively and efficiently drained by any existing wells within the proration unit.

(15) That infill drilling will substantially increase recoverable reserves from each proration unit in the Basin Dakota Gas Pool.

(16) That infill drilling will result in greater ultimate recovery of the reserves under each of the various proration units in the pool.

(17) That infill drilling in the Basin-Dakota Gas Pool will result in more efficient use of reservoir energy and will tend to ensure greater ultimate recovery of gas from the pool, thereby preventing waste.

(18) That implementation of infill drilling in the Basin-Dakota Gas Pool will afford each operator the opportunity to produce, without waste, his just and equitable share of the gas from the Pool, and his correlative rights, as defined by Section 70-2-33, New Mexico Statutes Annotated, 1978, will not be impaired.

(19) That both wells on a proration unit should be produced so long as it is economically feasible to do so.

(20) That the application should be approved.

IT IS THEREFORE ORDERED:

(1) That the Special Rules for the Basin-Dakota Gas Pool in San Juan and Rio Arriba Counties, New Mexico, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended to permit the optional drilling of a second well on each proration unit; to provide that the deliverability of a proration unit containing two wells shall be the sum of the deliverabilities of each of the wells; to provide that the unit allowable may be produced from both of the wells in any proportion; to consider both wells on the proration unit as one well for purposes of balancing underproduction or overproduction; to provide for the reporting of production from each well individually and to require the reporting of total production from the unit; and to compare the unit production against the unit allowable in determining whether a unit should be classified marginal or non-marginal.

(2) That Rule 2 of the Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, is hereby amended to read as follows:

"~~A. WELL LOCATION AND ACREAGE REQUIREMENTS~~

RULE 2(A)

The initial well drilled on a proration unit shall be located not closer than 790 feet to any outer boundary of the quarter section on which the well is located, and not closer than 130 feet to any quarter-quarter section line or subdivision inner boundary.

The initial well to be drilled on a proration unit may be drilled in either quarter section in the proration unit.

Any gas well location approved ~~to be~~ drilled in accordance with the location rules in effect ~~prior to~~ the date of this order will be considered as a standard location.

In the event any such well is completed as an oil well at a location nearer than 330 feet to a governmental quarter-quarter section line, said well shall not be produced unless and until such time as the unorthodox oil well location

has been approved by the Division after notice and hearing.

RULE 2(B)

The second well drilled on a proration unit shall be located in the quarter section of the unit not containing a well, and shall be located with respect to the unit boundaries as described in Rule 2(A) above.

No Dakota infill well shall be drilled nearer than 920 feet to an existing Dakota well on the same proration unit.

The plats (OCD Form C-102) accompanying the Application for Permit to Drill (OCD Form C-101 or Federal Form 9-331-C) for the second well on a proration unit shall have outlined thereon the boundaries of the unit and shall show the location of the first well on the unit as well as the proposed new well.

RULE 2(C)

In the event a second well is drilled on any proration unit, ~~both~~ wells shall be produced for so long as it is economically feasible to do so. "

(2) ~~(3)~~ That Rule 3 of the Special Rules of the Basin-Dakota Gas Pool as promulgated by Order Nos. R-1670 and R-1670-C, as amended, is hereby amended to read as follows:

"

RULE 3

The Director of the Division shall have authority to grant an exception to the footage requirements of Rules 2(A) and 2(B), without notice and hearing where an application therefor has been filed in due form and the Director determines that such exception is necessitated by topographical conditions and good cause exists for granting such exception.

Applicants shall furnish all offset operators ~~and all operators within the section in which the subject well is~~

written statement

~~located~~ a copy of the application to the Division, and applicant shall include with his application a list of names and addresses of all such operators, together with a ~~stipulation~~ that proper notice has been given said operators at ~~the addresses given~~. The Director of the Division shall wait at least 20 days before approving any such unorthodox location, and may approve such unorthodox location only in the absence of objection from any offset operator, ~~or any operator within the section in which the well is located~~. In the event such an operator objects to the unorthodox location, the Division shall consider the matter only after proper notice and hearing."

(3) ~~(4)~~ That the Special Rules for the Basin-Dakota Gas Pool as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 9:

~~9. ALLOCATION AND GRANTING OF ALLOWABLES~~

RULE 9(A)

The product obtained by multiplying each proration unit's acreage factor by the calculated deliverability (expressed as MCF per day) for the well(s) on the unit shall be known as the AD Factor for the unit. The acreage factor shall be determined to the second decimal place by dividing the acreage within the proration unit by 320 ~~subject to the acreage tolerances provided in Rule 5(A)~~; provided however, that a standard unit containing from 316 acres to 324 acres shall be considered a standard unit. The AD Factor shall be computed to the nearest whole number.

RULE 9(B)

The monthly allowable to be assigned to each marginal proration unit shall be equal to its latest available monthly production.

RULE 9(C)

The pool allowable remaining each month after deducting the total allowable as-

signed to marginal proration units shall be allocated among the non-marginal units entitled to an allowable in the following manner:

(1) Forty percent (40%) of the pool allowable remaining to be allocated to non-marginal units shall be allocated among such units in the proportion that each unit's "AD Factor" bears to the total "AD Factor" for all non-marginal units in the pool.

(2) Sixty percent (60%) of the pool allowable remaining to be allocated to non-marginal units shall be allocated among such units in the proportion that each unit's acreage factor bears to the total acreage factor for all non-marginal units in the pool.

RULE 9(D)

The current deliverability tests, taken in accordance with the "Gas Well Testing Rules and Procedures-San Juan Basin, New Mexico," shall be used in calculating allowables for the proration units in the pool for the 12-month period beginning April 1 of the following year.

RULE 9(E)

When calculating the allowable for a proration unit containing two wells in accordance with Rule 9 of these rules, the deliverability of both wells shall be added in calculating the AD Factor and the unit allowable may be produced from both wells.

(4) ~~(5)~~ That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rules 10(C) and 10(D):

RULE 10(C)

The calculated deliverability at the "deliverability pressure" shall be determined in accordance with the provisions of the current "Gas Well Testing

Rules and Procedures-San Juan Basin, New Mexico."

No well shall be eligible for reclassification to "Exempt Marginal" status unless it is located on a marginal proration unit.

RULE 10(D)

Within ninety (90) days after the second well on the unit is first delivered to a gas transportation facility, both wells on the unit shall have been tested in accordance with "Gas Well Testing Rules and Procedures-San Juan Basin, New Mexico" and the results of the tests filed with the Division's Aztec office and with the gas transportation facility to which the well is connected. If a test for the current test period has previously been filed for the first well on the unit, the second test will not be required. Both tests will be treated as Initial Tests for purposes of assigning allowables to the unit. This rule shall apply to newly completed wells.

(5) ~~(6)~~ That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 12:

RULE 12

The full production of gas from each well, including drilling gas, shall be charged against the proration unit's allowable regardless of the disposition of the gas; provided, however, that gas used in maintaining the producing ability of the well shall not be charged against the allowable.

(6) ~~(7)~~ That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 14:

~~D. BALANCING OF PRODUCTION~~

out

RULE 14(A)

Underproduction: Any non-marginal proration unit which has an underproduced status as of the end of a gas proration period shall be allowed to carry such underproduction forward into the next gas proration period and may produce such underproduction in addition to the allowable assigned during such succeeding period. Any allowable carried forward into a gas proration period and remaining unproduced at the end of such gas proration period shall be cancelled.

RULE 14(B)

Production during any one month of a gas proration period in excess of the allowable assigned to a proration unit for such month shall be applied against the underproduction carried into such period in determining the amount of allowable, if any, to be cancelled.

(7) ~~(8)~~ That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 15:

RULE 15(A)

Overproduction: Any proration unit which has an overproduced status as of the end of a gas proration period shall carry such overproduction forward into the next gas proration period. Said overproduction shall be made up during the succeeding gas proration period. Any unit which has not made up the overproduction carried into a gas proration period by the end of said period shall not be produced until such overproduction is made up.

RULE 15(B)

If, during any month, it is discovered that a proration unit is overproduced in an amount exceeding six times its average monthly allowable for the preceding twelve months (or, in the case of

a newly connected proration unit, six times its average monthly allowable for the months available), it shall not be produced that month nor each succeeding month until it is overproduced in an amount six times or less its average monthly allowable, as determined hereinabove.

RULE 15(C)

Allowable assigned to a proration unit during any one month of a gas proration period in excess of the production for the same month shall be applied against the overproduction chargeable to such unit in determining the amount of overproduction which must be made up pursuant to the provisions of Rule 15(A) or 15(B) above.

RULE 15(D)

The Director of the Division shall have authority to permit a proration unit which is subject to shut-in, pursuant to Rules 15(A) or 15(B) above, to produce up to 500 MCF of gas per month upon proper showing to the Director that complete shut-in would cause undue hardship, provided however, such permission shall be rescinded for any proration unit produced in excess of the monthly rate authorized by the Director.

RULE 15(E)

The Division may allow overproduction to be made up at a lesser rate than permitted under Rules 15(A), 15(B), or 15(D) above, upon a showing at public hearing that the same is necessary to avoid material damage to the unit well(s).

RULE 15(F)

Any allowable accruing to a proration unit at the end of a gas proration period due to the cancellation of underage in the pool and the redis-

tribution thereof shall be applied against the unit's overproduction.

RULE 15(G)

The Director of the Division shall have authority to grant a pool-wide moratorium of up to three months on the shutting in of gas wells in a pool during periods of high-demand emergency upon proper showing that such emergency exists, and that a significant number of the wells in the pool are subject to shut-in pursuant to the provisions of Rules 15(A) or 15(B) above. No moratorium beyond the aforementioned three months shall be granted except after notice and hearing.

(8) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Section E:

E. CLASSIFICATION OF UNITS

RULE 16 (A)

The proration period (as defined in Rule 13) shall be divided into four classification periods of three months each, commencing on April 1, July 1, October 1, and January 1. After the production data is available for the last month of each classification period, any unit which had an underproduced status at the beginning of the proration period shall be classified marginal if its highest single month's production during the classification period is less than its average monthly allowable during said classification period; provided however, that the operator of any unit so classified, or other interested party, shall have 15 days after receipt of notification of marginal classification in which to submit satisfactory evidence to the Division that the unit is not of marginal character and should not be so classified.

RULE 16 (B)

The Director may reclassify a marginal or non-marginal proration unit at any time the unit's production data, deliverability data, or other evidence as to the unit's producing ability justifies such reclassification.

RULE 17

A proration unit which is classified as marginal shall not be permitted to accumulate underproduction, and any underproduction accrued to the unit prior to its classification as marginal shall be cancelled.

RULE 18

If, at the end of a proration period, a marginal proration unit has produced more than the total allowable for the period assigned to a non-marginal unit of like deliverability and acreage, the marginal unit shall be reclassified non-marginal and its allowable and net status adjusted accordingly. (If the unit has been classified as marginal for one proration period only, or a portion of one proration period only, any underproduction cancelled as the result of such classification shall be reinstated upon reclassification back to non-marginal status. All uncompensated-for overproduction accruing to the unit while marginal shall be chargeable upon reclassification to non-marginal.)

RULE 19

A proration unit containing a well which has been reworked or recompleted shall be classified non-marginal as of the date of reconnection of the well to a pipeline until such time as production data, deliverability data, or other evidence as to the unit's producing

ability indicates that the unit should be classified marginal.

RULE 20

All proration units not classified marginal shall be classified non-marginal.

(9) ~~(10)~~ That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 21 (A):

F. REPORTING OF PRODUCTION

RULE 21 (A)

The monthly gas production from each well shall be metered separately and the gas production therefrom shall be reported to the Division on Form C-115 in accordance with Rule 1115 of the Division's Rules and Regulations, so as to reach the Division on or before the 24th day of the month next succeeding the month in which the gas reported was produced. The operator shall show on such report what disposition has been made of the gas produced. The sum of the production from both wells on the proration unit shall also be reported for multiple-well units.

(10) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rules 22 and 23.

G. GENERAL

RULE 22

No gas, either dry gas or casinghead gas, produced from the Basin-Dakota Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Division after notice and hearing.

RULE 23

Failure to comply with the provisions of this order or the rules contained herein shall result in the cancellation of allowable assigned to the affected proration unit. No further allowable shall be assigned to the affected unit until all rules and regulations are complied with. The Division Director shall notify the operator of the unit and the purchaser, in writing, of the date of allowable cancellation and the reason therefor.

(12) ~~(12)~~ That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

(11) That the effective date of this order and all of the provisions ~~amendments and~~ herein shall be July 1, 1979.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION OF NEW MEXICO FOR THE PURPOSE OF CONSIDERING:

Case No. 6533 1670-V
Order No. R-~~6013~~

APPLICATION OF EL PASO NATURAL GAS COMPANY FOR THE AMENDMENT OF ORDER NOS. R-1670 and R-1670-C, BASIN-DAKOTA POOL, SAN JUAN AND RIO ARRIBA COUNTIES, NEW MEXICO, TO PERMIT THE OPTIONAL DRILLING AND PRODUCTION OF A SECOND WELL ON PRORATION UNITS IN SAID POOL, TO ESTABLISH WELL LOCATION REQUIREMENTS, AND TO PROVIDE THAT THE DELIVERABILITIES OF BOTH WELLS ON THE UNIT WOULD BE ADDITIVE FOR ALLOWABLE PURPOSES.

On P 4 fee in the date the order is to be signed

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9:00 a.m. on April 30, 1979, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this _____ day of _____, 1979, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the "Dakota Producing Interval" in San Juan and Rio Arriba Counties, New Mexico, was created and defined by Commission Order Nos. R-1287, dated November 21, 1958, and R-1287-A, dated March 2, 1959.

(3) That the Basin-Dakota Gas Pool, located in San Juan and Rio Arriba Counties, New Mexico, was created by Commission Order No. R-1670-C, dated November 4, 1960.

(4) That the Basin-Dakota Gas Pool is governed by special rules and regulations, promulgated by the Commission in Order Nos. R-1670 and R-1670-C, as amended, which provide for 320-acre proration units and for the assignment of allowable to each proration unit in the pool based on the amount of acreage in the unit and the deliverability of the unit well.

(5) That the applicant, El Paso Natural Gas Company, seeks an order amending said Order Nos. R-1670 and R-1670-C, as amended, to permit the optional drilling of an additional well on each 320-acre proration unit in the Basin-Dakota Gas Pool; to determine the deliverability of each proration unit upon which an additional well is drilled by adding the deliverabilities of the two wells; to permit the production of the allowable assigned to a proration unit containing two wells from both wells in any proportion; to consider both wells on a proration unit as one well for purposes of balancing underproduction or overproduction; to report the production of each well on the unit as well as the total unit production; and to compare the unit production against the unit allowable for determining whether a unit should be classified marginal or non-marginal.

(6) That the Basin-Dakota Gas Pool has been developed for approximately 18 years on 320-acre proration units.

(7) That to change the unit size now in said pool would disturb the equities under many of the existing proration units.

(8) That the provisions set forth in Order No. R-1670-C, as amended, relative to acreage dedication and vertical and horizontal limits shall continue to be applicable.

(9) That the proration unit size in the Basin-Dakota Gas Pool should continue to be 320 acres.

(10) That Section 70-2-11, New Mexico Statutes Annotated, 1978, empowers the Commission to prevent waste of hydrocarbons and to protect the correlative rights of the owners of each interest in said hydrocarbons.

(11) That Section 70-2-6, New Mexico Statutes Annotated, 1978, confers jurisdiction on the Commission over all matters relating to the conservation of oil and gas.

(12) That "waste" is defined by Section 70-2-3, New Mexico Statutes Annotated, 1978.

(13) That the producing formation of the Basin-Dakota Gas Pool is comprised of various sands of low permeability and porosity which are not being efficiently and effectively drained by existing wells in the various proration units in the pool, and which can be more efficiently and effectively drained by the drilling of additional wells pursuant to the rule changes proposed by the applicant.

(14) That the infill drilling of a second well on an established proration unit in the Basin-Dakota Gas Pool is necessary to effectively and efficiently drain a portion of the reservoir covered by the proration unit which cannot be effectively and efficiently drained by any existing wells within the proration unit.

(15) That infill drilling will substantially increase recoverable reserves from each proration unit in the Basin Dakota Gas Pool.

(16) That infill drilling will result in greater ultimate recovery of the reserves under each of the various proration units in the pool.

(17) That infill drilling in the Basin-Dakota Gas Pool will result in more efficient use of reservoir energy and will tend to ensure greater ultimate recovery of gas from the pool, thereby preventing waste.

(18) That implementation of infill drilling in the Basin-Dakota Gas Pool will afford each operator the opportunity to produce, without waste, his just and equitable share of the gas from the Pool, and his correlative rights, as defined by Section 70-2-33, New Mexico Statutes Annotated, 1978, will not be impaired.

(19) That both wells on a proration unit should be produced so long as it is economically feasible to do so.

(20) That the application should be approved.

IT IS THEREFORE ORDERED:

(1) That the Special Rules for the Basin-Dakota Gas Pool in San Juan and Rio Arriba Counties, New Mexico, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended to permit the optional drilling of a second well on each proration unit; to provide that the deliverability of a proration unit containing two wells shall be the sum of the deliverabilities of each of the wells; to provide that the unit allowable may be produced from both of the wells in any proportion; to consider both wells on the proration unit as one well for purposes of balancing underproduction or overproduction; to provide for the reporting of production from each well individually and to require the reporting of total production from the unit; and to compare the unit production against the unit allowable in determining whether a unit should be classified marginal or non-marginal.

(2) That Rule 2 of the Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, is hereby amended to read as follows:

~~A. WELL LOCATION AND ACREAGE REQUIREMENTS~~

"RULE 2(A)

The initial well drilled on a proration unit shall be located not closer than 790 feet to any outer boundary of the quarter section on which the well is located, and not closer than 130 feet to any quarter-quarter section line or subdivision inner boundary.

The initial well to be drilled on a proration unit may be drilled in either quarter section in the proration unit.

Any gas well location approved to be drilled in accordance with the location rules in effect prior to , 1979, will be considered as a standard location.

In the event any such well is completed as an oil well at a location nearer than 330 feet to a governmental quarter-quarter section line, said well shall not be produced unless and until such time as the unorthodox oil well location

has been approved by the Division after notice and hearing.

" RULE 2(B)

The second well drilled on a proration unit shall be located in the quarter section of the unit not containing a well, and shall be located with respect to the unit boundaries as described in Rule 2(A) above.

No Dakota infill well shall be drilled nearer than 920 feet to an existing Dakota well on the same proration unit.

The plats (OCD Form C-102) accompanying the Application for Permit to Drill (OCD Form C-101 or Federal Form 9-331-C) for the second well on a proration unit shall have outlined thereon the boundaries of the unit and shall show the location of the first well on the unit as well as the proposed new well.

" RULE 2(C)

In the event a second well is drilled on any proration unit, ~~both~~ each wells shall be produced for so long as it is economically feasible to do so."

(2) That Rule 3 of the Special Rules of the Basin-Dakota Gas Pool as promulgated by Order Nos. R-1670 and R-1670-C, as amended, is hereby amended in its entirety to read as follows:

" RULE 3

The Director of the Division shall have authority to grant an exception to the footage requirements of Rules 2(A) and 2(B), without notice and hearing where an application therefor has been filed in due form and the Director determines that such exception is necessitated by topographical conditions and good cause exists for granting such exception.

" Applicants shall furnish all offset operators ~~and all operators within the section in which the subject well is~~

written statement

~~located~~ a copy of the application to the Division and applicant shall include with his application a list of names and addresses of all such operators, together with a ~~stipulation~~ that proper notice has been given said operators ~~at the addresses given.~~ by registered or certified mail The Director of the Division shall wait at least 20 days before approving any such unorthodox location, and may approve such unorthodox location only in the absence of objection from any offset operator. ~~or any operator within the section in which the well is located.~~ In the event such an operator objects to the unorthodox location, the Division shall consider the matter only after proper notice and hearing."

(3) That the Special Rules for the Basin-Dakota Gas Pool as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 9:

~~C. ALLOCATION AND GRANTING OF ALLOWABLES~~

RULE 9(A)

The product obtained by multiplying each proration unit's acreage factor by the calculated deliverability (expressed as MCF per day) for the well(s) on the unit shall be known as the AD Factor for the unit. The acreage factor shall be determined to the second decimal place by dividing the acreage within the proration unit by 320, ~~subject to the acreage tolerances provided in Rule 5(A).~~ provided however, that a unit containing from 316 acres to 324 acres shall be considered a standard unit. The AD Factor shall be computed to the nearest whole number.

RULE 9(B)

The monthly allowable to be assigned to each marginal proration unit shall be equal to its latest available monthly production.

RULE 9(C)

The pool allowable remaining each month after deducting the total allowable as-

signed to marginal proration units shall be allocated among the non-marginal units entitled to an allowable in the following manner:

(1) Forty percent (40%) of the pool allowable remaining to be allocated to non-marginal units shall be allocated among such units in the proportion that each unit's "AD Factor" bears to the total "AD Factor" for all non-marginal units in the pool.

(2) Sixty percent (60%) of the pool allowable remaining to be allocated to non-marginal units shall be allocated among such units in the proportion that each unit's acreage factor bears to the total acreage factor for all non-marginal units in the pool.

RULE 9(D)

The current deliverability tests, taken in accordance with the "Gas Well Testing Rules and Procedures-San Juan Basin, New Mexico," shall be used in calculating allowables for the proration units in the pool for the 12-month period beginning April 1 of the following year.

RULE 9(E)

When calculating the allowable for a proration unit containing two wells in accordance with Rule 9 of these rules, the deliverability of both wells shall be added in calculating the AD Factor and the unit allowable may be produced from both wells.

(4) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rules 10(C) and 10(D):

RULE 10(C)

The calculated deliverability at the "deliverability pressure" shall be determined in accordance with the provisions of the current "Gas Well Testing

Rules and Procedures-San Juan Basin, New Mexico."

No well shall be eligible for reclassification to "Exempt Marginal" status unless it is located on a marginal proration unit.

RULE 10(D)

Within ninety (90) days after gas from the second well on the unit is first delivered to a gas transportation facility, both wells on the unit shall have been tested in accordance with "Gas Well Testing Rules and Procedures-San Juan Basin, New Mexico" and the results of the tests filed with the Division's Aztec office and with the gas transportation facility to which the well is connected. If a test for the current test period has previously been filed for the first well on the unit, ~~the~~ a second test of said well will not be required. Both tests will be treated as Initial Tests for purposes of assigning allowables to the unit. This rule shall apply to newly completed wells.

(5) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 12:

RULE 12

The full production of gas from each well, including drilling gas, shall be charged against the proration unit's allowable regardless of the disposition of the gas; provided, however, that gas used in maintaining the producing ability of the well shall not be charged against the allowable.

(6) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 14:

~~D. BALANCING OF PRODUCTION~~

RULE 14(A)

Underproduction: Any non-marginal proration unit which has an underproduced status as of the end of a gas proration period shall be allowed to carry such underproduction forward into the next gas proration period and may produce such underproduction in addition to the allowable assigned during such succeeding period. Any allowable carried forward into a gas proration period and remaining unproduced at the end of such gas proration period shall be cancelled.

RULE 14(B)

Production during any one month of a gas proration period in excess of the allowable assigned to a proration unit for such month shall be applied against the underproduction carried into such period in determining the amount of allowable, if any, to be cancelled.

(9) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 15:

RULE 15(A)

Overproduction: Any proration unit which has an overproduced status as of the end of a gas proration period shall carry such overproduction forward into the next gas proration period. Said overproduction shall be made up during the succeeding gas proration period. Any unit which has not made up the overproduction carried into a gas proration period by the end of said period shall not be produced until such overproduction is made up.

RULE 15(B)

If, during any month, it is discovered that a proration unit is overproduced in an amount exceeding six times its average monthly allowable for the preceding twelve months (or, in the case of

a newly connected proration unit, six times its average monthly allowable for the months available), it shall not be produced that month nor each succeeding month until it is overproduced in an amount six times or less its average monthly allowable, as determined hereinabove.

RULE 15(C)

Allowable assigned to a proration unit during any one month of a gas proration period in excess of the production for the same month shall be applied against the overproduction chargeable to such unit in determining the amount of overproduction which must be made up pursuant to the provisions of Rule 15(A) or 15(B) above.

RULE 15(D)

The Director of the Division shall have authority to permit a proration unit which is subject to shut-in, pursuant to Rules 15(A) or 15(B) above, to produce up to 500 MCF of gas per month upon proper showing to the Director that complete shut-in would cause undue hardship, provided however, such permission shall be rescinded for any proration unit produced in excess of the monthly rate authorized by the Director.

RULE 15(E)

The Division may allow overproduction to be made up at a lesser rate than permitted under Rules 15(A), 15(B), or 15(D) above, upon a showing at public hearing that the same is necessary to avoid material damage to the unit well(s).

RULE 15(F)

Any allowable accruing to a proration unit at the end of a gas proration period due to the cancellation of underage in the pool and the redis-

tribution thereof shall be applied against the unit's overproduction.

RULE 15(G)

The Director of the Division shall have authority to grant a pool-wide moratorium of up to three months on the shutting in of gas wells in a pool during periods of high-demand emergency upon proper showing that such emergency exists, and that a significant number of the wells in the pool are subject to shut-in pursuant to the provisions of Rules 15(A) or 15(B) above. No moratorium beyond the aforementioned three months shall be granted except after notice and hearing.

(8) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Section E:

E. CLASSIFICATION OF UNITS

RULE 16 (A)

The proration period (as defined in Rule 13) shall be divided into four classification periods of three months each, commencing on April 1, July 1, October 1, and January 1. After the production data is available for the last month of each classification period, any unit which had an underproduced status at the beginning of the proration period shall be classified marginal if its highest single month's production during the classification period is less than its average monthly allowable during said classification period; provided however, that the operator of any unit so classified, or other interested party, shall have 15 days after receipt of notification of marginal classification in which to submit satisfactory evidence to the Division that the unit is not of marginal character and should not be so classified.

RULE 16 (B)

The Director may reclassify a marginal or non-marginal proration unit at any time the unit's production data, deliverability data, or other evidence as to the unit's producing ability justifies such reclassification.

RULE 17

A proration unit which is classified as marginal shall not be permitted to accumulate underproduction, and any underproduction accrued to the unit prior to its classification as marginal shall be cancelled.

RULE 18

If, at the end of a proration period, a marginal proration unit has produced more than the total allowable for the period assigned to a non-marginal unit of like deliverability and acreage, the marginal unit shall be reclassified non-marginal and its allowable and net status adjusted accordingly. (If the unit has been classified as marginal for one proration period only, or a portion of one proration period only, any underproduction cancelled as the result of such classification shall be reinstated upon reclassification back to non-marginal status. All uncompensated-for overproduction accruing to the unit while marginal shall be chargeable upon reclassification to non-marginal.)

RULE 19

A proration unit containing a well which has been reworked or recompleted shall be classified non-marginal as of the date of reconnection of the well to a pipeline until such time as production data, deliverability data, or other evidence as to the unit's producing

ability indicates that the unit should be classified marginal.

RULE 20

All proration units not classified marginal shall be classified non-marginal.

(9) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rule 21 (A):

F. REPORTING OF PRODUCTION

RULE 21 (A)

The monthly gas production from each well shall be metered separately and the gas production therefrom shall be reported to the Division on Form C-115 in accordance with Rule 1115 of the Division's Rules and Regulations, so as to reach the Division on or before the 24th day of the month next succeeding the month in which the gas reported was produced. The operator shall show on such report what disposition has been made of the gas produced. The sum of the production from both wells on the proration unit shall also be reported for multiple-well units.

(10) That said Special Rules for the Basin-Dakota Gas Pool, as promulgated by Order Nos. R-1670 and R-1670-C, as amended, are hereby amended by the addition of the following Special Rules 22 and 23.

G. GENERAL

RULE 22

No gas, either dry gas or casinghead gas, produced from the Basin-Dakota Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Division after notice and hearing.

RULE 23

Failure to comply with the provisions of this order or the rules contained herein shall result in the cancellation of allowable assigned to the affected proration unit. No further allowable shall be assigned to the affected unit until all rules and regulations are complied with. The Division Director shall notify the operator of the unit and the purchaser, in writing, of the date of allowable cancellation and the reason therefor.

(12) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

(11) That the effective date of this order shall be July 1, 1979.

RECEIVED
JUN 13 1979
OIL CONSERVATION DIVISION
SANTA FE

Case 6533

Department of Energy
Washington, D.C. 20461

JUN 7 1979

File:
Basin Dakota
Infill Case

Mr. Joe D. Ramey
Director
New Mexico Oil Conservation
Commission
P.O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

The Department of Energy (DOE) is following with interest the recent proposal of El Paso Natural Gas Company and other interested leaseholders to obtain approval from the New Mexico Oil Conservation Commission to reduce well spacing for the Basin Dakota Gas Pool in the San Juan Basin of New Mexico.

We are cognizant of the success achieved to date with a similar proposal approved by the Commission for the Blanco Mesa Verde Field. Information provided by El Paso indicates that monthly production for the Mesa Verde had increased an average of 10 billion cubic feet due primarily to the infill drilling carried out by El Paso since 1975.

DOE has placed increased emphasis on the need to increase the production of natural gas as a way of reducing oil imports and satisfying increasing demands for natural gas. It is particularly significant in the El Paso case because a substantial volume of the gas produced in the San Juan Basin is ultimately delivered by El Paso to southern California, where there has been a persistent requirement for clean burning energy sources, such as natural gas.

The Office of Resource Applications is currently involved with the implementation of various initiatives to bring into commercial production unconventional natural gas sources, such as coalbed methane, Devonian shale, and tight sands.

We recognize the difficulty of achieving desired levels of production using conventional production practices in tight sands such as those existing in the San Juan Basin, and for this reason, we are quite interested in pursuing and encouraging various initiatives that increase the prospects for obtaining additional gas production from unconventional gas sources.

The price incentives provided by the Natural Gas Policy Act of 1978 will undoubtedly have a significant impact in encouraging further exploration and development drilling for natural gas. Such drilling efforts would be further enhanced if certain production practices, such as reduced well spacing, were given serious consideration in deciding whether they contribute to increasing the level of production and ultimate recovery of gas in a particular reservoir.

Given the success to date for the Mesa Verde Field, we are optimistic that a similar success could be achieved for the Basin Dakota Gas Pool. The DOE, therefore, believes that the concept of infill drilling has merits for achieving increased natural gas production and should receive favorable consideration by the Commission.

Sincerely,

R. Dobie Langenkamp
Deputy Assistant Secretary
Oil, Natural Gas and Shale
Resources
Resource Applications

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

DIRECTOR
JOE D. RAMEY

LAND COMMISSIONER
PHIL R. LUCERO

STATE GEOLOGIST
EMERY C. ARNOLD

May 23, 1979

Mr. Owen Lopez
Montgomery, Andrews & Hannahs
Attorneys at Law
Post Office Box 2307
Santa Fe, New Mexico 87501

Re: CASE NO. 6533
ORDER NO. R-1670-V

Applicant:

El Paso Natural Gas Company

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

Copy of order also sent to:

Hobbs OCC x
Artesia OCC x
Aztec OCC x

Other Dave Burleson, Gordon Ryan, William F. Carr, Richard Byrd, John Chisolm

Send copy of order in Case 6533
to:

John Chisolm
Smith Energy Services
No. 746 Metro Bank Bldg.
Denver, Colorado 80202

OIL CONSERVATION COMMISSION-SANTA FE

Sungas

April 27, 1979

State of New Mexico Energy and Mineral Department
Oil Conservation Division
State Land Office Building, Old Santa Fe Trail
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. Joe D. Ramey, Director

Re: Statement of Support
Docket No. 17-79 - CASE 6533
Commission Hearing - Monday-
April 30, 1979

Gentlemen:

Sun Oil Company wishes to support the application of El Paso Natural Gas Company for the amendment of Orders Nos. R-1670 and R-1670-C, Basin-Dakota Pool, San Juan and Rio Arriba Counties, New Mexico as pertains to permitting optional drilling and production of second wells on proration units, establishing well location requirements and providing that deliverabilities of both wells on the proration unit would be additive for allowable purposes.

Sun respectfully requests this statement of support be read into the record.

Yours very truly,

Charles A. Gray

Charles A. Gray
Sr. Conservation Representative
Sun Oil Company

CAG:lw

April 30, 1979

Mr. Joe D. Ramey
Division Director
New Mexico Oil Conservation Division
Post Office Box 2088
Santa Fe, New Mexico 87501

Re: Application of El Paso Natural Gas Company for Infill Dakota Wells Case No. 6533

Gentlemen:

Dugan Production Corp. wishes to state its support of El Paso Natural Gas Company's application for infill Dakota wells.

The approval of this application by the Division will provide an opportunity for oil and gas operators to recover additional natural gas from the Dakota formation which would not be recovered from one Dakota well in the currently established 320 acre proration units.

Without wishing to cloud the issues presented to the Division by El Paso we wish to draw the Division's attention to certain circumstances now existing for the Basin Dakota Pool. We agree with El Paso's testimony that the existing Dakota proration units should not be disturbed. However, there are situations where an operator may own the Dakota operating rights for only 160 acres.

We wish to submit for your consideration that this Division when rendering its decision provide for an administrative approval procedure for a Dakota well on a 160 acre proration unit where a 320 acre Dakota proration unit does not presently exist.

Thank you for your consideration of the above comments.

Respectfully submitted,

Thomas A. Dugan

Thomas A. Dugan
President

April 30, 1979

Mr. Joe D. Ramey
Division Director
New Mexico Oil Conservation Division
Post Office Box 2088
Santa Fe, New Mexico 87501

Re: Application of El Paso Natural Gas Company for Infill Dakota Wells Case No. 6533

Gentlemen:

Dugan Production Corp. wishes to state its support of El Paso Natural Gas Company's application for infill Dakota wells.

The approval of this application by the Division will provide an opportunity for oil and gas operators to recover additional natural gas from the Dakota formation which would not be recovered from one Dakota well in the currently established 320 acre proration units.

Without wishing to cloud the issues presented to the Division by El Paso we wish to draw the Division's attention to certain circumstances now existing for the Basin Dakota Pool. We agree with El Paso's testimony that the existing Dakota proration units should not be disturbed. However, there are situations where an operator may own the Dakota operating rights for only 160 acres.

We wish to submit for your consideration that this Division when rendering its decision provide for an administrative approval procedure for a Dakota well on a 160 acre proration unit where a 320 acre Dakota proration unit does not presently exist.

Thank you for your consideration of the above comments.

Respectfully submitted,

Thomas A. Dugan

Thomas A. Dugan
President

NORTHWEST PIPELINE CORPORATION

P.O. BOX 1526
SALT LAKE CITY, UTAH 84110
801-534-3600

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APR 27 1979
OIL CONSERVATION DIVISION
SANTA FE

April 24, 1979

Mr. J.D. Ramey, Sec.-Director
Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87801

RE: Docket No. 17-79 (Case 6533)
Application to Amend Certain Spacing and
Allowable Rules in the Basin Dakota Pool

Dear Sir:

Northwest Pipeline Corporation, as a major gatherer of natural gas from the San Juan Basin, wishes to state its support for the application of El Paso Natural Gas Company in the scheduled April 30, 1979, Commission hearing - Docket No. 17-79, Case 6533.

Northwest urges the Commission to adopt the proposed rule changes to permit the optional drilling and production of an additional well on the proration units of the Basin-Dakota pool, and to provide for the assignment of allowables for such additional wells and proration units.

Northwest believes that the proposed rule changes are a technically prudent and justifiable method for increasing the timely and ultimate gas recoveries from the Basin-Dakota pool.

Sincerely,

NORTHWEST PIPELINE CORPORATION

Neil T. Foley, Manager
Gas Reserves & Evaluations

NTF/dma

ATWOOD, MALONE, MANN & COOTER
A PROFESSIONAL ASSOCIATION
LAWYERS

JEFF D. ATWOOD [1883-1960]
ROSS L. MALONE [1910-1974]

P. O. DRAWER 700
SECURITY NATIONAL BANK BUILDING
ROSWELL, NEW MEXICO 88201
[505] 622-6221

CHARLES F. MALONE
RUSSELL D. MANN
PAUL A. COOTER
BOB F. TURNER
JOHN W. BASSETT
ROBERT E. SABIN
BRIAN W. COPPLE

RANDAL W. ROBERTS
STEVEN L. BELL

RECEIVED
APR 30 1979
OIL CONSERVATION DIVISION
SANTA FE

April 26, 1979

Mr. Joe Ramey
Secretary Director
Oil Conservation Commission
Post Office Box 2088
Santa Fe, New Mexico 87501

RE: Commission Hearing - Monday, April 30, 1979 - Case No. 6533

Dear Mr. Ramey:

We would appreciate your filing the enclosed Entry of Appearance for Amoco Production Company in Case No. 6533.

Your assistance in this matter is greatly appreciated.

Very truly yours,

Charles F. Malone

CFM:sgs
Enc.

cc: Gordon D. Ryan, Esquire
w/enc.

RECEIVED
SEP 29 1970
OIL CONSERVATION DIVISION
SANTA FE

BEFORE THE OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION)
OF EL PASO NATURAL GAS COMPANY)
FOR AMENDMENT OF ORDERS R-1670)
and R-1670-C, BASIN DAKOTA POOL,) No. 6533
SAN JUAN AND RIO ARRIBA COUNTIES,
NEW MEXICO.)

ENTRY OF APPEARANCE

The undersigned hereby enter appearance in behalf of Amoco Production Company with Gordon D. Ryan of Denver, Colorado.

ATWOOD, MALONE, MANN & COOTER, P.A.

By _____

Post Office Drawer 700
Roswell, New Mexico 88201

H. A. Ingram

CONOCO

To REM

Date 10-5

The Exhibits not included are big, so didn't include them.

JD

CASE 6492: (Continued from March 28, 1979, Examiner Hearing)

Application of Yates Petroleum Corporation for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the San Andres formation underlying the NE/4 NW/4 of Section 13, Township 17 South, Range 25 East, Eddy County, New Mexico, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision. Also to be considered will be the designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASE 6502: (Continued from April 11, 1979, Examiner Hearing)

Application of Stevens Oil Company for compulsory pooling, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the San Andres formation underlying the SW/4 SW/4 of Section 30, Township 8 South, Range 29 East, Chaves County, New Mexico, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision. Also to be considered will be the designation of applicant as operator of the well and a charge for risk involved in drilling said well.

CASE 6500: (Continued and Readvertised)

Application of Gulf Oil Corporation for approval of infill drilling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks a finding that the Division waived existing well-spacing requirements and found that the drilling of additional wells was necessary to effectively and efficiently drain those portions of the proration units in the Central Drinkard Unit located in Sections 28, 29, 30, 31, 32 and 33, Township 21 South, Range 37 East, Lea County, New Mexico, which could not be so drained by the existing wells.

CASE 6501: (Continued and Readvertised)

Application of Delta Drilling Company for directional drilling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to re-enter the Williamson State Unit Well No. 1, the surface location of which is 660 feet from the North and West lines of Section 30, Township 16 South, Range 33 East, Lea County, New Mexico, and directionally drill said well in such a manner as to bottom it in the Morrow formation within 100 feet of a point 1980 feet from the North and East lines of said Section 30, the N/2 of the section to be dedicated to the well.

****

Docket No. 17-79

DOCKET: COMMISSION HEARING - MONDAY - APRIL 30, 1979

OIL CONSERVATION COMMISSION - 9 A.M. - ROOM 205
STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

CASE 6533: Application of El Paso Natural Gas Company for the amendment of Orders Nos. R-1670 and R-1670-C, Basin-Dakota Pool, San Juan and Rio Arriba Counties, New Mexico. Applicant, in the above-styled cause, seeks the amendment of Orders Nos. R-1670 and R-1670-C, Basin-Dakota Pool, San Juan and Rio Arriba Counties, New Mexico, to permit the optional drilling and production of a second well on proration units in said pool, to establish well location requirements, and to provide that the deliverabilities of both wells on the unit would be additive for allowable purposes.

John McCaw
Dane Adams
Dave Burleson
Owen Lopez - El Paso
2 Witness

Gordon Ryan Amoco
1 Wit.

Neiberger

Wm F. Carr -
1 Wit.

Richard Byrd

Rich. Tulley

Bob Gibb

Tracy Stoddard

Jerry Brown

Arora

#1 Pool Rules
#2 Location Plat

El Paso -
Mel Urlick -
2nd well
Add deliverability
2nd well necessary to recovery
reserves

Gas Capacity
1,400,000,000 - Capacity
1,100,000,000 - delivered

A F Van Eberdingen

#3 - Map
#4 - Print out
5 Trillion ultimate
#5

Rec. Gas from Infill - 4.5 Trillion
Under present - 5.5 "
ultimate recovery.

Carr - Southland
Marlin Thompson

Ryan
Neiberger

4.6
Recom. same as El Paso

RECEIVED
APR 09 19
OIL CONSERVATION DIVISION
SANTA FE

BEFORE THE OIL CONSERVATION DIVISION
OF THE STATE OF NEW MEXICO

APPLICATION OF EL PASO NATURAL GAS COMPANY FOR AN AMENDMENT OF ORDER NO. R-1670, AS SUPPLEMENTED BY ORDER NO. R-1670-C, TO PERMIT THE OPTIONAL DRILLING AND PRODUCTION OF AN ADDITIONAL WELL ON PRORATION UNITS IN THE BASIN DAKOTA GAS POOL OF SAN JUAN AND RIO ARRIBA COUNTIES, NEW MEXICO, AND TO PROVIDE FOR THE ASSIGNMENT OF ALLOWABLES FOR SUCH ADDITIONAL WELLS AND PRORATION UNITS.

Case No. _____

APPLICATION

El Paso Natural Gas Company hereby applies to the New Mexico Oil Conservation Division for an order amending Order No. R-1670, as supplemented by Order No. R-1670-C, to permit the optional drilling and production of an additional well on proration units in the Basin Dakota Gas Pool of San Juan and Rio Arriba Counties, New Mexico, and to provide for the assignment of allowables for such additional wells and proration units, and in support of its application states:

1. El Paso Natural Gas Company (hereinafter referred to as "El Paso") is a Delaware corporation which is authorized to do business in the state of New Mexico.

2. El Paso is a "natural-gas company" within the meaning of the Natural Gas Act, 15 U.S.C. Section 717 et seq., and is engaged in the business of producing, purchasing, transporting and selling natural gas in interstate commerce to distribution companies and other pipeline companies for resale and directly to industries and others for their own consumption. El Paso's interstate pipeline system extends from the Permian Basin area of west Texas and southeast New Mexico, the Texas-Oklahoma Panhandle area, the San Juan Basin area of northwest New Mexico and southwest Colorado through the states of Texas, New Mexico and Arizona to points of termination at the boundaries between the state of California and Arizona and Arizona and Nevada.

3. El Paso produces natural gas from wells which it owns and operates in the Basin Dakota Gas Pool located in San Juan and Rio Arriba Counties, New Mexico, which natural gas is transmitted through El Paso's interstate pipeline system. El Paso purchases natural gas which is produced through wells owned and operated by others in the Basin Dakota Gas Pool, which natural gas also enters El Paso's interstate pipeline system.

4. The Basin Dakota Gas Pool is governed by Order No. R-1670, as supplemented by special rules and regulations promulgated by the Division in Order No. R-1670-C, which Order and rules and regulations provide for 320-acre proration units and well locations no nearer than 790 feet to the boundary line of the proration unit and shall be located no nearer than 130 feet to a governmental quarter-quarter section line or subdivision inner boundary line. Order No. R-1670, as supplemented by Order No. R-1670-C, also provides for the assignment of an allowable to each proration unit in the pool based on the amount of acreage in the unit and the deliverability of the unit well.

5. The drilling of an additional well on the undeveloped quarter section of each 320-acre proration unit on which one well has been drilled would develop additional recoverable reserves. In order to permit and encourage the drilling of such additional wells, the Division should amend its Order No. R-1670, as supplemented by Order No. R-1670-C, in the manner stated on Exhibit "A" attached hereto, which amendment would specifically permit the drilling and production of such additional wells and would prescribe the method of assigning allowables to the proration units upon which such wells would be located. The said Exhibit "A" is incorporated by reference and made a part of this application.

6. The drilling of a second well on established proration units in the Basin Dakota Gas Pool is necessary to effectively

and efficiently drain a portion of the reservoir covered by the proration unit which cannot be effectively and efficiently drained by any existing well within the proration unit.

7. Approval of this application by amendment of Order No. R-1670, as supplemented by Order No. R-1670-C, in the manner set forth on Exhibit "A" will substantially increase recoverable reserves to be produced within the useful life of production and transmission facilities, thereby preventing waste and protecting correlative rights.

8. The additional gas supply, in terms of reserves and deliverability, which would become available as the result of approval of this application is of critical importance in order that El Paso can more nearly fulfill the market demand for gas throughout its system.

WHEREFORE, El Paso requests that this application be set for hearing before the Division at the earliest practicable date and that the Division enter its order amending Order No. R-1670, as supplemented by Order No. R-1670-C, in the manner stated on Exhibit "A" attached to this application or in such other manner as the Division deems appropriate.

MONTGOMERY, ANDREWS & HANNAHS, P.A.

By _____
Owen M. Lopez
P. O. Box 2307
Santa Fe, New Mexico 87501

Attorneys for El Paso Natural Gas Company

RULE CHANGES PROPOSED BY EL PASO NATURAL GAS COMPANY
TO ORDER NO. R-1670, AS SUPPLEMENTED BY ORDER NO. R-1670-C,
APPLICABLE TO BASIN DAKOTA GAS POOL.

A. Rule 2(A) The initial well drilled on a proration unit shall be located not closer than 790 feet to any outer boundary of the quarter section on which the well is located, and not closer than 130 feet to any quarter-quarter section line or subdivision inner boundary.

Any gas well location approved to be drilled in accordance with the location rules in effect prior to the date of this order will be considered as a standard location.

In the event any such well is completed as an oil well at a location nearer than 330 feet to a governmental quarter-quarter section line, said well shall not be produced unless and until such time as the unorthodox oil well location has been approved by the Division after notice and hearing.

Rule 2(B) The second well drilled on a proration unit shall be located in the quarter section of the unit not containing a well, and shall be located with respect to the unit boundaries as described in Rule 2(A) above.

No Dakota infill well shall be drilled nearer than 920 feet to an existing Dakota well on the same proration unit.

The plats (OCD Form C-102) accompanying the Application for Permit to Drill (OCD Form C-101

EXHIBIT "A"

or Federal Form 9-331-C) for the second well on a proration unit shall have outlined thereon the boundaries of the unit and shall show the location of the first well on the unit as well as the proposed new well.

Rule 2(C) In the event a second well is drilled on any proration unit, both wells shall be produced for so long as it is economically feasible to do so.

Rule 3 The Director of the Division shall have the authority to grant an exception to the footage requirements of rules 2(A) and 2(B), without notice and hearing where an application therefor has been filed in due form and the Director determines that such exception is necessitated by topographical conditions and good cause exists for granting such exception.

Applicants shall furnish all offset operators and all operators within the section in which the subject well is located a copy of the application to the Division and applicant shall include with his application a list of names and addresses of all such operators, together with a stipulation that proper notice has been given said operators at the addresses given. The Director of the Division shall wait at least 20 days before approving any such unorthodox location, and may approve such unorthodox location only in the absence of objection from any offset operator or any operator within the section in which the well is located. In the event such an operator ob-

jects to the unorthodox location, the Division shall consider the matter only after proper notice and hearing.

C. ALLOCATION AND GRANTING OF ALLOWABLES:

Rule 9(A) The product obtained by multiplying each proration unit's acreage factor by the calculated deliverability (expressed as MCF per day) for the well(s) on the unit shall be known as the AD Factor for the unit. The acreage factor shall be determined to the second decimal place by dividing the acreage within the proration unit by 320, subject to the acreage tolerances provided in Rule 5(A). The AD Factor shall be computed to the nearest whole number.

Rule 9(B) The monthly allowable to be assigned to each marginal proration unit shall be equal to its latest available monthly production.

Rule 9(C) The pool allowable remaining each month after deducting the total allowable assigned to marginal proration units shall be allocated among the non-marginal units entitled to an allowable in the following manner:

(1) Forty percent (40%) of the pool allowable remaining to be allocated to non-marginal units shall be allocated among such units in the proportion that each unit's "AD Factor" bears to the total "AD Factor" for all non-marginal units in the pool.

(2) Sixty percent (60%) of the pool allowable remaining to be allocated to non-marginal units

shall be allocated among such units in the proportion that each unit's acreage factor bears to the total acreage factor for all non-marginal units in the pool.

Rule 9(D) The current deliverability tests, taken in accordance with the "Gas Well Testing Rules and Procedures-San Juan Basin, New Mexico," shall be used in calculating allowables for the proration units in the pool for the 12-month period beginning April 1 of the following year.

Rule 9(E) When calculating the allowable for a proration unit containing two wells, in accordance with Rule 9 of these rules, the deliverability of both wells shall be added in calculating the AD Factor and the unit allowable may be produced from both wells.

Rule 10(C) The calculated deliverability at the "Deliverability pressure" shall be determined in accordance with the provisions of the current "Gas Well Testing Rules and Procedures - San Juan Basin, New Mexico."

No well shall be eligible for reclassification to "Exempt Marginal" status unless it is located on a marginal proration unit.

Rule 12 The full production of gas from each well, including drilling gas, shall be charged against the proration unit's allowable regardless of the disposition of the gas; provided, however, that gas used in maintaining the producing ability of the well shall not be charged against the allowable.

D. BALANCING OF PRODUCTION:

Rule 14(A) Underproduction: Any non-marginal proration unit which has an underproduced status as of the end of a gas proration period shall be allowed to carry such underproduction forward into the next gas proration period and may produce such underproduction in addition to the allowable assigned during such succeeding period. Any allowable carried forward into a gas proration period and remaining unproduced at the end of such gas proration period shall be cancelled.

Rule 14(B) Production during any one month of a gas proration period in excess of the allowable assigned to a proration unit for such month shall be applied against the underproduction carried into such period in determining the amount of allowable, if any, to be cancelled.

Rule 15(A) Overproduction: Any proration unit which has an overproduced status as of the end of a gas proration period shall carry such overproduction forward into the next gas proration period. Said overproduction shall be made up during the succeeding gas proration period. Any unit which has not made up the overproduction carried into a gas proration period by the end of said period shall not be produced until such overproduction is made up.

Rule 15(B) If, during any month, it is discovered that a proration unit is overproduced in an amount exceeding six times its average monthly allowable

for the preceding twelve months (or, in the case of a newly connected proration unit, six times its average monthly allowable for the months available), it shall not be produced that month nor each succeeding month until it is overproduced in an amcunt six times or less its average monthly allowable, as determined hereinabove.

Rule 15(C) Allowable assigned to a proration unit during any one month of a gas proration period in excess of the production for the same month shall be applied against the overproduction chargeable to such unit in determining the amount of overproduction which must be made up pursuant to the provisions of Rules 15 (A) or 15 (B) above.

Rule 15(D) The Director of the Division shall have authority to permit a proration unit which is subject to shut-in, pursuant to Rules 15 (A) or 15 (B) above, to produce up to 500 MCF of gas per month upon proper showing to the Director that complete shut-in would cause undue hardship, provided however, such permission shall be rescinded for any proration unit produced in excess of the monthly rate authorized by the Director.

Rule 15(E) The Division may allow overproduction to be made up at a lesser rate than permitted under Rules 15 (A), 15 (B), or 15 (D) above upon a showing at public hearing that the same is necessary to avoid material damage to the unit well(s).

Rule 15(F) Any allowable accruing to a proration unit at the end of a gas proration period due to the can-

cellation of underage in the pool and the redistribution thereof shall be applied against the unit's overproduction.

Rule 15(G) The Director of the Division shall have authority to grant a pool-wide moratorium of up to three months on the shutting in of gas wells in a pool during periods of high-demand emergency upon proper showing that such emergency exists, and that a significant number of the wells in the pool are subject to shut-in pursuant to the provisions of Rules 15 (A) or 15 (B) above. No moratorium beyond the aforementioned three months shall be granted except after notice and hearing.

E. CLASSIFICATION OF UNITS:

Rule 16(A) The proration period (as defined in Rule 13) shall be divided into four classificaton periods of three months each, commencing on April 1, July 1, October 1, and January 1. After the production data is available for the last month of each classificaton period, any unit which had an underproduced status at the beginning of the proration period shall be classified marginal if its highest single month's production during the classification period is less than its average monthly allowable during said classification period; provided, however, that the operator of any unit so classified, or other interested party, shall have 15 days after receipt of notification of marginal classificaton in which to submit satisfactory evidence to the Division that

the unit is not of marginal character and should not be so classified.

Rule 16(B) The Director may reclassify a marginal or non-marginal proration unit at any time the unit's production data, deliverability data, or other evidence as to the unit's producing ability justifies such reclassification.

Rule 17 A proration unit which is classified as marginal shall not be permitted to accumulate underproduction, and any underproduction accrued to the unit prior to its classification as marginal shall be cancelled.

Rule 18 If, at the end of a proration period, a marginal proration unit has produced more than the total allowable for the period assigned to a non-marginal unit of like deliverability and acreage, the marginal unit shall be reclassified non-marginal and its allowable and net status adjusted accordingly. (If the unit has been classified as marginal for one proration period only, or a portion of one proration period only, any underproduction cancelled as the result of such classification shall be reinstated upon reclassificaton back to non-marginal status. All uncompensated-for overproduction accruing to the unit while marginal shall be chargeable upon reclassification to non-marginal.)

Rule 19 A proration unit containing a well which has been reworked or recompleted shall be classified non-marginal as of the date of reconnection of

the well to a pipeline until such time as production data, deliverability data, or other evidence as to the unit's producing ability indicates that the unit should be classified marginal.

Rule 20 All proration units not classified marginal shall be classified non-marginal.

F. REPORTING OF PRODUCTION:

Rule 21(A) The monthly gas production from each well shall be metered separately and the gas production therefrom shall be reported to the Division on Form C-115 in accordance with Rule 1115 of the Division's Rules and Regulations, so as to reach the Division on or before the 24th day of the month next succeeding the month in which the gas reported was produced. The operator shall show on such report what disposition has been made of the gas produced. The sum of the production from both wells on the proration unit shall also be reported for multiple-well units.

G. GENERAL:

Rule 22 No gas, either dry gas or casinghead gas, produced from the Basin-Dakota Gas Pool, except that gas used for "drilling-in" purposes, shall be flared or vented unless specifically authorized by order of the Division after notice and hearing.

Rule 23 Failure to comply with the provisions of this order or the rules contained herein shall result in the cancellation of allowable assigned to the

affected proration unit. No further allowable shall be assigned to the affected unit until all rules and regulations are complied with. The Division Director shall notify the operator of the unit and the purchaser, in writing, of the date of allowable cancellation and the reason therefor.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
State Land Office Building
Santa Fe, New Mexico
30 April 1979

COMMISSION HEARING

IN THE MATTER OF:

Application of El Paso Natural Gas Company for the amendment of Orders Nos. R-1670 and R-1670-C, Basin-Dakota Pool, San Juan and Rio Arriba Counties, New Mexico.

CASE 6533

BEFORE: Commissioner Ramey
Commissioner Arnold

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Commission: Ernest L. Padilla, Esq.
Legal Counsel for the Commission
State Land Office Bldg.
Santa Fe, New Mexico 87503

For El Paso Natural Gas: Owen Lopez, Esq.
MONTGOMERY, ANDREWS & HANNAHS
Paseo de Peralta
Santa Fe, New Mexico 87501
and
David T. Burleson, Esq.
Attorney at Law
El Paso Natural Gas Company
El Paso, Texas

SALLY WALTON BOYD
CERTIFIED SHORTHAND REPORTER
3020 Plaza Blanca (505) 471-2462
Santa Fe, New Mexico 87501

A P P E A R A N C E S

For Amoco Production Co.:	Gordon E. Ryan, Esq. Amoco Production Company Denver, Colorado
For Mesa Petroleum:	William F. Carr, Esq. CAMPBELL & BLACK Santa Fe, New Mexico 87501 and Richard C. Byrd, Esq. Ottaway, Kansas
For Southland Royalty:	William F. Carr, Esq. CAMPBELL & BLACK Santa Fe, New Mexico 87501
For Dugan Production:	Richard Tully, Esq. Dugan Production Corp. Farmington, New Mexico
For Consolidated Oil & Gas:	Tracy Stogner, Esq. Denver, Colorado
For Supron Energy:	Sudesh Arora Dallas, Texas
For Tenneco:	Bob Gibb, Esq. Denver, Colorado
For Getty Oil:	Gerry Brown, Esq. Denver, Colorado

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MELVIN A. ERLICH

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SALLY WALTON BOYD
CERTIFIED SHORTHAND REPORTER
3020 Plaza Blanca (505) 471-2462
Santa Fe, New Mexico 87501

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SALLY WALTON BOYD
CERTIFIED SHORTHAND REPORTER
3020 Plaza Blanca (505) 471-2462
Santa Fe, New Mexico 87501

MR. RAMEY: The hearing will come to order. We have one case on the docket this morning, Case 6533.

MR. PADILLA: Application of El Paso Natural Gas Company for the amendment of Orders Numbers R-1670 and R-1670-C, Basin Dakota Pool, San Juan and Rio Arriba Counties, New Mexico.

MR. RAMEY: Ask for appearances at this time.

MR. LOPEZ: May it please the Commission, my name is Owen Lopez, with the law firm of Montgomery, Andrews, and Hannahs, Santa Fe, New Mexico, appearing on behalf of the applicant, El Paso Natural Gas Company, and I have two witnesses to be sworn.

MR. RAMEY: Any other appearances?

MR. LOPEZ: Mr. Chairman, if I may, I'd also like to introduce Dave Burleson, who's from the Office of General Counsel from El Paso Natural Gas Company, who is appearing with me here today; Mr. Dane Adams, who's Director of the Reservoir Engineering Department for El Paso Natural Gas Company, and Mr. John McGruder, who's in charge of the Proration Department for El Paso.

MR. RYAN: My name is Gordon D. Ryan, I'm an attorney at law for Amoco Production Company, Denver, Colorado, appearing on behalf of Amoco Production Company.

SALLY WALTON BOYD
CERTIFIED SHORTHAND REPORTER
3020 Plaza Blanca (505) 471-2462
Santa Fe, New Mexico 87501

We're also appearing in association with the firm of Atwood and Malone, Roswell, New Mexico.

MR. RAMEY: Do you have any witnesses, Mr. Ryan?

MR. RYAN: Yes, I have one witness to be sworn.

MR. CARR: May it please the Commission, I am William F. Carr, appearing for Mesa Petroleum Company. I'm appearing today in association with Richard C. Byrd of Ottaway, Kansas, who will participate in this hearing for Mesa Petroleum.

I'm also appearing for Southland Royalty Company. I have one witness.

MR. BYRD: And Mesa will not have a witness.

MR. RAMEY: Do you have a witness, did you say, Mr. Carr?

MR. CARR: Yes, sir.

MR. TULLY: Richard Tully, General Counsel, Dugan Production Corp. Possibly counsel, myself, might wish to read a statement into the record.

MR. STOGNER: Tracy Stogner for Consolidated Oil and Gas. We will read a statement into the record.

MR. ARORA: Sudesh Arora, Supron Energy in Dallas. I'd like to read a statement into the record, please.

SALLY WALTON BOYD
CERTIFIED SHORTHAND REPORTER
3020 Plaza Blanca (505) 471-2462
Santa Fe, New Mexico 87501

MR. RAMEY: What was your name again?

MR. ARORA: Sudesh Arora, A-R-O-R-A.

MR. GIBB: My name is Bob Gibb. I'm from Tenneco Oil Company in Denver. I'd like to read a statement into the record.

MR. BROWN: Gerry Brown from Getty Oil Company, Denver. We want to read a statement into the record.

MR. RAMEY: Any other appearances?

Ask that all witnesses stand at this time and be sworn.

(Witnesses sworn.)

MR. RAMEY: You may proceed, Mr. Lopez.

MELVIN A. EHRLICH

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

DIRECT EXAMINATION

BY MR. LOPEZ:

Q Please state your name and place of residence.

A Melvin A. Ehrlich. I reside in El Paso, Texas.

Q By whom are you employed and in what capa-

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city?

A. By El Paso Natural Gas Company as a Vice President.

Q. As a Vice President for El Paso, for what area of activity are you responsible?

A. My responsibility covers the gas supply of El Paso Natural, which includes gas purchases, reservoir engineering, and gas proration.

In addition I am responsible for the marketing of natural gas through our Customer Affairs Department.

Q. Have you previously testified before this Commission and had your qualifications accepted?

A. No.

Q. Would you please describe your educational background and employment experience?

A. In 1950 I received a degree in commercial science from Enid Business College in Enid, Oklahoma.

I was thereupon employed by Phillips Petroleum Company in Bartlesville, Oklahoma, where I was responsible for coordinating the requirements of Phillips' Accounting Department with certain activities of Phillips' Natural Gas Department.

In June of 1955 I accepted employment with Pacific Northwest Pipeline Corporation as Director of their

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Natural Gas Accounting Department. I remained employed with this company until their merger with El Paso on December 31, 1959.

I might also mention that for the last two years prior to the merger I was Director of their Gas Marketing Department and Regulatory Affairs Department, Pacific Northwest Pipeline.

From 1960 until August of 1968 my chief responsibilities for El Paso pertained to gas marketing and customer relations for El Paso's Northwest Division. My responsibilities in this area covered the implementation and evaluation of market surveys, the negotiations of agreements for the sale of gas and other responsibilities in connection with the Northwest Division System marketing activities.

Starting in the fall of 1968 my chief responsibilities were in the same area but were expanded to include the Southern Division System, first as Manager, and then as Director of Gas Marketing and Customer Relations.

The Northwest Division and Southern Division together included the entire El Paso system.

In 1974 I became an Assistant Vice President and was in addition to Gas Marketing and Customer Relations, put in charge of Reservoir Engineering, Proration, and Gas Purchase Departments.

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In 1977 I was promoted to full Vice President.

Q. Have you previously testified before other regulatory bodies?

A. Yes. I have on numerous occasions testified before the Federal Energy Regulatory Commission, formerly the Federal Power Commission, the California Public Utilities Commission, the Arizona Corporation Commission, and the Nevada Public Service Commission.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this case is to introduce and explain the proposed rule -- pool rule changes we wish to be implemented by the Commission in the event our application is granted.

In addition, I propose to show that the El Paso system has sufficient capacity to transport all additional recoverable reserves that will be realized as a result of an infill drilling program.

Q. Are you familiar with El Paso's application in this case?

A. Yes, I am.

MR. LOPEZ: Mr. Chairman, are the qualifications of the witness acceptable?

MR. RAMEY: Consider him qualified.

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Q (Mr. Lopez continuing.) Mr. Ehrlich, please state briefly what El Paso is seeking in this case.

A. El Paso is seeking to change the existing rules governing the drilling and producing of gas wells in the Basin-Dakota Gas Pool of San Juan and Rio Arriba Counties, New Mexico, to permit, at the option of the operator of each 320 acre proration unit, the drilling of a second well on that unit, with the prorated allowable for that unit being calculated according to the same formula that is now in use, exceptthat the deliverability of the unit will be calculated by adding together the deliverability of the two wells on the unit.

We are also asking that in considering wells as marginal or non-marginal, and in balancing over-production or under-production, both wells' production be considered as being produced from one proration unit.

We further seek a finding by the Commission that a second well on each 320-acre proration unit in the Basin-Dakota Gas Pool is necessary to efficiently and effectively drain the proration unit; that the drilling of an infill well in the Basin-Dakota Gas Pool will increase the recovery of reserves from each proration unit in the pool; will result in more efficient use of reservoir energy; and will tend to insure greater ultimate recovery of gas from the pool.

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Q All right, now I hand you what has been marked for identification as El Paso's Exhibit Number One, and ask you to identify it.

A This exhibit sets forth El Paso's proposed rule changes to Order R-1670, as supplemented by Order R-1670-C, which, if the application is granted, would be applicable to the Basin-Dakota Gas Pool in San Juan and Rio Arriba Counties, New Mexico.

Q Without going into detail, would you describe to the Commission the essential changes the proposed rules seek to effect as they pertain to the Basin-Dakota Gas Pool?

A ere are essentially two areas where if the application is approved the rule should be changed.

The first deals with the well location and acreage requirements which would pertain to the infill well. In this connection I would draw the Commission's attention to Exhibit Two, which consists of two pages, on which a theoretical 320-acre proration unit is set forth on each page.

The first page of the exhibit shows rectangular and square areas within which a well must be located within the proration unit pursuant to present pool rules.

Q Mr. Ehrlich, if I could interrupt, I think

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probably everyone should get a copy of Exhibit Two who wants one so they can follow your testimony.

Q. Okay, if you'll proceed.

A. The second page shows the same theoretical 320-acre unit, but shows square areas within which, according to the proposed rules, an initial well or an infill well must be located.

It should also be mentioned that if a well already exists within an existing proration unit in the Basin-Dakota Gas Pool, then any infill well must be drilled on the opposite 160-acre quarter section within the proration unit.

Again, of course, within the square areas reflected on page two of Exhibit Two, distances from various boundaries are also shown on the exhibit.

Q. Did El Paso consider requesting 160-acre spacing rather than the option of drilling a second well on the existing 320-acre proration unit?

A. Yes. We gave that full consideration but we decided against it because this would disturb the equities in present proration units, some of which have been in existence for more than eighteen years.

Q. Mr. Ehrlich, I believe you stated that there were two essential changes that need to be effected by the proposed rules set forth in Exhibit One.

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Would you now please discuss the second major change?

A. The second essential change in the rules has to do with the allocation formula.

The present formula grants allowable to wells in two parts. Sixty percent of the allowable is calculated by using the ratio of the well's acreage to the total acreage of the pool, and forty percent of the allowable is calculated by using the ratio of that well's deliverability, as determined by the State deliverability test, to the total pool deliverability, which is adjusted by the acreage factor.

With the drilling of a second well in a proration unit there would be the same allowable factor based on acreage, but for the deliverability portion of the formula, the deliverability of two wells on a proration unit would be added together. This sum would be the value used to calculate that portion of allowable related to deliverability.

Q. Mr. Ehrlich, would you explain why the deliverability of the second well should be added to the first in calculating the deliverability factor to be used in the allocation formula?

A. As the spacing would remain 320 acres, adding the deliverability of both wells for the purpose of

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calculating the allowable for the proration unit would permit an operator the opportunity to recover his total reserves. This is the same method currently being followed in the Blanco Mesaverde Gas Pool.

Q Does Exhibit One have any additions, deletions, or corrections contained in it that are different from the proposed rule changes that were contained in Exhibit A, attached to El Paso's application for this hearing?

A Yes, it does. For the most part the changes contained in Exhibit One are as a result of minor typographical errors or grammatical mistakes that were made in the Exhibit A attached to El Paso's application.

I have here an errata sheet that shows where these changes were made, and will be glad to distribute them to those who are interested.

In addition I should mention that the only possible significant change is the addition of Rule 10(D), which you will find set forth at the bottom of page 4 and top of page 5 of Exhibit One.

This is a new rule that we would like to see incorporated into the proposed rules so that the testing procedures are up to date with what is necessary for completion test requirements for each new well on the proration units.

Q With the exception of the addition of

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Rule 10(D), in your opinion do any of these changes really modify or change any of the rules set forth in Exhibit A attached to El Paso's application?

A. No, sir. These corrections were made in an effort to cause the proposed rules contained in Exhibit One to be as correct as possible and to parallel as nearly as possible the other general rules and special rules which have been set out in Order R-1670, as supplemented by Order R-1670-T, which set forth the special rules for infill drilling in the Blanco Mesaverde Pool.

Q. Mr. Ehrlich, do you have an opinion as to the gas price applicable to the gas produced from the Dakota infill wells?

A. Our evidence, to be presented by Mr. Van Everdingen, will show that the infill wells are required in the Basin-Dakota Gas Pool to efficiently and effectively drain the gas reserves underlying the present 320-acre proration units.

Under the regulations recently adopted pursuant to the Natural Gas Policy Act, the Dakota infill wells will be in a category similar to the Blanco-Mesaverde infill wells, and subject to the State of New Mexico issuing an order, similar to the order issued for the Blanco-Mesaverde Gas Pool, will qualify for the gas price prescribed under Section 103 of the Act for new onshore production

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gas wells.

Q How much gas can El Paso's facilities in the San Juan Basin handle on a daily basis?

A. El Paso's facilities are presently designed to handle 1,400-million cubic feet of wellhead gas per day. After deducting shrinkage, fuel, and field use, these facilities have the capability of delivering approximately 1,300-million cubic feet a day to our mainline.

During 1978 the field production attached to El Paso's system averaged approximately 1,100-million cubic feet.

Q Mr. Ehrlich, assuming that this application would be granted to permit infill drilling the Blanco-Mesa -- the Basin-Dakota Gas Pool, would El Paso have the capability to handle these additional gas volumes, including the projected gas supply from infill wells drilled in the Blanco-Mesaverde Gas Pool?

A. Yes. Production estimated to become available to El Paso from the infill drilling of both formations would essentially normalize the decline of both -- excuse me, would essentially normalize the decline in deliverability and maintain the production essentially level over the next several years. This volume will be necessary for El Paso to meet its customers' high priority needs.

Q If this application is granted, do you

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foresee that El Paso would be required to reduce its take from existing wells?

A. Production from the wells in the San Juan Basin have been on the decline for many years, and El Paso firmly believes that it will be able to take all of the additional gas made available to us in the San Juan Basin, whether this additional gas results from other development wells in existing fields or from infill well programs.

Q. Mr. Ehrlich, in your opinion would the granting of the application in this case be in the interest of the prevention of waste and protection of correlative rights?

A. Yes. Under the proposed rules each operator would have the opportunity to increase his recoverable reserves and deliverability underlying this 320-acre proration unit, thereby preventing waste and protecting correlative rights.

Q. In your opinion what are the principal advantages to be gained by the proposed infill program?

A. There are many advantages which will result from this program, but I think the most important advantage is the increase in the gas recovery and availability from the Basin-Dakota Gas Pool, which Mr. Van Everdingen will discuss more fully in his testimony.

By virtue of the increased production and

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increased recoverable reserves, more gas will be produced at a time when our country desperately needs the gas. Further, because the facilities will be fully loaded, the consumer could get the gas cheaper since the unit volume costs them less.

Also, by utilizing the existing facilities more fully, and taking advantage of the available reservoir energy, this type of waste would be prevented. The producer would benefit from this infill program, as it would afford them an opportunity to increase their recoverable reserves. The royalty owners would be substantial beneficiaries from the proposed program. These would include the State of New Mexico and the Federal government.

The State of New Mexico would benefit through increased taxes brought about from the increased production, plus the increase in business activity fostered by the approval of the infill program.

I believe, in summary, that there are a great many benefits to be gained from an infill program and many recipients of these benefits.

Q. Mr. Ehrlich, were Exhibits One and Two prepared by you or under your supervision?

A. Yes.

MR. LOPEZ: At this time we'll move El Paso's Exhibits One and Two be received in evidence.

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MR. RAMEY: They will be admitted.

MR. LOPEZ: Mr. Chairman, this concludes our direct of this witness.

MR. RAMEY: Any questions of the witness?

MR. BYRD: Mr. Chairman, I have a couple questions I'd like to ask.

MR. RAMEY: Mr. Byrd.

CROSS EXAMINATION

BY MR. BYRD:

Q. Mr.Ehrlich, referring to proposed new rule 2(C), do I understand that -- I do understand that's the same provision that's in the Mesaverde order, is that right?

A. Yes, sir.

Q. Could you tell me what you mean by economically -- as long as it's economically feasible to do?

A. Well, we feel that both wells should be produced. We think that under today's conditions it's difficult to predict just when it will not be economically feasible to produce a well; therefore, we suggest that -- that both wells be produced for just as long as it's economically possible.

Q. So the purpose, your intended purpose of the provisions of rule 2(C) is to make sure that both wells

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remain on production as long as they're producing.

A. Yes, sir.

Q. Also, referring to your proposed rule 9(E), there, as I understand your proposal, the unit allowable may be produced from both wells, is that correct?

A. Yes, sir.

Q. And that provision is exactly the same as is presently in the Mesaverde, is that right?

A. Yes, sir.

Q. Could you accomplish the purpose of Rule 2(C), guaranteeing production from both wells, by providing that the unit allowable be produced proportionately from the two wells on the unit, based on their deliverability?

A. I suppose you could; however, that's not what we are proposing here today.

Q. I -- I understand that. You also made the statement in your direct testimony that in your opinion the infill well will be entitled to a 103 price under the Natural Gas Policy Act, providing you received an order from the State Commission similar to the one that you received in Mesaverde.

Isn't it true that in addition to that order the FERC requires an affidavit from the producer and the pipeline that the well will be produced based according to their ability to produce into your pipeline?

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A. Let me ask you -- I wasn't following your question. Who requires this?

Q. Doesn't the Federal Energy Regulatory Commission require that in the Mesaverde Pool --

A. Yes, sir, that's correct.

Q. And isn't the purpose of that affidavit to make sure that the wells are produced in accordance in affect, to the deliverability?

A. Yes, sir, I'm sure that they would frown on shutting in only one, if that's what you're driving at, with the lower price in order to collect the -- the higher price under the allowable formula.

Q. Thus the provision in the State Commission's rule requiring that deliverability of the two wells determine how the production is going to be distributed within the unit would eliminate the necessity of that affidavit, wouldn't it?

A. I'm not sure whether it would eliminate it, but I'd think that it would certainly eliminate a lot of stumbling blocks we might otherwise have.

MR. BRYD: Thank you.

MR. RAMEY: Any other questions of the witness?

MR. RYAN: Just a few questions, if I might.

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CROSS EXAMINATION

BY MR. RYAN:

Q. Mr. Ehrlich, you've indicated that if this application is granted that there'll be additional wells and that El Paso has the facilities to process that gas, that additional gas, is that correct?

A. Yes, sir.

Q. If that gas is produced does El Paso have a market for the gas?

A. Yes, sir. I -- I could go into considerable detail, but let me just tell you this, that we have a transmission capacity of roughly 3.9-billion, for which we have a market demand of at least that figure. We're now supplying about 2.9-billion to that market. In other words, we have roughly a billion cubic feet a day cut off of our system every day.

Q. So if -- if these additional wells that are being considered would be drilled and it could be marketed, it wouldn't need to be left in the ground.

A. Be no question.

MR. RAMEY: Any other questions? Mr. Arnold, do you have a question?

MR. ARNOLD: Yes.

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CROSS EXAMINATION

BY MR. ARNOLD:

Mr. Ehrlich, when the original proration order was written in the Basin-Dakota Pool, there had to be a finding that the deliverability was related to the reserve in the pool in order to justify the proration factor, deliverability factor.

A. Yes, sir.

Q. How do you relate add-on deliverability to reserves in the tract?

A. I'm not sure, Mr. Commissioner, I understand the question. There would be an additional deliverability and additional recoverable reserves, as a result of the second well, and what we're suggesting here today is that -- that the deliverability of the two wells be added together in order to determine the forty percent of that deliverability.

Q. Wouldn't you reach a point some place in drilling infill wells where you know -- where the relationship no longer -- what if you drilled a third well?

A. That might be possible. I think after we get on with this program for a few years we might take a look at that, but I think here today we're convinced that

the second well needs to -- to be drilled, without any question, and I think, to answer your question, it's going to depend largely on economics, and the shortage of gas in this country is so great and the decline of deliverability is so great each year, that I don't know how far down we will lower our gathering pressures at some time just to keep residential load on, but that's going to have a big important part in this.

Q. Right, the only issue I was making -- making of question was the relationship between deliverability and reserves in a proration formula when you drill additional wells on a proration unit.

A. Well, that's probably a question better answered by Mr. Van Everdingen, but it would seem to me that deliverability probably will decline faster than the reserves will.

MR. RAMEY: Any other questions of the witness? Mr. Nutter?

CROSS EXAMINATION

BY MR. NUTTER:

Q. The proration department of El Paso Natural Gas Company has always maintained to the Commission that wells classified as marginal are put on the line and left on the line at all times.

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Now, in the Blanco-Mesaverde, if we have a unit that is classified as non-marginal and subject to limitation to the allowable, but one of the wells is a poor well, is that well put on the line and left on the line at all times and the unit's production curtailed from the better well only?

A. No, sir, as I -- as I understand it, if it's classified as non-marginal we attempt to follow the proration rules, or the proration -- the allowable for that particular well, and it's --

Q. So all of the -- the poor well is also subject to curtailment, then?

A. No, sir, the marginal wells we leave on at all times.

Q. No, I'm talking about the poor well, which would be a marginal well, but it's on a unit where there's a good well and the unit is not marginal, is the poor well left on at all times?

A. Yes, sir, it will.

Q. So the brunt of curtailment falls on the good well only.

A. Yes, sir, as long as it's non-marginal.

Q. Okay. Now, in what respect does the rule proposed by El Paso in Exhibit One differ from the Mesaverde rules that we have at the present time?

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Now, I don't mean different from the Mesaverde rules, because I realize we've got a different allowable formula, for instance, 60-40 compared to 25-75.

A. Yes, sir.

Q. But in what respect do the changes in these rules from the present Dakota rules differ from the changes that we have embodied in 1670-T, which was the infill drilling rule for the Mesaverde?

A. The only major change that I recall is the -- let me see if I can find it -- well, I guess it was the 10-D that I mentioned in my earlier testimony, that, well, sets out the testing, I guess you'd say, to better clarify the testing procedures when you complete a new or infill well.

Q. Okay, 10-D is a new rule, then, that is not included in the Mesaverde pool?

A. Yes, sir.

Q. And in effect does 10-D provide that in the event one of the wells on the unit would be classified an exempt marginal well and the other well is a testable well, that both wells would have to be tested? So you could get a true deliverability picture of the unit?

A. The old well, not necessarily if it's had a current test, it would not require a further test until the next appropriate time. The new well would.

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Q. If the new well required testing, the old well requires testing also, is that it?

And the old well would never fall into an exempt marginal status.

A. If I understand what we proposed here, the -- if the old well has had a current test recently and still in effect, we would not have to have a new test for that old well. You would on a new one.

Q. Okay, for the current test.

A. Right.

Q. Now, for future testing requirements, if one required testing would the other require testing?

A. Yes.

Q. Also?

A. Yes, sir, that's correct.

Q. Okay, and then is there also a change in Rule 15-B, which is different from the Mesaverde rules?

A. Yes. As I recall, on the Dakota-Mesaverde, that 500 Mcf per month in order to keep a well on, I believe that's 1000 in the -- in the Mesaverde.

Q. I believe, Mr. Ehrlich, that the Rule 15-B for the Mesaverde reads that a well that's subject to shut-in would receive 500 Mcf, and it's been interpreted that both wells would receive the 500 Mcf on the unit.

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A. Oh, I see.

Q. It's been reworded so the unit itself --

A. Well, I stand corrected. When I read that I thought you could add the two together.

Q. Here we're limiting it to 500 Mcf per unit.

A. Yes, sir, right. I think this probably clears up an area that probably would have been cleared up in the Mesaverde.

Q. All right.

MR. NUTTER: Okay, thank you, Mr. Ehrlich.

MR. RAMEY: Any other questions of the witness?

He may be excused.

MR. LOPEZ: Mr. Chairman, at this time I'd like to call Mr. Van Everdingen to the stand.

In this connection I might point out, all the exhibits that Mr. Van Everdingen plans to tender are set forth on the walls, beginning with Exhibit Three.

Exhibit Four is a computer printout of reserves in the Basin-Dakota Pool. We do not have extra copies of this exhibit. The Commission has a copy and they will have a working copy which people can check with, but I do not have any extra copies of Exhibit Four, which is the computer printout.

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These packets, and we might as well distribute those to those who do not have copies of exhibits, contain all the exhibits that are on the wall, except for Exhibit Three and Exhibit Four.

In addition, we don't have on the wall some photographs that are also contained in an exhibit, which is Exhibit Ten, three parts, A, B, and C.

So, with that little -- oh, incidentally, I'd also like to introduce Ms. Kyla Kriss, Mr. Van Everdingen's assistant, and I think I'll have her point to things on the charts and let Mr. Van keep his chair.

A. F. VAN EVERDINGEN

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

DIRECT EXAMINATION

BY MR. LOPEZ:

Q. Would you please state your name and where you reside?

A. I am A. F. Van Everdingen and I reside in Dallas, Texas.

Q. By whom are you employed and in what capacity?

A. I'm a Senior Vice President of DeGolyer

and MacNaughton.

Q. Mr. Van, have you previously testified before this Commission and had your qualifications accepted as a matter of record?

A. Yes. I have testified in the case of the Mesaverde formations on the same subject we are talking about here.

MR. LOPEZ: Mr. Chairman, I'd ask the Commission to take administrative notice of Mr. Van's qualifications as set forth in the Blanco-Mesaverde application.

MR. RAMEY: The Commission will consider the witness qualified.

Q. (Mr. Lopez continuing.) Mr.Van, since you testified in that Mesaverde case, have you had an occasion to do any further studies with respect to reservoir behavior?

A. Yes. I mean reservoir behavior has been always, it seems always in my blood, and we did at D&MN, awhile after the Mesaverde was out, and published a paper from the last meeting in Houston, the big SPE meeting, and that paper deals with the same subject. It was written by myself, I should say and Hyla Kriss, on the same subject we are talking about now.

Q. Okay. And you are familiar with El Paso's

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application in this case?

A. Very much so, sir.

Q. And the Commission has already ruled that you are qualified to testify here, so we'll get on with it.

In connection with your testimony that you plan to give today, have you made a study of the possible results that might be realized by doubling the well density in the Basin-Dakota Gas Pool?

A. Yes, I have.

Q. And what are some of the factors you feel you must consider?

A. I feel you should look, take a look at the ultimate production, at the amount of gas which is in place, and the reservoir characteristics of the formation.

Q. Now, in this connection, I turn your attention to what has been marked as Exhibit Three, El Paso Exhibit Three, and ask you to identify it.

A. Exhibit Three is a map giving all the locations of all existing wells in the Basin-Dakota, and of some -- in red, some of the figures of the units that exist, all of the units that exist.

MR. LOPEZ: If the Commission needs them we have some extra copies of ExhibitThree. Would you like to have them right now? I don't think we're going to be referring to Exhibit Three that much.

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MR. RAMEY: I think we can pretty well see it.

MR. LOPEZ: You can see it over there?

Q. (Mr. Lopez continuing.) Have you done a study of the estimated recoverable reserves under present field rules, and the estimated additional reserves that might be recovered if the application is granted?

A. Yes, I have.

Q. At this time I turn your attention to --

A. Exhibit Four.

Q. -- Exhibit Four, and ask you to explain what it is and what it shows. If you could discuss from --

A. I think I can.

Q. Okay.

A. Exhibit Four gives for all the existing wells in the field, in order of magnitude, the total of the amount yet to be recovered, and the reserve formation --

Q. Remaining reserves.

A. Remaining reserves, which is the amount yet to be recovered as of 1/1/79, and so -- well, that's all there is to it.

Q. Right. Now, as I understand it, this is a computer run prepared by the El Paso Reservoir Engineering Department. Did DeGolyer and MacNaughton, under your supervision prepare a similar study of the estimated reserves in

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the Basin-Dakota Pool, and were you able to compare the two?

A. We prepared, we have, and always keep up to date, a similar one for individual wells, and we compared almost eighty percent of the wells that are listed here to our own figures, finding out that the differences were only negligible. So we have accepted the figure that is shown in this, the total ultimate given here as 5-trillion cubic feet.

Q. Now, If I understand your testimony, then, you say that this exhibit shows that the estimated recoverable reserves, according to the calculations, under present pool rules in the Basin-Dakota, is approximately 5-trillion cubic feet.

A. You are quite right, sir.

Q. Okay. Now I'd turn your attention to what has been marked for identification as El Paso's Exhibits Five, Six, Seven, and Eight, and ask you to identify each exhibit and explain what they show.

A. Now ExhibitFive -- before I go into exhibits, I felt it was necessary, not only to go on the basis of only wells and their behavior, the pressure behavior, or whatever you have on individual wells, but we also should take an overall view of the field.

Exhibit Five gives you the total production of the Basin-Dakota, and this one, it's plotted on

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similar paper, and it's one of the easiest graphs that can be made, can be extrapolated down to an economic limit, and it yields about 4.9, 5-trillion cubic feet ultimate.

Number --

Q. Six.

A. -- Six is the same graph as Number Five, except that we are not convinced that seven years on which we have data, and a little portion to come, to see what that means, if you say you can extrapolate it out and produce it, because it brings us to the year 2042 before all that gas will be recovered.

And now we come -- I can't see which one?

Q. Exhibit Seven.

A. I can't see it because I'm on the end, you know.

Q. Average line pressure.

MR. KRISS: Average line pressure.

A. Now, in making the graph of the rate of production, it is shown on Exhibit Seven that during the time that the graph -- the data were assemblied, there was some drilling going on in the Basin-Dakota, and also, the line pressure decreased from around 300 to 200 pounds, which means that the factors favorable, which justify -- which would really put the question of 5-trillion in some doubt. And so we also have made the Number Eight, which

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gives you the P/Z curve for the field as a whole, and which undoubtedly indicates that on that basis you would expect about 6-trillion cubic feet.

So that our answer on the whole thing in summary is you can rely on 5-trillion cubic feet as the amount of gas as is coming out today.

Q Okay. Now, as I understand it, as you just explained, Exhibits Five through Eight address the amount of recoverable gas under present pool rules.

A Yes.

Q Have you done any calculations with respect to the amount of gas in place in the Basin-Dakota Gas Pool?

A Yes, we have done quite a lot of work on it. As a matter of fact, El Paso estimated, by what they call high grading electric logs, that there would be slightly over 10-trillion cubic feet of gas in place.

Now, that's nice, except the high grading makes you feel there should be more gas in place. So we went off the logs once again, only to find out that any logging engineer with a lot of experience will give you more, though they say that this is the very minimum that you can see. It is the quantity on all the sands where there is no dispute possible, but there is other sand where there is a dispute. You do not know what you have, whether --

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or how much gas comes out of the less permeable sands that are not present over the entire -- that are not present well developed over the entire structure.

Therefore, we had to give up the assembly of additional data on logs, and we went to a lot of core data for which -- of which a lot of are available, all taken before 1965. Those core data were analyzed and they are reviewed on our Number Nine.

Q Exhibit Nine.

A On Exhibit Nine, where is it?

Q It's the last one down there. Now, as I understand it, Mr. Van, you said that you and El Paso both examined various electric logs, as well as core data -- or you took the core data --

A Yes, sir.

Q -- and analyzed it.

A Yes, sir.

Q Could you tell us how many and, for how many wells?

A Oh, we had fifteen wells on which core data on the Basin-Dakota were available, and those fifteen wells are given here on this map. I think they are the wells marked in red in the better portions of the field.

Well, here they are. They're not.

Q Now these core data were taken from fif-

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teen wells and the wells are indicated on the Exhibit Three.

A This --- these wells were chosen because they both, we thought, are in the middle of the field, in the better portions, and so we could rely that whatever we get out of it, that is available over there.

There is only in that field -- Hyla, point to --

There is one other portion in the field that is real good; that's the one on the top where the best well in the field had been drilled. A well from Number Five, from Exhibit Five -- Four, that shows 11-trillion.

Here on the Huerfano wells there is one that has 10-trillion. It's where the core data are coming from.

So we feel that we had a representative sample of core data for the field as a whole.

Q I believe you said 10-trillion; you meant 10-billion.

A Oh, definitely.

Q Okay. Now, I think we ought to go back to your Exhibit Nine and explain what it represents and how you came up with even more gas in place than El Paso is willing to predict.

A Well, El Paso almost did. They almost indicated there is more gas by their descriptions high-

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grading it, you know. So we first checked the highgrading, was it correct, and it is correct. We checked that in the office. We don't always take a client's word for granted.

And then we did some additional work that showed there is more than they have given. Now that work was done by the core data, and grouping them in 2 percent porosities.

So the first set was from zero to 2, which you might say is practically not -- has no gas in it, but from 2 to 4 there is some gas in it; from 4 to 6, et cetera, up to 14 to 16.

Some samples were not permeable, and by permeable we mean they -- they had the porosity and permeability of 1/10th of a millidarcy or less, and we knocked those out.

But all of the samples given here, even the 2 to 4 percent had a permeability, which is only 1/2, which is 1/2 of the average for the reservoir. The permeabilities are given in the -- in column four, enclosure 9.

And remarkable, the average is less than 1/10th of a millidarcy, and this makes the -- the field almost the least permeable I've ever come in my fifty years, you know, come across in my fifty years.

You see another characteristic, which is to be expected. The number of impermeable samples decreases

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when the total poronity goes up.

You see the 2-to-4 had 40 permeable samples, which is less than -- which is 40 percent, but if you come to the 8-to-10 class, there's only 40 out of a total 150 more impermeable, and later on in the 14-to-16 group, everybody is permeable.

Now, you can add up these figures. We had to make some kind of an assumption as to how should we use these figures, and we have assumed that like El Paso did it in the 10.3-trillion, they took 6 percent porosity as the base. Anything less than 6 percent was knocked out. And they took 50 percent water as a base. Anything more than 50 percent was knocked out.

Unfortunately, I don't have data for water, but I have, of course, plenty of data for porosity, and that showed that out of the total percentages porosity that we have analyzed, there was 1,056 samples and they together contained 8000 percentages porosity, which is kind of a hybrid form to express it in. And those percentages of porosity, only 5000 were present in formations with more than 6 percent porosity and less than 50 percent water.

No, for 6 porosity; on the water I am quiet.

Consequently, it showed, that analysis showed, that there is 50 percent more pore space available.

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I'm saying pore space available that could be filled with gas that you would obtain from the basis on which El Paso has worked.

Now, 50 percent, you -- you don't have always to accept the highest figure possible. You could say well, I do not care to know the lower figures.

No. I was told to go slow or I mess it up, and now I don't want to mess it up.

Q Well, this area you're discussing, Mr. Van --

A Yes, sir.

Q -- you're talking about El Paso used a 6 percent cutoff and you're saying that in calculating the gas in place you decided that the area between 2 and 6 percent porosity had the same permeability, so you couldn't just necessarily discount that, isn't that right?

A. Not necessarily. You could discount it some. You must discount it some or it's not as good as the top above 10 percent, and we didn't know just how to handle it, you know. I mean because we don't have from core data the exact water percentages.

But you can take out of the figures that's shown on this Nine, you can make up comparisons and one of them would give you an additional 20 percent, which is darned sure that it is 20 percent higher than El Paso had

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given us, you see.

So, now you have a gain as normal in cases like this. You are talking about two sets of figures, one, the highest; one -- and you could, out of the fifty percent more, you can put 15-trillion initial in place.

Out of the twenty percent more you can put 12, 12-1/2-trillion in place.

And I can only say, take your choice. Probably the truth sits somewhere in the middle but we cannot define it.

Now, that gives you one figure which is higher than the 10-trillion given by El Paso, mentioned before, and therefore it makes an estimate of additional recovery more amenable.

Now, in order to get an impression, may I now introduce --

Q Exhibits Ten A, B, and C, sure.

A C, which give you -- let me go back. There were available some thin sections. Now, a thin section, I think the geologists know what they are, but these thin sections, that always impresses me, were one-ten-thousandth of an inch thick. So when I heard that, I thought there might be some porosity visible in it.

So we went out to the thin sections, checked about 25 of them, and had some photographs made of

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them, you know.

Now, you do this by -- by going to the university and ask -- they have the best of equipment -- could they please make you a color picture, and they give you a slide on it at that time. And those slides, you magnify, Xerox does it for you, and then you get the graphs out like you see here, which on Number Eight is a graph of -- gives an indication the various minerals. White is always quartz, but how much other minerals you will find in it, you know, how many, and if you -- that does not give you much detail, but on B, where we have blown it up to 100 and better, you know, you see that the grains have grown together. Look at the blue one; now look at the forms that comes in there. It was not feasible for us, or not possible for us to find any holes in it until we come to 10-C, which gives you a slight indication of a fracture present, and since I talk about the fracture, there are, for anybody who has the core data on it, core data really show one-half of the cores to be fractured, and if a thing is fractured, you think the gas just walks out.

Now, we have listed fracd permeabilities and unfracd permeabilities separately. And for the classes given we always find that fractured, as described in core data, and unfractured, are exactly the same.

So that put to rest the idea that frac-

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ture, if a man talks fractured permeability, or fractured core date, he will have a better than average well.

The wells, or the fracture -- the fractured wells or the fractured average was just the same, 1/10th of a millidarcy as it was in the non-fractured wells.

Q. Okay, Mr. Van, I know that you've covered this, but I just want to make sure the record is complete.

In your opinion are the core samples that you studied from the fifteen wells in the Basin-Dakota Gas Pool well representative of the Basin's characteristics?

A. Yes. I think they are very representative of it.

Q. Okay, good.

Now, I think in addition to studies of the core samples and their respective permeabilities and porosities, did you do any other studies to support your estimate of the effects of the infill drilling program, and in this connection I'd ask you to turn your attention to El Paso's Exhibits Eleven and Twelve.

A. Yes. You know, when you are talking first about 10-trillion, and you are talking about those tight formations that existing -- exist, that there's nothing but tight formations, then you doubt whether infill drilling can be -- can be very effective, because it's so tight you wouldn't expect much more than 50 percent in the

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first go around. That's a nice recovery.

But it turns out there is, let us simply say, 14-trillion that is waiting for production, or waiting to be let out, total. So to do that we went back to simple reservoir engineering and made the build-up tests. We collected all the tests we could find, and here is a well, 212 on the map here -- okay, that's 212 -- drilled in '78 in which the first build-up gave us 2650 pounds, which is exactly the build-up that this well had shut-in pressure, which is about equal to the build-up pressures found when the first well in that neighborhood was drilled ten years ago.

Now, what that log tells me, ten years of production and we have not been able to decrease the pressure perceptibly, or at all. I won't fight for five pounds if somebody wants to bring it up, but this is, I would say, is an indication that it's not being drained.

Now, wellhead pressures are, to me, they are good, but just to be safe, there was also measured the bottom hole pressure, and if you put the weight of the gas and the total depth of the well together, bottom hole pressure just confirms the wellhead pressure that was given.

There's also on the graph a little hump, which is, of course, somebody went haywire there. I can't -- I can't explain it. But he came back to normal pressures

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again for the bottom hole.

Now this is about 2600 at that spot. Then I ought to show -- it's just now an isolated spot, because it's somewhat meagre to go on one, and told me first, let's make another in that neighborhood, which Hyla is right now next to it, and our Well 212 is right there in the black -- in blue. That's 212.

Q Now she's pointing to Exhibit Twelve.

A Yes. And now Exhibit Twelve shows that all of a sudden showed that 258 and 259, also shown in blue, they're exactly the same. You find initial pressures back on all those wells that were drilled in 200 on the present spacing of 320, and they are also surrounded by wells that are ten years old.

So this gives you the idea that there is no drainage at those points. Now that idea is not entirely new because when you look at the -- well, back to Number Eleven, when you go to those old wells you will see that the pressure is -- the pressure line, Hyla, on Number Eleven. You see, the downhole pressure assumes a horizontal position, which is one characteristic of a reservoir of a well that has reached the highest pressure it can possibly get in that reservoir.

The logical conclusion comes then, if

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that's the highest pressure and then you haven't been able to do anything for it in the ten years that you produced the well, that's what we call a limited, a bounded, or whatever terms you wish to use, it's not covering the acreage, 320.

There is here room for infill drilling. Yes, sir.

Q Okay. Now I turn to -- I turn your attention to what has been marked for identification as Exhibits Thirteen, Fourteen, and Fifteen, and ask you now to explain how these exhibits also support your conclusion that the drilling of infill wells will result in recovery of substantial additional gas reserves.

A. I will start on Twelve, Thirteen, Fourteen, just one second.

Mind that in the Number Eleven that big pressures have been reached. You might say the turning point in pressures has been reached in less than ten hours. I think seven or eight hours is where the curve turns over and becomes practically horizontal.

Now go to Eleven, Twelve, and Thirteen, those are the Huerfano wells on which good pressure build-ups were available, and I mean by good pressure build-ups El Paso has had permission to shut the well in, and some were shut in for two or three years, you know, to get the

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data that are shown here.

And mind you, in the first two wells, Twelve and Thirteen, it took the well almost two years -- no, it took the well a year before it reached its maximum pressure, and because the well had been producing for some time. The producing time is given -- is written up in the bottom.

How long did they produce that well? I can't read it from here.

MS. KRISS: 390 days.

A. 390 days, and it took them another 390 days, I think, to come to its maximum pressure.

I shouldn't ask this question because it was in here if I just turn over.

Yes. The well had been producing 108 days, that's on Number Thirteen, and it took 390 days before it came to a maximum pressure. After that it varied a little bit, but it did not add any more pressure.

That's 117, or Exhibit Thirteen.

Fourteen, unfortunately 121 is the next one. Is that the excellent well?

MALE VOICE: Yes.

A. And there they accuse each other of losing the beginning, but after 349 days the well had reached its maximum pressure and it's also at about 1750 to

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1800 pounds.

Q That's Exhibit Fifteen.

A. Okay, okay, okay. I take it at Fifteen because I've got two numbers and don't know which one to believe.

Q Okay.

A. Okay, this is Fifteen. Then I have Fourteen, then, which shows build-up time -- the well which has produced 190 days and takes 708 days before he nullifies whatever he has taken out in the 190 days, and after that they shut him in another 400 days, or better than a year, and he doesn't add any pressure to it.

But here we have three wells that in themselves also show that we're talking about limited reservoirs present even in the best part of the field. Mind you, that one has only that little thing in it, you know. That's number two in the -- I think that's number -- the second best well in the field.

Q Okay. I think now we could go to Exhibit Sixteen and I'd ask you to explain what that exhibit shows.

A. Let me say first, Exhibit Sixteen, the simplest way of explaining it, it is a summary of Exhibit Four, the printout. The printout gives us the total cumulative -- the total gas to be expected from every one of the 2500 wells.

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Sixteen shows in the bottom simply the well number from 100 to 2500, you see. Vertically above it we have given the total gas that's expected from the well. So it shows, it starts from 11.4 and then goes to 10, and then dives under 10, and it goes down to 100-million cubic feet. There we stopped it.

There are some more wells who are not expected to produce a 100-million cubic feet, but we -- the graph stops at 100-million cubic feet.

If you integrate, then the size of the well, and the number, of course, you come to the 5-trillion cubic feet that we expect ultimately out of it.

It is one representation of the variety that exists in the field, because a man would say, well, if I have 15-trillion cubic feet; I expect 2-trillion; do you expect 2-trillion per well. Do you expect 2-trillion per well out of every well that's being infill drilled?

Well, this graph shows you you shouldn't. There are some wells -- if a well is drilled within a billion cubic feet ultimate, you get another well with a billion cubic feet ultimate, but if you have -- you drill a well between wells of 5-billion cubic feet, you don't -- you are just too darned optimistic to expect 5-billion.

So we have used graph 16 to determine how much ultimate can be expected from the infill drilling pro-

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gram.

Now, that graph we cut in three parts. We said, well, it looks as if nobody is going to drill anything that will only give him 400-million. Some people may do it but we said, huh-uh, 500-million is the limit we take. If you don't have 500-million you are not supposed to infill drill it. If some want to risk their money, that's their business, but I'm not going to say that it's profitable.

The cost of 500-million we come up along the curve up to a total of 3-billion over that range. Wells within that range, I expect you could probably do as good as the already existing well, you see, but when you go above 3-billion, then we just cut it off. We said the best you can do is 3-billion from an intermediate well.

And the net result is that the first -- the best group of wells will give you a total additional of 1.2-billion.

The second group, and there are in that group, there are 1700 wells, they will give you an additional 3.2-trillion.

And then the third group, from 500 down, that's only a small amount, but they will give you nothing.

Is that sufficient, sir?

Q Right. I think, I just need to point out

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to the Commission that the graph on the wall has two "X's" marked on the curve which the hand-outs don't have. These were just put in recently, and obviously the point, in accordance with Mr. Van's testimony, is that he did not in making his calculations compute the best wells in the reservoir. He used a 3-billion gas in place cutoff, and continued it, and then -- recoverable gas in place, and then on the down side of the scale there's another "X" where he, after 500-million, used a cutoff point, too.

So, I'll just make that observation.

A. We could add here, you know, if you're interested, when you have some wells in the field, just find out what number you are on the list that you have, or that is available from El Paso, and you find out which number or where are the people that are larger than or which are the wells smaller than. Then you'll fit into this graph.

It is really a summary of --

Q Exhibit Four.

A. -- Exhibit Four.

Q And as everyone knows Exhibit Four is the computer printout, starting with the best well in the field to the worst well in the field.

A. Yes. You can, if you want to find out where a 2-billion well -- 2-billion cubic feet well fill in, simply make a horizontal line through the 2-billion mark on

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the vertical axis. You see there are given -- the axis is given -- so you start on 100-million, 200, 300, 400, up to 1000-million. Then you to to 10-billion again, so you take a horizontal line and then the vertical line downward and there you are, or vice versa, if you want to be number 412, 412, you come up vertically, go horizontal until you intersect; go horizontally and you'll know how big number 412 is.

Q. Okay. Now, Mr. Van, in your opinion what is the amount of additional recoverable gas that will be realized by infill drilling the Basin-Dakota Gas Pool?

A. Well, this question I think I answered. Maybe I talked too fast and I'll answer it again.

Q. Okay.

A. Here we have 4 to 4-1/2-trillion cubic feet on the basis as shown.

Q. In your opinion will it be possible under the infill program for a producer to develop additional reserves, and in this connection I turn your attention to what has been marked as Exhibit Seventeen.

A. Well, Seventeen is a payout schedule for an infill well, and I was told that the initial cost for a well varied a little bit from Two Eighty-five, Two Eighty-six, to Two Sixty-five, depending on whether your talking about the east or the west side of the field.

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It cost a little bit -- it cost another $6,000 to prepare it; $200 was given as an operating cost. And at the price of gas of $2.00, which is apparently the NGPA price, uncorrected for quality and uncorrected for fluids that may come along, fluids are not present everywhere, you can then say, now, depending on how good a well I get, do I get 100,000, do I get 200,000 allowable, or 300,000 allowable per day, depending on that allowable and the cost figures given, the payouts are at most 57 months and at least -- that's the highest figure -- and they could come down to less than a year and a half.

And I think our figures are, as I say, conservative because I have heard that quality and liquid may obtain, please, the $2.00 to as high as $2.40.

Q. Very good. Do you have an opinion as to how the performance in the Basin-Dakota will compare to that which has been experienced in the Mesaverde, and in this connection I turn the Commission's attention to Exhibit Eighteen.

A. Do I have an opinion? Sounds somewhat contrary, you know. We have here in the Basin-Dakota a formation which is definitely tighter than our friends in the Mesaverde, you know, but for infill drilling a tight formation is better, because the tighter the formation, the more you can expect out of it -- additional you can expect

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out of it as a percentage basis.

But to show you what has been accomplished in the past, Number Sixteen, that's him, Number Sixteen is a graph of all wells from the Blanco-Mesaverde which produced as of one month, 1975. That's the yellow rate of production on the graph.

And then the blue wells give you the additional production obtained to date from those wells that were infills.

And as you can see without any further explanation on my part, the production is rising for the first time. For years it has been coming down; it goes down even on the infill wells, but the total production of the field now is coming up, and I think the latest figures show that there's forty percent of all gas of Blanco-Mesaverde coming from infill wells, which are now almost 650 at the end of 1978, 650 have been drilled I think out of a total of, I think, 2500, but that I'm not sure.

Q. This, I think you misspoke, Mr. Van. It's Exhibit Eighteen, not Sixteen, that we're talking about.

A. Yeah, Exhibit Eighteen, you're right. Did I? Oh, well, excuse me.

Q. Okay. In your opinion is it necessary to drill an infill well in the Basin-Dakota Gas Pool in order to efficiently and effectively drain the proration unit?

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A. Very much so. There is gas in this pool and -- or in this formation. The gas that you get by an infill well is gas you will not see at all, never mind how long you wait for it, you know. You'll get the 5-trillion, no doubt about that; you may even get 5-1/2-trillion; but you do not get those 4-trillion I said here, I have mentioned here, because a well is not capable of draining past the 160-acres. You couldn't do it in 320 in ten years, so I am afraid that he cannot do 160 in the time that you can make some money out of it.

Q. In your opinion will the granting of this application be in the interest of the prevention of waste and protection of correlative rights?

A. Yes, sir.

Q. Were Exhibits Three through Eighteen prepared by you or under your supervision?

A. Oh, yes. Yes, sir.

MR. LOPEZ: At this time I'd like to introduce -- or will introduce Exhibits Three through Eighteen.

MR. RAMEY: Exhibits Three through Eighteen will be admitted.

MR. LOPEZ: This concludes our direct.

MR. RAMEY: Okay. We're going to take a fifteen minute recess.

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(Thereupon a recess was taken.)

MR. RAMEY: Are there any questions of Mr. Van Everdingen?

MR. BYRD: Mr. Chairman, I just have a couple questions.

MR. RAMEY: Mr. Byrd.

CROSS EXAMINATION

BY MR. BYRD:

Q Mr. Van, am I correct from your study that you've concluded that one well will not drain more than 160 acres?

A. Yes.

Q So that if the Commission approved the infill drilling program as proposed, the second well should recover as much gas as the original well, is that right?

A. Yes, sir, but here I make some reservations, you know, going to drill a well next to an 11-billion well, because there you may not get more than -- I have put it, after talking to myself a long time, at 3-billion.

MR. BYRD: Thank you.

MR. RAMEY: Any other questions of the witness? Mr. Arnold?

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CROSS EXAMINATION

BY MR. ARNOLD:

Q. Mr. Van, you may have said what the average well reserve was in the field by your study on 160-acre spacing. I didn't get it.

A. Now, total reserve as it is now, the total, now I talk reserve, the term is a bit loose, you know, the total ultimate, as it exists now, if 5 or 5.5, if you consider the few locations that still can be drilled without infill drilling, you know, and there you have from 2-billion to 2.2-billion ultimate. Now, the reserve is a different story; simply you deduct what you have, you see, and in the future you have 4.4, you get 5-trillion more from infill drilling.

Now, does that answer the question? That is ultimate production, not necessarily --- well, the infill drilling is all reserves as yet, you know.

Q. What would that give you as the total ultimate recoverable reserve on 160-acre spacing?

A. Well, my graph, Number Eighteen, on that last graph, you know, it depends on where you want to sit on the acreage. There are wells that will not make but 100-million, the lowest one we show there. When you drill in there, you get 100-million, and if you can make a little

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profit off 100-million, you can drill a lot of wells, because he does drain only a limited amount. He is real tight.

The question that, I think that Mr. Chairman asked, 80 acres later, you know, well how do you know; I don't know. I haven't seen enough data on it, but it is possible it has to be considered 25 years from now, 20 years from now. It's possible that we can still get better when we have more wells, more experience, more data.

Makes me think about something. All of the wells that I came across, it's possible from dry data to make a map of it like this. Now I notice that you do not allow to make open flows any more, which is good. I mean that saves the gas. I think it's from you here somewhere. But the well had shut in pressures that are given there, are very, very informative, you know, and you can do a lot with it.

As to logging, we are talking about such mediocre stuff. Excuse me for saying it that way. It's stuff that's sandy all through, you know, and I have been hopped upon by the El Paso people because it's limited. The sand is not so much limited, it is the permeability which is varying a little bit and it varies just slightly and you have nothing left, you know. To me it looks -- assume that you have a lot of -- that you have a square

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mile in the original base, of sand of same calibre. That is just wishful thinking. Can you imagine that there's a sand exists or a sea exists in which all the sand will be 10 feet thick and of exactly the same calibre, or exactly the same grain size, and that the rivers that will bring in that sand never flooded; all of this? Why that is just not in the cards.

I have been instrumental for keeping on in computing work so that we could figure out the water influx, and if you can't compute the water influx, by the way, you don't ever get a water influx here, don't you worry. I mean that is too darned tight to have any water coming in, and you get the first water when you come to the Morrow, but upon the sides, no, sir.

You have to get it out, out of the energy as it sits in the reservoir.

That stuff can be, well, depending how fast it varied, the permeability goes from, let us say, 1 - 2/10ths to something that you can hardly drain, and you need all this sand and it doesn't matter how low a permeability in order to get all the gas there is, and you need it.

So you have to frac your holes, make the best completion you can, in order to come up to the figures we have given. They may be exceeded; I wish we were here

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to look at it, but that's a long time yet. It comes out slow.

I made a promise one time. I promised -- I think it was you -- I promised I make an estimate as to what the pressure is if I take 100,000 cubic feet of gas and how much is the pressure drop at 160 acres. No go. You cannot get 100,000 cubic feet of gas out of 1/10th of a millidarcy unless you make it very, very thick and you get a pressure drop at 160 acres in 10 years.

That thing does not work. That gas equation does not work under the conditions existing here.

You know, I quite often try to explain why, look, that gas is so expandable, and you know how expandable it is, you open a valve and it only has to expand a little bit, it drops out, you know. It does not really have to flow. No, that thing has to go work itself into the formation for a long time, and then you have two systems working for you, one with a low pressure, and one with a high pressure, and Lord, I'm not clever enough to solve it, and whoever says they can solve it, well, it's not on my conscience.

No, I -- this is -- this is such tight formation that unless you do something for it you don't get the gas that's in it.

Now, have I confused you enough?

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Q. Well, using whatever economic cutoffs you were using, did you come up with a total reserve to be added in the pool by going to --

A. Yes, it -- I would put them now at 4-1/2 billion. And to make life simple, I would give them the total of 10-trillion for the whole pool, that's the total ultimate production.

Q. Okay. Thank you.

A. By the way, when I talked about this, it was my point, you have to drill 2500 wells in the field. There are still 100 more to come. But on my graph for infill drilling we used 2120 and there entered the 500-million or less, and I've already been told of people who would gladly drill a 500-million cubic feet well.

So you can add a few more wells to my 2120 that we mentioned there.

Q. Do you think there will be that many infill wells drilled eventually?

A. Oh, yes, very much so. Someone's got to do it. I beg your pardon?

Q. You do have a deliverability point after awhile where maybe it won't be economic.

A. Well, how much does it cost to add one more well or to keep them on, you know, and then the question is, it's not the total or average, it's the question

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how much can I save by taking them off, you know, and I was told that it comes -- the pressure is to go down to 50 pounds and the cost is appreciably less than the $200 I have used, appreciably less, but I was told to stay away from cost because it might not sit well, so I didn't go into detail there.

Q. Did you use a deliverability cutoff on a well and --

A. No, we have used -- no, we have not used deliverability cutoffs. We have used, for the graph over there, which consists of 2100 wells, I think a last figure of 7-million cubic feet of gas per day with all the wells as exist now, if they go down on the percentage decline, there's about 7-million. Now, that's in 2040. By that time I bet the price is not going to be any longer $2.00. It's going to be somewhat more, but anyhow, that's the figure we have used now; on the basis of $2.00, 7-million per day. That means operating the field, roughly, 7-million, that would be $14,000, see, which you can save by shutting down --

Q. You didn't mean 7-million a day.

A. Oh, yes, you have a look at that, 2500 wells at 7-million.

Q. Total field, that would be total field.

A. Yes, sir, total field. That is less than

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the 100,000, oh, yes, way less than the 100,000. 2500 into 7-million, that's about 140 -- 14,000 cubic feet per day per well.

Q Okay.

MR. RAMEY: Mr. Hutter?

CROSS EXAMINATION

BY MR. HUTTER:

Q Mr. Van Everdingen, looking at your Exhibit Number Twelve, it would appear that the early wellhead shut-in pressures were something in the neighborhood of 26, 27, 2800 pounds.

A Yes, sir.

Q Would that be representative of original wellhead shut-in pressure?

A Yes. I was told, the graph is not here but we -- did we bring one graph?

We had the initial wellhead pressures per township but had not separated on it per well, and we finally decided to leave it out. The initial wellhead pressures can go, I think, as high as 2800; slightly higher on the east side; 2400 on the west side of the field. As a matter of fact, that you are talking about not one sand but various sand and they vary under different conditions.

You also have the variation in gasoline

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content. I mean how much gasoline do you get, or liquid do you get, and in some cases, even oil do you get, but it's only in parts of the field; other parts I saw there was never a mention of any liquid content.

Q Well then, if we had an original bottom -- an original wellhead shut-in pressure of 24 on the west and 28 on the east, why do we have here on Exhibit Number Eight, this graph of cumulative production, when you have zero production you only have a wellhead shut-in pressure on it of 1500 pounds on that one?

A Well, these are the wellhead pressures. These are the pressures measured for the rules and regulations of the 7-day shutin. They were measured once a year, so you have a year of production; in seven days there's no way that you ever get anything representing the average for the reservoir. It gives you a figure, which if you accumulate it over a year, is long enough, it helps you out in determining where you're going, but it's not representative of the actual pressure in that reservoir.

Q In other words, this is only a 7-day buildup.

A Oh, yes.

Q And one of your other exhibits showed a 790-day buildup.

A That's right, that's what you needed to

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come back to the pressure as it existed after you have produced for a year.

Q Well now, in determining that the production would decline here in the year 2042 to 7-million Mcf per day --

A Is it 7-million Mcf per day?

Q -- 7-million cubic feet.

A Oh, that's different. 7-million --

Q Is this taking it to an economic limit or is this taking it to some reservoir abandonment pressure?

A We took, if I remember properly, less than 50 pounds. It's some economic limit, yes, vaguely now, because it's so far in the future there won't be any around to ask me about it.

Q Well now, where does Exhibit Eight stop? When you have a wellhead pressure here of approximately 700 pounds, the cumulative production is less than 3-trillion.

A Yes, six.

Q And yet our Exhibit Number Four shows that we already have more than 3-trillion cubic feet. So when was the cutoff point for Exhibit Number Eight?

A We have it at about 5-trillion cubic feet, and it is at 100 pounds or slightly better, because now we are talking about a 7-day shutin pressure, you know, which is -- you should tell the wellhead shutin pressure --

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Q Well, isn't this what we have already achieved on Exhibit Eight?

A So far we have achieved 2. -- this thing ends probably in the year '77, because it's no longer required to put in every year to measure wellhead shutin pressure. I think they vary from every other year, you see.

Q Okay.

A And that --

Q In other words, Exhibit Eight is not up to date as far as total production and decline of pressure.

A No, it gives you all the pressures that were correct, you know, and there are some measurements by El Paso on a hundred wells and they differ materially from what you see here. These are wells -- these are 1000's and more wells that goes into this average and it is just not correct to use a sample that somebody has on his own well that may not be the field over all.

So I had to leave a few figures for '79 -- '78 out.

Q Because you didn't have them, okay. Now, Exhibit Number Two, this --

A Yes, sir.

Q -- listing of the wells, Exhibit Number Four, I'm sorry.

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A. Yes, sir.

Q. The listing of the wells, was this prepared by your office or is this an El Paso --

A. This El Paso did. We have the same wells we have them -- these data are handy, available in the Dwight's yearly -- which are based on the figures you have -- you publish here, you know, you give out here.

Dwight's collects them and gives you a 10-year review in those data. Now that's the one we have used as a basis because right now it's '79, we have nine years of good data and Dwight's gives you the cumulative and they started in 1970, and on that basis, from Dwight's and from the graph you had, I had about, I would say, 70 to -- 70 to 80 percent of the wells that were given in Number Four, also individually worked up by DMN and confirmed with the percentages, are what they show.

Q. Okay --

A. But we have, if anyone doesn't want to take it, we have the map with us and I showed both figures, but I didn't want to show it.

Q. I presume you're acquainted with the El Paso -- with El Paso's Exhibit Number Four and know how it was derived.

A. Yes. They have wells, they have used pressures and the --

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Q All right, are these original recoverable reserves and cumulative production and remaining reserves based on a production versus pressure decline?

A Yes, sir.

Q And what abandonment pressure was used in that calculation?

A Well, they probably also used close to 500 -- close to 50 or 100 pounds. It's probably less than 50 because abandonment, you take a well in as long as you can, it doesn't cost you much -- it's very difficult to say what you should use. You can use and it's on an average -- well, I think -- where is my production man, what did you quote?

Where is the production from, you people?

A SPECTATOR: 112

MR. LOPEZ: 112.

A Oh, they took 112.

Q Okay. Now, Mr. Van Everdingen, assuming that the pool today has 4.9-trillion cubic feet of remaining reserves and another maybe 1/10th of a trillion for additional wells that would be drilled under today's spacing, would give us a total ultimate recoverable reserves of 5-trillion, I think you stated, is that correct?

A Please, sir, tell me once more, because you used a term reserves. I think you mean we have recovered

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almost 3-trillion.

Q Yes, and I think --

A And there's 1.9 to come yet.

Q Right, so we have approximately 4.9-billion cubic feet of total recoverable reserves in the pool.

A Yes, sir.

Q Under today's spacing.

A Yes, sir.

Q And then I think you said that there were also some additional locations under today's spacing that had not been drilled --

A That's right.

Q -- and the drilling of those would bring the total recoverable reserves in the pool under today's spacing to approximately 5-trillion cubic feet.

A That, or even 5.5.

Q 5.5?

A Yes, sir.

Q Now you stated that you thought the additional drilling under the proposal here would recover another 4.5-trillion cubic feet?

A Yes, they allow me to take 5.5 and then this 4.5 come up, right you are.

Q Okay. I'm slow, Mr Van Everdingen, and I didn't catch it. Would you explain why? Why we're going

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to get 4.5 additional trillion cubic feet of gas from the infill drilling program?

A. Because the wells, as I interpret the pressures, which is the best, to me has always been the most reliable source of information, if I interpret the pressures that have been measured correctly, they show that they do not -- that they do not pertain to what is in the -- in the oil business you use as an infinite reservoir.

You were talking about the limited drainage areas on practically all of the wells.

Q. Is it exemplified, Mr. Van Everdingen, by your Exhibit Number Twelve?

A. Yes, sir.

Q. Where we have No. 212 that was drilled in 1978 right in the middle of a pattern of wells which had been drilled a number of years before, maybe ten years before ---

A. Not all, there are some five year wells; but to say on eight year wells, and then eight year wells, those surrounding wells, have not been capable to reduce the pressure at the location of 212 by a measurable -- to a measurable extent.

Q. And No. 212 recovered what was almost virgin reservoir ---

A. Yes, sir.

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Q. -- pressures?

A. Yes, sir. Then I thought, well, that was fairly late, and then we made the map just behind you, that I think is Number Twelve, yeah, same map. It's right behind you on the wall. We found the same two -- we found two wells, 258 and 259, which showed the same picture, and I will bet you if I could take time off and make a map for the entire field, you will find that that phenomenon is not an isolated case; that you will find many more wells when they are drilled later than the surrounders, giving the initial pressure. You get more familiarity, but unfortunately, I was not clever enough to start on that way when the job came up.

Q. Well now, digressing just a moment, Mr. Van Everdingen, do you remember in 1974 when you testified in Blanco-Mesaverde --

A. Yes, sir.

Q. -- case, what were the expected pressures in the undrilled 160-acre tracts supposed to be at that time?

A. This problem did not arise. I do not know. I do not know. The one thing that, when that testimony came up, you know, for the first time we saw there buildups, I think they had a half a dozen, that lasted for two years and the wells were still going, you know. Now,

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I think the most was almost three years, and I never thought about measuring pressures or giving instructions or requiring that the pressures be measured within 24 days, like you have here, WH, whatever you call them, wellhead shutin pressures upon completion.

That's what -- I could have done a better job on that.

Q. I was thinking we were expecting pressures some place in the nature of 75 percent of the original pressures ---

A. Leave me out on account of age. I don't recall.

Q. I see.

MR. NUTTER: I believe that's all, thank you.

MR. RAMEY: Any other questions of the witness? He may be excused.

Do you have anything further, Mr. Lopez?

MR. LOPEZ: No, Mr. Chairman. That concludes our case.

(There followed a discussion off the record.)

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MARLAN THOMPSON

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

DIRECT EXAMINATION

BY MR. CARR:

Q. Will you state your name and place of residence?

A. My name is Marlan Thompson. I live in Arlington, Texas.

Q. Mr. Thompson, by whom are you employed and in what capacity?

A. I work for Southland Royalty Company as a reservoir engineer.

Q. Mr. Thompson, have you previously testified before this Commission and had your credentials accepted and made a matter of record?

A. No, sir.

Q. Will you briefly review for the Commission your educational background and work experience?

A. I graduated from the University of Texas in 1963 with a Bachelor of Science degree in petroleum engineering.

I worked for Southland Royalty for the past year as a reservoir engineer. Most of the prior ex-

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perience, which totals about fifteen years, I spent with Texaco. About nine out of the fifteen years I worked as a reservoir engineer.

Q Are you familiar with the subject matter of this case and the Basin-Dakota pool?

A Yes, I am.

MR. CARR: Are the witness' qualifications acceptable?

MR. RAMEY: They are acceptable.

Q (Mr. Carr continuing.) Mr. Thompson, as a reservoir engineer does your area of responsibility include the San Juan Basin?

A Yes, sir.

Q How many wells does Southland operate in the San Juan Basin?

A About 600 in the San Juan Basin.

Q How many of these are in the Basin-Dakota?

A 172.

Q Will you please refer to what has been marked for identification as Southland Royalty Company's Exhibit Number One and explain to the Commission what it is and what it shows?

A Exhibit Number One is a comparison of pressures between recently drilled wells and older offset wells. Not only is the -- the initial shutin pressure is

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shown on both the original -- or both the new and the original well, and also a current or recent shutin pressure on the older wells.

There are six -- six groups of wells that show this pressure comparison, and these wells cover six different townships in the San Juan Basin.

The first four are in the Aztec area and the other two are in the Jicarilla Reservation area.

Looking at -- looking at the first comparison, would be Southland Royalty's Culpepper-Martin No. 17, showing that this well is located in Section 33 of 17 North, 12 West. This well was completed in October of '78; had initial shutin wellhead pressure -- this is a 7-day shutin pressure -- of 1583 pounds.

The offsetting Culpepper-Martin No. 3 Well, drilled in 1966, May of 1966, had initial shutin pressure of 1578.

The new well, Culpepper-Martin 17, the pressure is five pounds higher in the new well than in the older offset well.

Referring to a recent shutin wellhead pressure in the offset well, this number is 780 pounds, which is considerably lower than the -- than the shutin pressure in the recently drilled well, this pressure being 1583 pounds.

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The other five groups of wells have similar comparisons. As you can see, three out of the six, the new well has higher pressures than the older wells, while three have somewhat lower pressures than the older wells.

Another case, the recent, or what we might call a current shutin wellhead pressure was considerably lower than the shutin pressure in the new wells. All these new wells were drilled in 1978 or '79.

Q. Mr. Thompson, what conclusion do you draw from this exhibit?

A. I concluded that from this exhibit, that a well will not drain 320 acres. This pressure -- these pressure comparisons, those small differences in pressure in these newer wells compared to the older wells, indicates that one well will not drain a full 320 acres.

Q. Do you have a recommendation to make to the Commission in this case?

A. Yes. My recommendation is that the infill program, infill Dakota program, as proposed by El Paso be adopted.

Q. Mr. Thompson, do you believe that granting the application of El Paso will result in recovery of gas which otherwise would be left in place?

A. Yes, I do.

MR. CARR: At this time we would offer

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Southland Royalty Company Exhibit Number One.

MR. RALEY: Southland Royalty Exhibit Number One will be admitted in evidence.

MR. CARR: I have nothing further on direct.

MR. RALEY: Are there any questions of the witness? Mr. Arnold?

CROSS EXAMINATION

BY MR. ARNOLD:

Q. Mr. Thompson, you're not necessarily saying that you think four out of five of the infill wells you're going to drill are going to have a higher pressure than the first well drilled?

A. No, sir. I'd say they'ld be very nearly the same. I'd say that no drainage had occurred in that particular area.

Q. In fact, if the new well got higher pressure than the old well, must indicate something other than drainage area.

A. There is some small differences. This could be some inaccuracy in measurement. They are only a small amount higher than the older well. I think that's probably measurement inaccuracy, measurement conditions. I'd say they're essentially the same.

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MR. RAMEY: Any other questions of the witness?

MR. WILLINGHAM: I would like to know has he shutin the wells, new wells, for how long and how long were they produced before being shut in.

A The initial wellhead pressures are 7-day shutin pressures, and the wells had produced only a very short time, the production during the initial testing operation.

Now, the recent shutin wellhead pressures, the wells have been producing a long time.

In fact from the completion date in -- in the case of Culpepper-Martin No. 3, it was completed in 1966, and this recent shutin wellhead pressure was taken in '77.

MR. RAMEY: Any other questions of the witness?

MR. STAMETS: Mr. Ramey.

MR. RAMEY: Mr. Stamets.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Thompson, these initial shutin pressures, were those taken after a period of flow? What I'm trying to determine is how close are these to a reservoir

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pressure, or how close are they to actual shutin pressures?

A. They are taken after a period of flow. They are not -- they're all taken on the same basis. We presented the comparison and do not represent them as being the initial reservoir pressures.

Q. So they're not stable?

A. They're not fully built up, no, sir.

Q. So you really don't know whether or not, if they were allowed to stabilize, whether the new tests would show decrease in pressure or increase in pressure?

A. No, sir, they're all taken under the same conditions, so I think when -- when -- I think you can compare them and say that the reservoir conditions are the same.

They're all taken after a flow period and after a shutin -- shutin period, 7-day shutin period.

MR. STAMETS: That's all.

MR. RAMEY: Any other questions of the witness? He may be excused.

MR. CARR: We have nothing further.

MR. RAMEY: Mr. Ryan, would there be some where we could stop in about ten or fifteen minutes?

MR. RYAN: What I was thinking, Mr. Chairman, if we wanted to -- I have some preliminary remarks to make, and if you wanted to do that, I mean I need to qualify

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the witness, and we might do that in advance of the lunch hour.

MR. RAMEY: Okay, let's --

MR. RYAN: Then during the lunch break we can put our exhibits on the board and then we can have those.

L. E. NEIBERGER

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

DIRECT EXAMINATION

BY MR. RYAN:

Q As sort of a preliminary statement, I'd like to fill in the Commission a little bit about what Amoco's position is in this hearing, and what we purport to show with an expert witness and some exhibits.

Amoco is a major operator in this field. We operate 356 wells and have an interest in an additional 382 wells.

Our net production for December, 1978 was 44-million cubic feet of gas per day.

To the present time, the end of 1978, Amoco's share of the gas has been 777 Bcf, which represents about 22 percent, or 21 percent, of the field.

Amoco is supporting El Paso's application

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to infill drilling, so that the nation needs the gas and the gas is there, and it will not be produced by the existing wells.

In arriving at this, Amoco had done an extensive study, which was presented by Mr. Neiberger in preparation for this hearing. He did an independent study apart from El Paso's study, to arrive at whether Amoco wanted to participate and recommend an infill drilling program.

That study, in anticipation of that, how much money we were going to spend and what we were going to do, we anticipate if this application is granted, that over the next decade we'll drill in the neighborhood of 350 wells, so we really anticipate doing infill drilling in practically all -- practically all of our locations, and that will cost at present figures, in excess of $100-million, or we estimate $115-million at the present time.

We do plan to get into the program of drilling as soon as possible if the application is granted, and start certainly next year operating four or five rigs if they're available and during the first part of the 1980's do a great part of our drilling.

Part of the situation that prompted this study that we did was because of the results that we feel that we've had from the Mesaverde infill drilling program.

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Our original forecast in that -- in that program was we thought we would recover an additional .85 Bcf per well and we've recovered far exceeding that by over 1-billion cubic feet of gas.

We expect, as our figures will show in the study, that we anticipate that we will get far better results out of the -- out of the Dakota infill drilling program.

I think our conclusion is that we'll get over 2-billion with the additional wells, and of course, depending on frac techniques, we can even get greater than that.

I would say at this point that the field rules proposed by El Paso, we have no objection to them. We would recommend that those rules be adopted.

I do have one witness and I'd like to qualify him at this time.

Would you please state your name, by whom you're employed, and in what capacity?

A. My name is Lance Neiberger. I'm employed with Amoco Production as a Senior Petroleum Engineer.

Q. First of all, would you spell your last name?

A. N-E-I-B-E-R-G-E-R.

Q. And would you speak up loudly where all

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can here you?

Have you ever testified before this Commission?

A. No.

Q. Would you briefly state your qualifications first as to education and then as to work experience?

A. I graduated from the University of Colorado in December of 1974 with a Bachelor of Science in civil engineering. January of 1975 I began work with Amoco Production as a production engineer in the Casper, Wyoming office. Approximately a year and ten months later I was transferred into Denver as a reservoir engineer and worked there for a little over two years.

For the last six months I've been transferred back up to Casper, Wyoming and an engineering supervisor.

I am registered in the State of Colorado as a professional engineer.

Q. During the two years that you were in the Denver office working as a reservoir engineer, was the area that's the subject of this application within your jurisdiction?

A. Yes, sir.

Q. And did you work closely with the BAsin-Dakota Field?

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A. Yes, sir.

Q. And in your reservoir study, did you do an extensive study of the field for reservoir purposes?

A. Yes, I did.

Q. And did you compile this field study? That was done by you?

A. Yes.

Q. And that's an extensive reservoir study of the field?

A. Yes, it is.

Q. And did you do that to estimate reserves and to -- to see the feasibility of an infill drilling program within that field?

A. Yes, I did.

Q. And the results of that study, do you have them complete?

A. Yes.

Q. And in preparation for this hearing have you prepared certain exhibits that you are -- are going to introduce in this hearing related with this field and your study?

A. Yes, I have.

MR. RYAN: May he be qualified as an expert witness?

MR. RAMEY: Yes, we'll consider him to be

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qualified.

And with that, let's recess until 1:30.

(Thereupon the noon recess was taken.)

MR. RAMEY: Mr. Ryan, you may continue.

MR. RYAN: Yes. I might explain as a preliminary matter that I think everyone -- we've put the exhibits, we've got a whole stack of them there, there are two stacks of exhibits. The first one is a map marked as Exhibit One. The second one is a packet of exhibits. This contains a total of six exhibits, two of which are multiple page, but I stamped the first page of each exhibit with the official stamp so that will give you an indication of how they are numbered and we'll go through them individually.

Q (Mr. Ryan continuing.) Mr. Neiberger, you are still sworn and did you prepare certain exhibits in this cause?

A Yes, I did.

Q Would you please refer to what the reporter has marked as Exhibit Number One, and I'll ask you to identify that exhibit and explain it, please.

A Exhibit Number One is a map of the Basin-Dakota Field. For the general purposes the wells on here are all BAsin-Dakota wells. This line across the top is a border between Colorado and New Mexico and the town of

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Farmington lies approximately here.

A few things I'll be talking about later on I'd like to point out at this time.

The green dots shown in here are wells on which we ran pressure buildup tests for study.

The small red dots are areas on which I studied in order to condense my study instead of studying all of our Amoco wells in the field. I broke it down into a two township area to our main study area, Township 29 North, Range 12 West, and Township 30 North, Range 12 West.

In addition to this two township area there are model wells in each of the other areas as shown by the red dots.

In addition there are two red arrows on the map. These arrows indicate locations which simulate infill drillings. I'll explain later.

Q. Now, on Exhibit One, that basically shows all of the wells that have been drilled to date in this formation?

A. Yes, it does.

Q. Is there anything else on Exhibit One at this time?

A. I don't believe so.

Q. Now, you've indicated that you have

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done a study, a complete study in your opinion, on this field in preparation for this hearing?

A. Yes, I have.

Q. Are you prepared at this time to go through a step by step version of some of the things that you did in the study?

A. Yes, I am.

Q. And are those shown by the exhibits?

A. Yes, they are.

Q. Can we now look at what the reporter has marked as Exhibit Number Two. Is that a four-page exhibit?

A. Yes, it is. Exhibit Number Two is four pages. These are material/balance graphs on the four subject wells on which we are --

Q. Would you identify what wells they are by which dots they are on Exhibit One.

A. These are the green dots on Exhibit One. These wells are the Pan American Gas Com. "B" No. 1, Section 31, Township 30 North, Range 11 West; Sullivan Gas Com. "D" No. 1, Section 26, Township 29 North, 11 West; the Gallegos Canyon Unit No. 173, Section 29, Township 29 North, Range 12 West; and the L.C. Kelly No. 1, Section 5, Township 30 North, Range 12 West.

Q. Now, let's look first at Page 1 of Exhibit Two, and I will ask that you state what went into that

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exhibit.

A. This exhibit, as I stated earlier, is a material/balance prediction for the well. The real data I wanted to show with the use of the exhibit was the fact, that was mentioned earlier by Mr. Van Everdingen, that pressure data, true static pressure of a reservoir, is not measured acurately by the seven-day test as required by the State. The three or four circled areas begin with a previous State seven-day deliverability BHP/Z points. All of the triangles were data that were gathered from our pressure buildup tests. The tests range in length from twenty-four days to fifty-six days and a method of extrapolating to a static reservoir pressure was used. The bottom triangle in each case is the pressure that was measured the seven-day period so as to correlate with the State test.

The next triangle up was the pressure as it was last measured on each well and I might say here that the pressure was increasing on each well as the bombs were pulled. The highest pressure there, the highest triangle, is the extrapolated static reservoir pressure on this well.

These four buildup surveys were run in order to try and get a correlation between the seven-day deliverability test and the static reservoir pressure.

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Because of fracture effected data on all wells accept for this Pan American Gas Com. "B" only a conservative estimate of reservoir pressure could be obtained. In other words the fracture data had effected the mathematical methods of obtaining the true reservoir pressure.

Because only one well yielded the results I was looking for, I considered this method for my study and my determination for gas in place as not conclusive.

Q. Now, pages 2, 3, and 4 of Exhibit Number Two are similar graphs for those individual wells?

A. Yes, they are.

Q. And what did you conclude on this study that you did on these wells?

A. I concluded that I could not use this method throughout my report to determine gas in place --

Q. On a field wide basis?

A. -- on a field wide basis.

Q. Did you at that time think it would be necessary to consider another method of calculating gas in place on a field wide basis?

A. Yes, I did.

Q. And what method was that?

A. I went to a computerized mathematical model which was developed by a Mr. Carter of Amoco's

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Tulsa Research Center especially for extremely tight gas reservoirs.

Q. Do you feel that that was necessary step? That the information that you gained from the wells on Exhibit Two would indicate that the reservoir was tight and that it was necessary to go to another method?

A. Yes, I do.

Q. Is Exhibit Three, marked by the reporter, some of the factors that were considered in the gas reservoir model?

A. Yes, these are.

Q. Could you give us a little background on the model and what went into that.

A. Okay. Through a computer analysis of log and core data certain formation characteristics were determined. These characteristics were all -- well, the net pay, water saturation, porosity under the input data. In order to run the model all of the input data and the variables were put into the computer. The computer by matching a point in time cumulative at this point in time and a producing rate at this point in time, all three factors gave future performance predictions or performance predictions. They gave rate versus time predictions, production -- cumulative production versus time and a reservoir pressure versus time. By changing the

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variables a match was then obtained on each well after probably an average of thirty to forty runs per well, which actually overlaid the actual production of the well.

Q. How many wells did you use in the study?

A. I used seventy-eight wells of which they were all in these study areas, as previously mentioned.

Q. So you took the seventy-eight wells and used the input data that you indicated on Exhibit Three to arrive a situation that is comparable to that well?

A. Yes, I did.

Q. And then is that the method that you used to project future reserves?

A. Yes, this method gives a rate versus time history and so it can actually be used not only to match actual production but to project future production.

Q. Has Amoco used this method in the past?

A. Amoco has used this method very successfully in the past.

Q. Have they been pleased with the results?

A. We have been very pleased.

Q. Is there anything else you wish to indicate on Exhibit Number Three?

A. I do not believe so.

Q. Now, what has been marked as Exhibit Number

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Four, are those individual wells that follow through with the study you talked about on Exhibit Three?

A. Yes. Exhibit Number Four is a ten-page exhibit. These are actually model history matches of five wells. Each well has two pages. The first page being a rate versus time code. The actual production is shown along with the model production. The second page on each well shows little dots on there, those are the average productions for each year and the line that is drawn through those is the projection as made by a computerized model. By changing the parameters this model projection might lie anywhere on this page. However, until the reservoir formation characteristics are in a range which approximates the formation characteristics the model projection will not overlie the actual production.

Q. For example, if you look at page 1 of Exhibit Number Four could you indicate by the two symbols there of how you arrived at the model production versus the actual production.

A. Oh, the model production and the actual? Okay. The actual production is historical data on each of these wells. Each well had certain input data that were held constant by varying both the permeability of the well and the spacing pattern of the well. The model projection varied until these two parameters were found for this well

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that gave this overlying history match. I did not feel that I had formation characteristics that were reliable.

Q. Now, page one of that exhibit indicates a comparison of the model production from the actual production, and page two then is the -- is the future estimate of reserves.

A. Yes, it is.

Q. Well, what's the spacing factor that is considered?

A. Okay, originally the spacing was stated at 320 acres per well; however, as I said, it varied on each well once I got into matching wells.

The average drainage area for the wells that was modeled turned out to be approximately 195 acres, given a well life of 101 years.

Q. Before we get into that next exhibit, are the remaining pages of Exhibit Number Four similar situations, just using different wells?

A. Yes, they are.

Q. Did you feel by -- by -- and these are, the five wells you've used and shown here on Exhibit Number Five, are they indicative of -- of the wells that you used in this study?

A. Yes, these are typical wells used in the study.

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Q. It wasn't limited to the five, though. You did the study --

A. No.

Q. -- with seventy-eight wells.

A. We did the study with seventy-eight wells.

Q. And were the wells picked at various parts in the reservoir and in the field to give some sort of indication to what the total situation would be?

A. Yes,they are.

Q. And you feel that you have a pretty acurate study as far as this type of study is concerned?

A. I feel I do.

Q. Now, are the results of this study with the seventy-eight wells shown on what has been marked as Exhibit Five?

A. Yes, they are.

Q. Now, could you look at that exhibit and explain what that exhibit is?

A. Exhibit Five is a tabulation of the results of my modeled data. This is the data as determined for the average well of the seventy-eight as modeled. Barring no problems with corrosions or anything that would shorten the wells natural life the study indicated that the wells would actually produce up to one hundred one years. This average well would produce forty-eight percent of the

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three hundred twenty-acre gas in place and drain one hundred ninety-five acres. The average well would produce 4.2 BCF and with the present spacing one hundred twenty-five acres would be untouched by the present well.

Because of corrosion problems and Amoco has had a lot of problems with corrosion and had to abandon a number of wells. The purpose of my study -- I limit the well life to fifty years. With a fifty-year well life the average well presently producing with my seventy-eight would recover forty percent of the three hundred twenty acre gas in place, would drain one hundred sixty-thre acres, recover 3.5 BCF, and leave undrained one hundred fifty-seven acres.

If we were allowed to drill a second well with a one hundred one year well life my modeled data indicates that the average well would have 2.68 BCF additional recoverable reserves. Based on the fifty-year well life my model indicates 3.36 BCF per well additional recoverable reserves.

Because of the vast differences in a field this large I applied a seventy percent factor to take care of the differences which have not been obtained through the use of modeling different areas of the field. Applying the seventy percent to these previous numbers you come up with, for the one hundred one well life again,

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1.88 BCF of additional reserves. For the fifty-year well life 2.36 BCF of additional reserves.

Q. I have a couple of questions before you go on. Is it your opinion that you needed to get away from the one hundred one years because probably the well would not last that long as far as the casing is concerned and other factors --

A. That is right.

Q. -- and that fifty years is more realistic for the total life of the well.

A. The asterisk as shown on reserves will give us a range of additional reserves based on form drilling of the present system in Basin Dakota of 1.88 BCF per well. This model predicts that there is 4.6 TCF of additional recoverable reserves which could be obtained by infill drilling and 3.36 BCF per well that could be as much as 8.2 TCF additional recoverable reserves. This just shows the range by infill drilling the reserves would be increased, the whole field by at least 4.6 TCF and as much as 8.2 TCF.

Q. Now, when you apply the seventy percent factor to the second well, does that a conservative figure in your opinion?

A. Yes, I believe it is.

Q. And that is taking in the factors that you

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can't predict at this point.

A. Exactly.

Q. But even using that figure it is your prediction that the additional recovery from the infill drilling program will be 4.6 TCF additional recoverable reserves.

A. That's right.

Q. And you are talking about under that system 2.3 BCF additional reserves from a three hundred twenty-acre spacing as it now exists.

A. Yes, sir.

Q. Now, that would indicate that that is more than what is -- you've come to realize from the Mesaverde, is that correct?

A. Yes, it is.

Q. Is there anything else on that exhibit?

A. No, I think that is it.

Q. Now, in your opinion is the models that you have graphed to come up with these conclusions -- do you feel confident about that study?

A. Yes, I feel very confident about it. As I have said, we have used this method in numerous other tight gas reservoirs and we have gone back and double-checked the data years later and the data we have on reservoirs we've seen have predicted performance very good.

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Q. Now, did you do an additional study to simulate actual well conditions?

A. Yes. The modeling told us that we were not getting full drainage of the area so in order to further prove this we -- Amoco drilled two wells to simulate infill drilling.

Q. Now, are those wells and the results thereof shown on what the reporter has marked Exhibit Number Six?

A. Yes, they are.

Q. And that is a four-page exhibit.

A. Yes.

Q. And are the first -- pages one and three on the board there?

A. Pages one and three, yes.

Q. Why don't you explain what went into those pages of the exhibit.

A. The well that Amoco drilled here is the Federal Gas Com No. 4, Southeast quarter of Section 23, Township 29 North, Range 10 West. This is legal 320 location and the previous Amoco well here had been plugged and abandoned because of corrosion problems. The offset wells are shown here. The drainage radiuses calculated for these wells are the shaded areas encompassed by the circle. When drilling this well, because of the fact that the drainage radiuses had not reached into this area

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virgin pressure or pressure approaching virgin pressure was expected. On page 3 of the same exhibit we have the Lopez Gas Com No. 1, the Northwest quarter, Section 2, Township 29 North, Range 9 West. This well is on a undrilled tract. It was drilled basically between two of Amoco's wells again. We felt that this simulated an infill drilling location.

Q. Now, pages 2 and 4 of Exhibit Number Six, those are the pressure data?

A. Yes, they are.

Q. And how much time did you use in getting the pressure?

A. On the Federal Gas Com No. 4 one hundred fifty hours was used to obtain pressure. On the Lopez one hundred ten hours was used.

Q. And the pressure on page 2 of the exhibit for the Federal Gas Com No. 4 well, what was your final pressure at the end of one hundred fifty hours?

A. At the end of one hundred fifty hours we had 2,569 PSI.

Q. Now, does that seem to approach virgin pressure?

A. Yes, it does.

Q. Now, what about the other well, the Lopez?

A. The other well at the end of one hundred ten

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hours we reached 1,982 PSI, which again I feel approaches virgin reservoir pressure.

Q. That certainly is higher than existing pressure in the field of surrounding wells.

A. Yes, it is, quite a bit.

Q. So this exhibit by drilling these two wells, and those wells were drilled not as infill wells but actual unit wells.

A. Yes.

Q. As on page one of Exhibit Six, to fill in for a well that was plugged and abandoned, is that correct?

A Yes, sir, that is.

Q But it ended up on 160-acre pattern?

A Yes.

Q And your conclusion is that the -- you did reach approximate virgin pressure with those wells.

A Yes.

Q Now, going back just for a minute to -- to the conclusions of your modeled study, even though the wells in this field were -- if they were capable of being produced for over 100 years, you indicated that they wouldn't drain the entire 320-acre unit, is that correct?

A That is correct.

Q At the end of this study that you made do you have any recommendations to make?

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A. I would recommend infill drilling as proposed by El Paso. I believe that we cannot fully drain the reservoir without a second well.

Q. So in your opinion a second well in each 320-acre tract is necessary to efficiently and effectively drain the proration unit of 320 acres?

A. Yes, it is necessary.

Q. In your opinion if additional wells are not drilled in the 320-acre spacing, will certain amounts of gas be undrained from that 320-acre spacing unit?

A. Yes, sir, they will be left where they are.

Q. And will not be produced at all?

A. That's right.

Q. In your opinion would that be physical waste of gas?

A. Yes, it would be.

Q. In your opinion can a second well be drilled in each of these 320-acre spacing units without violating the correlative rights of offsetting operators?

A. They can.

Q. The second well will not drain beyond the drilling spacing unit.

A. No.

Q. In your opinion is the granting of this

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application in the best interest of conservation?

A. Yes, it is.

Q. Certainly the country needs the gas, don't they?

A. I think so.

Q. It would be good for the economy of the country and of New Mexico.

A. Yes.

Q. Certainly of the area around Farmington where this field is located.

A. Yes, it would.

Q. Were exhibits One through Six prepared by you or under your direct supervision?

A. Yes, they were.

MR. RYAN: I offer the exhibits into evidence at this time.

MR. RAMEY: Exhibits One through Six will be admitted

Do you have anything further, Mr. Ryan?

MR. RYAN: In my opening remarks I indicated that Amoco has a program of drilling additional wells. Is that your understanding that it is being planned in the next few years to drill in the neighborhood of three hundred fifty wells?

A. Yes.

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Q. And we are going to get really serious in this program?

A. Yes, Amoco is very serious about it.

Q. That is all I have

MR. RAMEY: Any questions of Mr. Neiberger? Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q. Mr. Neiberger, as I understand it you used seventy-eight wells and then designed your computer program so that you get production versus time decline curve and then move that thing up and down until it fitted the actual decline curve.

A. Yes, by changing the variables the modeled prediction changes.

Q. And then based on that seventy-eight -- that was based on seventy-eight wells?

A. Yes.

Q. The results of the seventy-eight wells then are tabulated right here on Exhibit Five, is that it?

A. Yes, sir, that is the average of the seventy-eight wells.

Q. Now, are those seventy-eight wells good wells, bad wells, average wells, or what?

A. We took great lengths to try to obtain

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a good average over the field of wells. So they are good, bad, and medium wells in that average.

Q. Well, what were your average recoverable reserves for those seventy-eight wells?

A. I don't have that number off of the top of my head, but it would just simply be seventy-eight times the reserves as shown on here.

Q. Now, on Exhibit Five where you show recoverable reserves 4.2 BCF upon a 101-year basis, are those the recoverable reserves under the 195 acres?

A. Yes, sir.

Q. So that's not the full 320?

A. No, it is not.

Q. The total number of reserves under the 320-acre tract then would be the 4.2 plus the 2.68?

A. Yes.

Q. And was the 7 BCF then an average 320-acre tract?

A. A little over 6 BCF.

Q. It would be 7. Almost 7. 4.2 plus 2.7 is 6.9.

A. Oh, okay. Excuse me, I was looking at the wrong column. Yes, you are correct.

Q. Is 7 BCF typical of a Dakota well over there as far as the reserves under 320 acres?

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A. Well, based on the wells that I used, yes, they were.

Q. Based on your seventy-eight?

A. Based on my seventy-eight wells.

Q. Have you converted this additional reserve to be obtained under the 50-year or the 100-year program to the field as a whole so that we know what additional reserves we need for the entire field?

A. No. What I have done here is the asterisk as shown on Exhibit Number Five showed a range for the total field. In other words, using the lowest figure of the recoverable reserves for a second well of 1.88 BCF per well, I would say that at least 4.6 TCF could be recovered and using the highest number in those 4, 3.36 BCF per well, possibly as much as 8.2 TCF could be recovered.

Q. Now, the 8.2 is not based on seventy percent?

A. No, this is just a range.

Q. I believe that is all.

MR. RAMEY: Are there any other questions? You may be excused. Is there anything further, Mr. Ryan?

MR. RYAN: That is all of the testimony I have.

MR. RAMEY: Mr. Tully, do you have a

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witness?

MR. TULLY: No, sir, I would just like to make a statement for the record at the proper point in the procedure.

MR. RAMEY: I think we are ready for statements so you can start now, Mr. Tully.

MR. TULLY: Dugan Production Corp. wishes to state its support of El Paso Natural Gas Company's application for infill Dakota well. The approval of this application by the Division will provide an opportunity for natural gas operators to recover additional natural gas from the Dakota formation which would not be recovered from one Dakota well and the currently established 320-acre proration unit. Without wishing to cloud the issues presented to the Division by El Paso Natural Gas we wish to draw the Divisions attention to certain circumstances now existing for the Basin-Dakota Pool. We agree with El Paso's testimony that the existing Dakota Proration Unit should not be disturbed. However, there are situations where an operator may own the Dakota operating rights for only 160 acres.

We wish to submit for your consideration that this Division, in rendering its decision, provided for an administrative approval procedure for a Dakota well on a 160-acre proration unit, for a 320-acre Dakota proration

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unit does not presently exist.

Thank you for your consideration of the above comments. Respectfully submitted, Thomas A. Dugan, President.

MR. RAMEY: Mr. Carr, do you have anything?

MR. CARR: I have Mr. Morris, Vice President of Southland Royalty Company, who would like to make a statement.

MR. MORRIS: I would like to re-emphasize what our testimony was by Mr. Marlon Thompson. We are in support of El Paso's position to drill a second well on the 320-acre spacing in this pool.

MR. RAMEY: Thank you, Mr. Morris. Mr. Byrd do you have anything?

MR. BYRD: Mr. Chairman, no prepared statement, but we do want the record to reflect that the Mesa Petroleum does support the application .

My questions on cross examination of the witnesses were to point out some possible alternate language that you might consider in those two sections that I questioned.

MR. RAMEY: Thank you, Mr. Byrd.

Mr. Stogner?

MR. STOGNER: Yes, sir.

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I have a statement to read into the record. Consolidated Oil and Gas, Inc. concurs with El Paso Natural Gas Company's application to ammend Order R-1670 and R-1670-C to permit the optional drilling and production of an additional well on roration units in the Basin-Dakota gas pool of San Juan and Rio Arriba Counties, New Mexico, and for the assignments of allowables for such additional wells and proration units.

Consolidated is currently operating 69 wells in the Basin-Dakota pool and has been operating gas wells in the San Juan Basin for over 20 years. Based on its experience with the Basin-Dakota formation, Consolidated has concluded that one well will not effectively and efficiently drain the existing 320-acre proration units and that the drilling of additional wells will be necessary in order to drain those portions of the proration units which can not be drained by the existing wells.

MR. RAMEY: Thank you, Mr. Stogner. Mr. Arora.

MR. ARORA: My name is Sudesh Arora. I am the Manager of Reserves and Evaluation of Supron Energy Corporation.

Supron Energy Corporation owns and operates a substantial number of gas wells producing from the Basin-Dakota gas pool of San Juan and Rio Arriba

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Counties, New Mexico. Each of these wells has been drilled on a 320-acre spacing unit in accordance with previously effective spacing rules of the Oil Conservation Commission pertaining to the Basin-Dakota gas pool.

Supron Energy Corporation has reviewed the pending application of El Paso Natural Gas Company in this case seeking an amendment of the existing spacing rules to permit the drilling of an additional infill Dakota well on each established 320-acre spacing unit. Our company concurs with the views expressed by El Paso Natural Gas Company with respect to the desirability and necessity of additional infill Dakota formation wells in the San Juan Basin and supports the application of El Paso Natural Gas Company in that regard.

MR. RAMEY: Thank you, Mr. Arora. Mr. Gibb.

MR. GIBB: Tenneco Oil Company recommends approval of the application for infill drilling presented by El Paso Natural Gas Company today.

We feel that the testimony presented, as well as our own studies, shows that infill drilling in the Basin-Dakota is necessary to efficiently and effectively drain the remaining reserves.

MR. RAMEY: Thank you, Mr. Gibb. Mr. Brown.

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REPORTER'S CERTIFICATE

I, SALLY WALTON BOYD, a Court Reporter, DO HEREBY CERTIFY that the foregoing and attached Transcript of Hearing before the Oil Conservation Division was reported by me; that said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability, knowledge, and skill, from my notes taken at the time of the hearing.

Sally W. Boyd, C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. ____, heard by me on _____ 19____.

_____, Examiner
Oil Conservation Division

MR. BROWN: Getty Oil Company wishes to go on record as supporting the application of El Paso Natural Gas Company for infill drilling in the Basin-Dakota pool in San Juan and Rio Arriba Counties, New Mexico.

MR. RAMEY: Anyone else have a statement?

Well, the Commission will take the case under advisement, and the Hearing is adjourned.

(Hearing adjourned.)

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STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
State Land Office Building
Santa Fe, New Mexico
30 April 1979

COMMISSION HEARING

IN THE MATTER OF:

Application of El Paso Natural Gas Company for the amendment of Orders Nos. R-1670 and R-1670-C, Basin-Dakota Pool, San Juan and Rio Arriba Counties, New Mexico. CASE 6533

BEFORE: Commissioner Ramey
Commissioner Arnold

TRANSCRIPT OF HEARING

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For Supron Energy: Sudesh Arora
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For Tenneco:
Bob Gibb, Esq.
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For Getty Oil: Gerry Brown, Esq.
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MR. RAMEY: The hearing will come to order. We have one case on the docket this morning, Case 6533.

MR. PADILLA: Application of El Paso Natural Gas Company for the amendment of Orders Numbers R-1670 and R-1670-C, Basin Dakota Pool, San Juan and Rio Arriba Counties, New Mexico.

MR. RAMEY: Ask for appearances at this time.

MR. LOPEZ: May it please the Commission, my name is Owen Lopez, with the law firm of Montgomery, Andrews, and Hannahs, Santa Fe, New Mexico, appearing on behalf of the applicant, El Paso Natural Gas Company, and I have two witnesses to be sworn.

MR. RAMEY: Any other appearances?

MR. LOPEZ: Mr. Chairman, if I may, I'd also like to intrcduce Dave Burleson, who's from the Office of General Counsel from El Paso Natural Gas Company, who is appearing with me here today; Mr. Dane Adams, who's Director of the Reservoir Engineering Department for El Paso Natural Gas Company, and Mr. John McGruder, who's in charge of the Proration Department for El Paso.

MR. RYAN: My name is Gordon D. Ryan, I'm an attorney at law for Amoco Production Company, Denver, Colorado, appearing on behalf of Amoco Production Company.

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We're also appearing in association with the firm of Atwood and Malone, Roswell, New Mexico.

MR. RAMEY: Do you have any witnesses, Mr. Ryan?

MR. RYAN: Yes, I have one witness to be sworn.

MR. CARR: May it please the Commission, I am William F. Carr, appearing for Mesa Petroleum Company. I'm appearing today in association with Richard C. Byrd of Ottaway, Kansas, who will participate in this hearing for Mesa Petroleum.

I'm also appearing for Southland Royalty Company. I have one witness.

MR. BYRD: And Mesa will not have a witness.

MR. RAMEY: Do you have a witness, did you say, Mr. Carr?

MR. CARR: Yes, sir.

MR. TULLY: Richard Tully, General Counsel, Dugan Production Corp. Possibly counsel, myself, might wish to read a statement into the record.

MR. STOGNER: Tracy Stogner for Consolidated Oil and Gas. We will read a statement into the record.

MR. ARORA: Sudesh Arora, Supron Energy in Dallas. I'd like to read a statement into the record, please.

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MR. RAMEY: What was your name again?

MR. ARORA: Sudesh Arora, A-R-O-R-A.

MR. GIBB: My name is Bob Gibb. I'm from Tenneco Oil Company in Denver. I'd like to read a statement into the record.

MR. BROWN: Gerry Brown from Getty Oil Company, Denver. We want to read a statement into the record.

MR. RAMEY: Any other appearances?

Ask that all witnesses stand at this time and be sworn.

(Witnesses sworn.)

MR. RAMEY: You may proceed, Mr. Lopez.

MELVIN A. EHRLICH

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

DIRECT EXAMINATION

BY MR. LOPEZ:

Q. Please state your name and place of residence.

A. Melvin A. Ehrlich. I reside in El Paso, Texas.

Q. By whom are you employed and in what capa-

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city?

A. By El Paso Natural Gas Company as a Vice President.

Q. As a Vice President for El Paso, for what area of activity are you responsible?

A. My responsibility covers the gas supply of El Paso Natural, which includes gas purchases, reservoir engineering, and gas proration.

In addition I am responsible for the marketing of natural gas through our Customer Affairs Department.

Q. Have you previously testified before this Commission and had your qualifications accepted?

A. No.

Q. Would you please describe your educational background and employment experience?

A. In 1950 I received a degree in commercial science from Enid Business College in Enid, Oklahoma.

I was thereupon employed by Phillips Petroleum Company in Bartlesville, Oklahoma, where I was responsible for coordinating the requirements of Phillips' Accounting Department with certain activities of Phillips' Natural Gas Department.

In June of 1955 I accepted employment with Pacific Northwest Pipeline Corporation as Director of their

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Natural Gas Accounting Department. I remained employed with this company until their merger with El Paso on December 31, 1959.

I might also mention that for the last two years prior to the merger I was Director of their Gas Marketing Department and Regulatory Affairs Department, Pacific Northwest Pipeline.

From 1960 until August of 1968 my chief responsibilities for El Paso pertained to gas marketing and customer relations for El Paso's Northwest Division. My responsibilities in this area covered the implementation and evaluation of market surveys, the negotiations of agreements for the sale of gas and other responsibilities in connection with the Northwest Division System marketing activities.

Starting in the fall of 1968 my chief responsibilities were in the same area but were expanded to include the Southern Division System, first as Manager, and then as Director of Gas Marketing and Customer Relations.

The Northwest Division and Southern Division together included the entire El Paso system.

In 1974 I became an Assistant Vice President and was in addition to Gas Marketing and Customer Relations, put in charge of Reservoir Engineering, Proration, and Gas Purchase Departments.

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In 1977 I was promoted to full Vice President.

Q. Have you previously testified before other regulatory bodies?

A. Yes. I have on numerous occasions testified before the Federal Energy Regulatory Commission, formerly the Federal Power Commission, the California Public Utilities Commission, the Arizona Corporation Commission, and the Nevada Public Service Commission.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this case is to introduce and explain the proposed rule -- pool rule changes we wish to be implemented by the Commission in the event our application is granted.

In addition, I propose to show that the El Paso system has sufficient capacity to transport all additional recoverable reserves that will be realized as a result of an infill drilling program.

Q. Are you familiar with El Paso's application in this case?

A. Yes, I am.

MR. LOPEZ: Mr. Chairman, are the qualifications of the witness acceptable?

MR. RAMEY: Consider him qualified.

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Q. (Mr. Lopez continuing.) Mr. Ehrlich, please state briefly what El Paso is seeking in this case.

A. El Paso is seeking to change the existing rules governing the drilling and producing of gas wells in the Basin-Dakota Gas Pool of San Juan and Rio Arriba Counties, New Mexico, to permit, at the option of the operator of each 320 acre proration unit, the drilling of a second well on that unit, with the prorated allowable for that unit being calculated according to the same formula that is now in use, exceptthat the deliverability of the unit will be calculated by adding together the deliverability of the two wells on the unit.

We are also asking that in considering wells as marginal or non-marginal, and in balancing over-production or under-production, both wells' production be considered as being produced from one proration unit.

We further seek a finding by the Commission that a second well on each 320-acre proration unit in the Basin-Dakota Gas Pool is necessary to efficiently and effectively drain the proration unit; that the drilling of an infill well in the Basin-Dakota Gas Pool will increase the recovery of reserves from each proration unit in the pool; will result in more efficient use of reservoir energy; and will tend to insure greater ultimate recovery of gas from the pool.

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Q. All right, now I hand you what has been marked for identification as El Paso's Exhibit Number One, and ask you to identify it.

A. This exhibit sets forth El Paso's proposed rule changes to Order R-1670, as supplemented by Order R-1670-C, which, if the application is granted, would be applicable to the Basin-Dakota Gas Pool in San Juan and Rio Arriba Counties, New Mexico.

Q. Without going into detail, would you describe to the Commission the essential changes the proposed rules seek to effect as they pertain to the Basin-Dakota Gas Pool?

A. There are essentially two areas where if the application is approved the rule should be changed.

The first deals with the well location and acreage requirements which would pertain to the infill well. In this connection I would draw the Commission's attention to Exhibit Two, which consists of two pages, on which a theoretical 320-acre proration unit is set forth on each page.

The first page of the exhibit shows rectangular and square areas within which a well must be located within the proration unit pursuant to present pool rules.

Q. Mr. Ehrlich, if I could interrupt, I think

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probably everyone should get a copy of Exhibit Two who wants one so they can follow your testimony.

Q. Okay, if you'll proceed.

A. The second page shows the same theoretical 320-acre unit, but shows square areas within which, according to the proposed rules, an initial well or an infill well must be located.

It should also be mentioned that if a well already exists within an existing proration unit in the Basin-Dakota Gas Pool, then any infill well must be drilled on the opposite 160-acre quarter section within the proration unit.

Again, of course, within the square areas reflected on page two of Exhibit Two, distances from various boundaries are also shown on the exhibit.

Q. Did El Paso consider requesting 160-acre spacing rather than the option of drilling a second well on the existing 320-acre proration unit?

A. Yes. We gave that full consideration but we decided against it because this would disturb the equities in present proration units, some of which have been in existence for more than eighteen years.

Q. Mr. Ehrlich, I believe you stated that there were two essential changes that need to be effected by the proposed rules set forth in Exhibit One.

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Would you now please discuss the second major change?

A The second essential change in the rules has to do with the allocation formula.

The present formula grants allowable to wells in two parts. Sixty percent of the allowable is calculated by using the ratio of the well's acreage to the total acreage of the pool, and forty percent of the allowable is calculated by using the ratio of that well's deliverability, as determined by the State deliverability test, to the total pool deliverability, which is adjusted by the acreage factor.

With the drilling of a second well in a proration unit there would be the same allowable factor based on acreage, but for the deliverability portion of the formula, the deliverability of two wells on a proration unit would be added together. This sum would be the value used to calculate that portion of allowable related to deliverability.

Q Mr. Ehrlich, would you explain why the deliverability of the second well should be added to the first in calculating the deliverability factor to be used in the allocation formula?

A As the spacing would remain 320 acres, adding the deliverability of both wells for the purpose of

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calculating the allowable for the proration unit would permit an operator the opportunity to recover his total reserves. This is the same method currently being followed in the Blanco Mesaverde Gas Pool.

Q. Does Exhibit One have any additions, deletions, or corrections contained in it that are different from the proposed rule changes that were contained in Exhibit A, attached to El Paso's application for this hearing?

A. Yes, it does. For the most part the changes contained in Exhibit One are as a result of minor typographical errors or grammatical mistakes that were made in the Exhibit A attached to El Paso's application.

I have here an errata sheet that shows where these changes were made, and will be glad to distribute them to those who are interested.

In addition I should mention that the only possible significant change is the addition of Rule 10(D), which you will find set forth at the bottom of page 4 and top of page 5 of Exhibit One.

This is a new rule that we would like to see incorporated into the proposed rules so that the testing procedures are up to date with what is necessary for completion test requirements for each new well on the proration units.

Q. With the exception of the addition of

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Rule 10(D), in your opinion do any of these changes really modify or change any of the rules set forth in Exhibit A attached to El Paso's application?

A. No, sir. These corrections were made in an effort to cause the proposed rules contained in Exhibit One to be as correct as possible and to parallel as nearly as possible the other general rules and special rules which have been set out in Order R-1670, as supplemented by Order R-1670-T, which set forth the special rules for infill drilling in the Blanco Mesaverde Pool.

Q. Mr. Ehrlich, do you have an opinion as to the gas price applicable to the gas produced from the Dakota infill wells?

A. Our evidence, to be presented by Mr. Van Everdingen, will show that the infill wells are required in the Basin-Dakota Gas Pool to efficiently and effectively drain the gas reserves underlying the present 320-acre proration units.

Under the regulations recently adopted pursuant to the Natural Gas Policy Act, the Dakota infill wells will be in a category similar to the Blanco-Mesaverde infill wells, and subject to the State of New Mexico issuing an order, similar to the order issued for the Blanco-Mesaverde Gas Pool, will qualify for the gas price prescribed under Section 103 of the Act for new onshore production

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gas wells.

Q. How much gas can El Paso's facilities in the San Juan Basin handle on a daily basis?

A. El Paso's facilities are presently designed to handle 1,400-million cubic feet of wellhead gas per day. After deducting shrinkage, fuel, and field use, these facilities have the capability of delivering approximately 1,300-million cubic feet a day to our mainline.

During 1978 the field production attached to El Paso's system averaged approximately 1,100-million cubic feet.

Q. Mr. Ehrlich, assuming that this application would be granted to permit infill drilling the Blanco-Mesa -- the Basin-Dakota Gas Pool, would El Paso have the capability to handle these additional gas volumes, including the projected gas supply from infill wells drilled in the Blanco-Mesaverde Gas Pool?

A. Yes. Production estimated to become available to El Paso from the infill drilling of both formations would essentially normalize the decline of both -- excuse me, would essentially normalize the decline in deliverability and maintain the production essentially level over the next several years. This volume will be necessary for El Paso to meet its customers' high priority needs.

Q. If this application is granted, do you

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foresee that El Paso would be required to reduce its take from existing wells?

A. Production from the wells in the San Juan Basin have been on the decline for many years, and El Paso firmly believes that it will be able to take all of the additional gas made available to us in the San Juan Basin, whether this additional gas results from other development wells in existing fields or from infill well programs.

Q. Mr. Ehrlich, in your opinion would the granting of the application in this case be in the interest of the prevention of waste and protection of correlative rights?

A. Yes. Under the proposed rules each operator would have the opportunity to increase his recoverable reserves and deliverability underlying this 320-acre proration unit, thereby preventing waste and protecting correlative rights.

Q. In your opinion what are the principal advantages to be gained by the proposed infill program?

A. There are many advantages which will result from this program, but I think the most important advantage is the increase in the gas recovery and availability from the Basin-Dakota Gas Pool, which Mr. Van Everdingen will discuss more fully in his testimony.

By virtue of the increased production and

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increased recoverable reserves, more gas will be produced at a time when our country desperately needs the gas. Further, because the facilities will be fully loaded, the consumer could get the gas cheaper since the unit volume costs them less.

Also, by utilizing the existing facilities more fully, and taking advantage of the available reservoir energy, this type of waste would be prevented. The producer would benefit from this infill program, as it would afford them an opportunity to increase their recoverable reserves. The royalty owners would be substantial beneficiaries from the proposed program. These would include the State of New Mexico and the Federal government.

The State of New Mexico would benefit through increased taxes brought about from the increased production, plus the increase in business activity fostered by the approval of the infill program.

I believe, in summary, that there are a great many benefits to be gained from an infill program and many recipients of these benefits.

Q. Mr. Ehrlich, were Exhibits One and Two prepared by you or under your supervision?

A. Yes.

MR. LOPEZ: At this time we'll move El Paso's Exhibits One and Two be received in evidence.

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MR. RAMEY: They will be admitted.

MR. LOPEZ: Mr. Chairman, this concludes our direct of this witness.

MR. RAMEY: Any questions of the witness?

MR. BYRD: Mr. Chairman, I have a couple questions I'd like to ask.

MR. RAMEY: Mr. Byrd.

CROSS EXAMINATION

BY MR. BYRD:

Q. Mr.Ehrlich, referring to proposed new rule 2(C), do I understand that -- I do understand that's the same provision that's in the Mesaverde order, is that right?

A. Yes, sir.

Q. Could you tell me what you mean by economically -- as long as it's economically feasible to do?

A. Well, we feel that both wells should be produced. We think that under today's conditions it's difficult to predict just when it will not be economically feasible to produce a well; therefore, we suggest that -- that both wells be produced for just as long as it's economically possible.

Q. So the purpose, your intended purpose of the provisions of rule 2(C) is to make sure that both wells

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remain on production as long as they're producing.

A. Yes, sir.

Q. Also, referring to your proposed rule 9(E), there, as I understand your proposal, the unit allowable may be produced from both wells, is that correct?

A. Yes, sir.

Q. And that provision is exactly the same as is presently in the Mesaverde, is that right?

A. Yes, sir.

Q. Could you accomplish the purpose of Rule 2(C), guaranteeing production from both wells, by providing that the unit allowable be produced proportionately from the two wells on the unit, based on their deliverability?

A. I suppose you could; however, that's not what we are proposing here today.

Q. I -- I understand that. You also made the statement in your direct testimony that in your opinion the infill well will be entitled to a 103 price under the Natural Gas Policy Act, providing you received an order from the State Commission similar to the one that you received in Mesaverde.

Isn't it true that in addition to that order the FERC requires an affidavit from the producer and the pipeline that the well will be produced based according to their ability to produce into your pipeline?

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A. Let me ask you -- I wasn't following your question. Who requires this?

Q. Doesn't the Federal Energy Regulatory Commission require that in the Mesaverde Pool --

A. Yes, sir, that's correct.

Q. And isn't the purpose of that affidavit to make sure that the wells are produced in accordance in affect, to the deliverability?

A. Yes, sir, I'm sure that they would frown on shutting in only one, if that's what you're driving at, with the lower price in order to collect the -- the higher price under the allowable formula.

Q. Thus the provision in the State Commission's rule requiring that deliverability of the two wells determine how the production is going to be distributed within the unit would eliminate the necessity of that affidavit, wouldn't it?

A. I'm not sure whether it would eliminate it, but I'd think that it would certainly eliminate a lot of stumbling blocks we might otherwise have.

MR. BRYD: Thank you.

MR. RAMEY: Any other questions of the witness?

MR. RYAN: Just a few questions, if I might.

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CROSS EXAMINATION

BY MR. RYAN:

Q. Mr. Ehrlich, you've indicated that if this application is granted that there'll be additional wells and that El Paso has the facilities to process that gas, that additional gas, is that correct?

A. Yes, sir.

Q. If that gas is produced does El Paso have a market for the gas?

A. Yes, sir. I -- I could go into considerable detail, but let me just tell you this, that we have a transmission capacity of roughly 3.9-billion, for which we have a market demand of at least that figure. We're now supplying about 2.9-billion to that market. In other words, we have roughly a billion cubic feet a day cut off of our system every day.

Q. So if -- if these additional wells that are being considered would be drilled and it could be marketed, it wouldn't need to be left in the ground.

A. Be no question.

MR. RAMEY: Any other questions? Mr. Arnold, do you have a question?

MR. ARNOLD: Yes.

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CROSS EXAMINATION

BY MR. ARNOLD:

Mr. Ehrlich, when the original proration order was written in the Basin-Dakota Pool, there had to be a finding that the deliverability was related to the reserve in the pool in order to justify the proration factor, deliverability factor.

A. Yes, sir.

Q. How do you relate add-on deliverability to reserves in the tract?

A. I'm not sure, Mr. Commissioner, I understand the question. There would be an additional deliverability and additional recoverable reserves, as a result of the second well, and what we're suggesting here today is that -- that the deliverability of the two wells be added together in order to determine the forty percent of that deliverability.

Q. Wouldn't you reach a point some place in drilling infill wells where you know -- where the relationship no longer -- what if you drilled a third well?

A. That might be possible. I think after we get on with this program for a few years we might take a look at that, but I think here today we're convinced that

the second well needs to -- to be drilled, without any question, and I think, to answer your question, it's going to depend largely on economics, and the shortage of gas in this country is so great and the decline of deliverability is so great each year, that I don't know how far down we will lower our gathering pressures at some time just to keep residential load on, but that's going to have a big important part in this.

Q. Right, the only issue I was making -- making of question was the relationship between deliverability and reserves in a proration formula when you drill additional wells on a proration unit.

A. Well, that's probably a question better answered by Mr. Van Everdingen, but it would seem to me that deliverability probably will decline faster than the reserves will.

MR. RAMEY: Any other questions of the witness? Mr. Nutter?

CROSS EXAMINATION

BY MR. NUTTER:

Q. The proration department of El Paso Natural Gas Company has always maintained to the Commission that wells classified as marginal are put on the line and left on the line at all times.

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How, in the Blanco-Mesaverde, if we have a unit that is classified as non-marginal and subject to limitation to the allowable, but one of the wells is a poor well, is that well put on the line and left on the line at all times and the unit's production curtailed from the better well only?

A. No, sir, as I -- as I understand it, if it's classified as non-marginal we attempt to follow the proration rules, or the proration -- the allowable for that particular well, and it's --

Q. So all of the -- the poor well is also subject to curtailment, then?

A. No, sir, the marginal wells we leave on at all times.

Q. No, I'm talking about the poor well, which would be a marginal well, but it's on a unit where there's a good well and the unit is not marginal, is the poor well left on at all times?

A. Yes, sir, it will.

Q. So the brunt of curtailment falls on the good well only.

A. Yes, sir, as long as it's non-marginal.

Q. Okay. Now, in what respect does the rule proposed by El Paso in Exhibit One differ from the Mesaverde rules that we have at the present time?

Now, I don't mean different from the Mesaverde rules, because I realize we've got a different allowable formula, for instance, 60-40 compared to 25-75.

A. Yes, sir.

Q. But in what respect do the changes in these rules from the present Dakota rules differ from the changes that we have embodied in 1670-T, which was the infill drilling rule for the Mesaverde?

A. The only major change that I recall is the -- let me see if I can find it -- well, I guess it was the 10-D that I mentioned in my earlier testimony, that, well, sets out the testing, I guess you'd say, to better clarify the testing procedures when you complete a new or infill well.

Q. Okay, 10-D is a new rule, then, that is not included in the Mesaverde pool?

A. Yes, sir.

Q. And in effect does 10-D provide that in the event one of the wells on the unit would be classified an exempt marginal well and the other well is a testable well, that both wells would have to be tested? So you could get a true deliverability picture of the unit?

A. The old well, not necessarily if it's had a current test, it would not require a further test until the next appropriate time. The new well would.

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Q. If the new well required testing, the old well requires testing also, is that it?

And the old well would never fall into an exempt marginal status.

A. If I understand what we proposed here, the -- if the old well has had a current test recently and still in effect, we would not have to have a new test for that old well. You would on a new one.

Q. Okay, for the current test.

A. Right.

Q. Now, for future testing requirements, if one required testing would the other require testing?

A. Yes.

Q. Also?

A. Yes, sir, that's correct.

Q. Okay, and then is there also a change in Rule 15-B, which is different from the Mesaverde rules?

A. Yes. As I recall, on the Dakota-Mesaverde, that 500 Mcf per month in order to keep a well on, I believe that's 1000 in the -- in the Mesaverde.

Q. I believe, Mr. Ehrlich, that the Rule 15-B for the Mesaverde reads that a well that's subject to shut-in would receive 500 Mcf, and it's been interpreted that both wells would receive the 500 Mcf on the unit.

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A. Oh, I see.

Q. It's been reworded so the unit itself --

A. Well, I stand corrected. When I read that I thought you could add the two together.

Q. Here we're limiting it to 500 Mcf per unit.

A. Yes, sir, right. I think this probably clears up an area that probably would have been cleared up in the Mesaverde.

Q. All right.

MR. NUTTER: Okay, thank you, Mr. Ehrlich.

MR. RAMEY: Any other questions of the witness?

He may be excused.

MR. LOPEZ: Mr. Chairman, at this time I'd like to call Mr. Van Everdingen to the stand.

In this connection I might point out, all the exhibits that Mr. Van Everdingen plans to tender are set forth on the walls, beginning with Exhibit Three.

Exhibit Four is a computer printout of reserves in the Basin-Dakota Pool. We do not have extra copies of this exhibit. The Commission has a copy and they will have a working copy which people can check with, but I do not have any extra copies of Exhibit Four, which is the computer printout.

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These packets, and we might as well distribute those to those who do not have copies of exhibits, contain all the exhibits that are on the wall, except for Exhibit Three and Exhibit Four.

In addition, we don't have on the wall some photographs that are also contained in an exhibit, which is Exhibit Ten, three parts, A, B, and C.

So, with that little -- oh, incidentally, I'd also like to introduce Ms. Hyla Kriss, Mr. Van Everdingen's assistant, and I think I'll have her point to things on the charts and let Mr. Van keep his chair.

A. F. VAN EVERDINGEN

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

DIRECT EXAMINATION

BY MR. LOPEZ:

Q. Would you please state your name and where you reside?

A. I am A. F. Van Everdingen and I reside in Dallas, Texas.

Q. By whom are you employed and in what capacity?

A. I'm a Senior Vice President of DeGolyer

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and MacNaughton.

Q. Mr. Van, have you previously testified before this Commission and had your qualifications accepted as a matter of record?

A. Yes. I have testified in the case of the Mesaverde formations on the same subject we are talking about here.

MR. LOPEZ: Mr. Chairman, I'd ask the Commission to take administrative notice of Mr. Van's qualifications as set forth in the Blanco-Mesaverde application.

MR. RAMEY: The Commission will consider the witness qualified.

Q. (Mr. Lopez continuing.) Mr.Van, since you testified in that Mesaverde case, have you had an occasion to do any further studies with respect to reservoir behavior?

A. Yes. I mean reservoir behavior has been always, it seems always in my blood, and we did at D&MN, awhile after the Mesaverde was out, and published a paper from the last meeting in Houston, the big SPE meeting, and that paper deals with the same subject. It was written by myself, I should say and Hyla Kriss, on the same subject we are talking about now.

Q. Okay. And you are familiar with El Paso's

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application in this case?

A. Very much so, sir.

Q. And the Commission has already ruled that you are qualified to testify here, so we'll get on with it.

In connection with your testimony that you plan to give today, have you made a study of the possible results that might be realized by doubling the well density in the Basin-Dakota Gas Pool?

A. Yes, I have.

Q. And what are some of the factors you feel you must consider?

A. I feel you should look, take a look at the ultimate production, at the amount of gas which is in place, and the reservoir characteristics of the formation.

Q. Now, in this connection, I turn your attention to what has been marked as Exhibit Three, El Paso Exhibit Three, and ask you to identify it.

A. Exhibit Three is a map giving all the locations of all existing wells in the Basin-Dakota, and of some -- in red, some of the figures of the units that exist, all of the units that exist.

MR. LOPEZ: If the Commission needs them we have some extra copies of ExhibitThree. Would you like to have them right now? I don't think we're going to be referring to Exhibit Three that much.

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MR. RAMEY: I think we can pretty well see it.

MR. LOPEZ: You can see it over there?

Q (Mr. Lopez continuing.) Have you done a study of the estimated recoverable reserves under present field rules, and the estimated additional reserves that might be recovered if the application is granted?

A. Yes. I have.

Q. At this time I turn your attention to --

A. Exhibit Four.

Q. -- Exhibit Four, and ask you to explain what it is and what it shows. If you could discuss from --

A. I think I can.

Q. Okay.

A. Exhibit Four gives for all the existing wells in the field, in order of magnitude, the total of the amount yet to be recovered, and the reserve formation --

Q. Remaining reserves.

A. Remaining reserves, which is the amount yet to be recovered as of 1/1/79, and so -- well, that's all there is to it.

Q. Right. Now, as I understand it, this is a computer run prepared by the El Paso Reservoir Engineering Department. Did DeGolyer and MacNaughton, under your supervision prepare a similar study of the estimated reserves in

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the Basin-Dakota Pool, and were you able to compare the two?

A. We prepared, we have, and always keep up to date, a similar one for individual wells, and we compared almost eighty percent of the wells that are listed here to our own figures, finding out that the differences were only negligible. So we have accepted the figure that is shown in this, the total ultimate given here as 5-trillion cubic feet.

Q. Now, If I understand your testimony, then, you say that this exhibit shows that the estimated recoverable reserves, according to the calculations, under present pool rules in the Basin-Dakota, is approximately 5-trillion cubic feet.

A. You are quite right, sir.

Q. Okay. Now I'd turn your attention to what has been marked for identification as El Paso's Exhibits Five, Six, Seven, and Eight, and ask you to identify each exhibit and explain what they show.

A. Now ExhibitFive -- before I go into exhibits, I felt it was necessary, not only to go on the basis of only wells and their behavior, the pressure behavior, or whatever you have on individual wells, but we also should take an overall view of the field.

Exhibit Five gives you the total production of the Basin-Dakota, and this one, it's plotted on

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similar paper, and it's one of the easiest graphs that can be made, can be extrapolated down to an economic limit, and it yields about 4.9, 5-trillion cubic feet ultimate.

Number --

Q. Six.

A. -- Six is the same graph as Number Five, except that we are not convinced that seven years on which we have data, and a little portion to come, to see what that means, if you say you can extrapolate it out and produce it, because it brings us to the year 2042 before all that gas will be recovered.

And now we come -- I can't see which one?

Q. Exhibit Seven.

A. I can't see it because I'm on the end, you know.

Q. Average line pressure.

MR. KRISS: Average line pressure.

A. Now, in making the graph of the rate of production, it is shown on Exhibit Seven that during the time that the graph -- the data were assemblied, there was some drilling going on in the Basin-Dakota, and also, the line pressure decreased from around 300 to 200 pounds, which means that the factors favorable, which justify -- which would really put the question of 5-trillion in some doubt. And so we also have made the Number Eight, which

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gives you the P/Z curve for the field as a whole, and which undoubtedly indicates that on that basis you would expect about 6-trillion cubic feet.

So that our answer on the whole thing in summary is you can rely on 5-trillion cubic feet as the amount of gas as is coming out today.

Q. Okay. Now, as I understand it, as you just explained, Exhibits Five through Eight address the amount of recoverable gas under present pool rules.

A. Yes.

Q. Have you done any calculations with respect to the amount of gas in place in the Basin-Dakota Gas Pool?

A. Yes, we have done quite a lot of work on it. As a matter of fact, El Paso estimated, by what they call high grading electric logs, that there would be slightly over 10-trillion cubic feet of gas in place.

Now, that's nice, except the high grading makes you feel there should be more gas in place. So we went off the logs once again, only to find out that any logging engineer with a lot of experience will give you more, though they say that this is the very minimum that you can see. It is the quantity on all the sands where there is no dispute possible, but there is other sand where there is a dispute. You do not know what you have, whether --

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or how much gas comes out of the less permeable sands that are not present over the entire -- that are not present well developed over the entire structure.

Therefore, we had to give up the assembly of additional data on logs, and we went to a lot of core data for which -- of which a lot of are available, all taken before 1965. Those core data were analyzed and they are reviewed on our Number Nine.

Q. Exhibit Nine.

A. On Exhibit Nine, where is it?

Q. It's the last one down there. Now, as I understand it, Mr. Van, you said that you and El Paso both examined various electric logs, as well as core data -- or you took the core data --

A. Yes, sir.

Q. -- and analyzed it.

A. Yes, sir.

Q. Could you tell us how many and, for how many wells?

A. Oh, we had fifteen wells on which core data on the Basin-Dakota were available, and those fifteen wells are given here on this map. I think they are the wells marked in red in the better portions of the field.

Well, here they are. They're not.

Q. Now these core data were taken from fif-

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teen wells and the wells are indicated on the Exhibit Three.

A. This -- these wells were chosen because they both, we thought, are in the middle of the field, in the better portions, and so we could rely that whatever we get out of it, that is available over there.

There is only in that field -- Hyla, point to --

There is one other portion in the field that is real good; that's the one on the top where the best well in the field had been drilled. A well from Number Five, from Exhibit Five -- Four, that shows 11-trillion.

Here on the Huerfano wells there is one that has 10-trillion. It's where the core data are coming from.

So we feel that we had a representative sample of core data for the field as a whole.

Q. I believe you said 10-trillion; you meant 10-billion.

A. Oh, definitely.

Q. Okay. Now, I think we ought to go back to your Exhibit Nine and explain what it represents and how you came up with even more gas in place than El Paso is willing to predict.

A. Well, El Paso almost did. They almost indicated there is more gas by their descriptions high-

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grading it, you know. So we first checked the highgrading, was it correct, and it is correct. We checked that in the office. We don't always take a client's word for granted.

And then we did some additional work that showed there is more than they have given. Now that work was done by the core data, and grouping them in 2 percent porosities.

So the first set was from zero to 2, which you might say is practically not -- has no gas in it, but from 2 to 4 there is some gas in it; from 4 to 6, et cetera, up to 14 to 16.

Some samples were not permeable, and by permeable we mean they -- they had the porosity and permeability of 1/10th of a millidarcy or less, and we knocked those out.

But all of the samples given here, even the 2 to 4 percent had a permeability, which is only 1/2, which is 1/2 of the average for the reservoir. The permeabilities are given in the -- in column four, enclosure 9.

And remarkable, the average is less than 1/10th of a millidarcy, and this makes the -- the field almost the least permeable I've ever come in my fifty years, you know, come across in my fifty years.

You see another characteristic, which is to be expected. The number of impermeable samples decreases

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when the total porosity goes up.

You see the 2-to-4 had 40 permeable samples, which is less than -- which is 40 percent, but if you come to the 8-to-10 class, there's only 40 out of a total 150 more impermeable, and later on in the 14-to-16 group, everybody is permeable.

Now, you can add up these figures. We had to make some kind of an assumption as to how should we use these figures, and we have assumed that like El Paso did it in the 10.3-trillion, they took 6 percent porosity as the base. Anything less than 6 percent was knocked out. And they took 50 percent water as a base. Anything more than 50 percent was knocked out.

Unfortunately, I don't have data for water, but I have, of course, plenty of data for porosity, and that showed that out of the total percentages porosity that we have analyzed, there was 1,056 samples and they together contained 8000 percentages porosity, which is kind of a hybrid form to express it in. And those percentages of porosity, only 5000 were present in formations with more than 6 percent porosity and less than 50 percent water.

No, for 6 porosity; on the water I am quiet.

Consequently, it showed, that analysis showed, that there is 50 percent more pore space available.

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I'm saying pore space available that could be filled with gas that you would obtain from the basis on which El Paso has worked.

Now, 50 percent, you -- you don't have always to accept the highest figure possible. You could say well, I do not care to know the lower figures.

No. I was told to go slow or I mess it up, and now I don't want to mess it up.

Q Well, this area you're discussing, Mr. Van --

A. Yes, sir.

Q. -- you're talking about El Paso used a 6 percent cutoff and you're saying that in calculating the gas in place you decided that the area between 2 and 6 percent porosity had the same permeability, so you couldn't just necessarily discount that, isn't that right?

A. Not necessarily. You could discount it some. You must discount it some or it's not as good as the top above 10 percent, and we didn't know just how to handle it, you know. I mean because we don't have from core data the exact water percentages.

But you can take out of the figures that's shown on this Nine, you can make up comparisons and one of them would give you an additional 20 percent, which is darned sure that it is 20 percent higher than El Paso had

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given us, you see.

So, now you have a gain as normal in cases like this. You are talking about two sets of figures, one, the highest; one -- and you could, out of the fifty percent more, you can put 15-trillion initial in place.

Out of the twenty percent more you can put 12, 12-1/2-trillion in place.

And I can only say, take your choice. Probably the truth sits somewhere in the middle but we cannot define it.

Now, that gives you one figure which is higher than the 10-trillion given by El Paso, mentioned before, and therefore it makes an estimate of additional recovery more amenable.

Now, in order to get an impression, may I now introduce --

Q. Exhibits Ten A, B, and C, sure.

A. C, which give you -- let me go back. There were available some thin sections. Now, a thin section, I think the geologists know what they are, but these thin sections, that always impresses me, were one-ten-thousandth of an inch thick. So when I heard that, I thought there might be some porosity visible in it.

So we went out to the thin sections, checked about 25 of them, and had some photographs made of

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them, you know.

Now, you do this by -- by going to the university and ask -- they have the best of equipment -- could they please make you a color picture, and they give you a slide on it at that time. And those slides, you magnify, Xerox does it for you, and then you get the graphs out like you see here, which on Number Eight is a graph of -- gives an indication the various minerals. White is always quartz, but how much other minerals you will find in it, you know, how many, and if you -- that does not give you much detail, but on B, where we have blown it up to 100 and better, you know, you see that the grains have grown together. Look at the blue one; now look at the forms that comes in there. It was not feasible for us, or not possible for us to find any holes in it until we come to 10-C, which gives you a slight indication of a fracture present, and since I talk about the fracture, there are, for anybody who has the core data on it, core data really show one-half of the cores to be fractured, and if a thing is fractured, you think the gas just walks out.

Now, we have listed fracd permeabilities and unfracd permeabilities separately. And for the classes given we always find that fractured, as described in core data, and unfractured, are exactly the same.

So that put to rest the idea that frac-

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ture, if a man talks fractured permeability, or fractured core date, he will have a better than average well.

The wells, or the fracture -- the fractured wells or the fractured average was just the same, 1/10th of a millidarcy as it was in the non-fractured wells.

Q. Okay, Mr. Van, I know that you've covered this, but I just want to make sure the record is complete.

In your opinion are the core samples that you studied from the fifteen wells in the Basin-Dakota Gas Pool well representative of the Basin's characteristics?

A. Yes. I think they are very representative of it.

Q. Okay, good.

Now, I think in addition to studies of the core samples and their respective permeabilities and porosities, did you do any other studies to support your estimate of the effects of the infill drilling program, and in this connection I'd ask you to turn your attention to El Paso's Exhibits Eleven and Twelve.

A. Yes. You know, when you are talking first about 10-trillion, and you are talking about those tight formations that existing -- exist, that there's nothing but tight formations, then you doubt whether infill drilling can be -- can be very effective, because it's so tight you wouldn't expect much more than 50 percent in the

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first go around. That's a nice recovery.

But it turns out there is, let us simply say, 14-trillion that is waiting for production, or waiting to be let out, total. So to do that we went back to simple reservoir engineering and made the build-up tests. We collected all the tests we could find, and here is a well, 212 on the map here -- okay, that's 212 -- drilled in '78 in which the first build-up gave us 2650 pounds, which is exactly the build-up that this well had shut-in pressure, which is about equal to the build-up pressures found when the first well in that neighborhood was drilled ten years ago.

Now, what that log tells me, ten years of production and we have not been able to decrease the pressure perceptibly, or at all. I won't fight for five pounds if somebody wants to bring it up, but this is, I would say, is an indication that it's not being drained.

Now, wellhead pressures are, to me, they are good, but just to be safe, there was also measured the bottom hole pressure, and if you put the weight of the gas and the total depth of the well together, bottom hole pressure just confirms the wellhead pressure that was given.

There's also on the graph a little hump, which is, of course, somebody went haywire there. I can't -- I can't explain it. But he came back to normal pressures

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again for the bottom hole.

Now this is about 2600 at that spot. Then I ought to show -- it's just now an isolated spot, because it's somewhat meagre to go on one, and told me first, let's make another in that neighborhood, which Hyla is right now next to it, and our Well 212 is right there in the black -- in blue. That's 212.

Q. Now she's pointing to Exhibit Twelve.

A. Yes. And now Exhibit Twelve shows that all of a sudden showed that 258 and 259, also shown in blue, they're exactly the same. You find initial pressures back on all those wells that were drilled in 200 on the present spacing of 320, and they are also surrounded by wells that are ten years old.

So this gives you the idea that there is no drainage at those points. Now that idea is not entirely new because when you look at the -- well, back to Number Eleven, when you go to those old wells you will see that the pressure is -- the pressure line, Hyla, on Number Eleven. You see, the downhole pressure assumes a horizontal position, which is one characteristic of a reservoir of a well that has reached the highest pressure it can possibly get in that reservoir.

The logical conclusion comes then, if

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that's the highest pressure and then you haven't been able to do anything for it in the ten years that you produced the well, that's what we call a limited, a bounded, or whatever terms you wish to use, it's not covering the acreage, 320.

There is here room for infill drilling. Yes, sir.

Q. Okay. Now I turn to -- I turn your attention to what has been marked for identification as Exhibits Thirteen, Fourteen, and Fifteen, and ask you now to explain how these exhibits also support your conclusion that the drilling of infill wells will result in recovery of substantial additional gas reserves.

A. I will start on Twelve, Thirteen, Fourteen, just one second.

Mind that in the Number Eleven that big pressures have been reached. You might say the turning point in pressures has been reached in less than ten hours. I think seven or eight hours is where the curve turns over and becomes practically horizontal.

Now go to Eleven, Twelve, and Thirteen, those are the Huerfano wells on which good pressure build-ups were available, and I mean by good pressure build-ups El Paso has had permission to shut the well in, and some were shut in for two or three years, you know, to get the

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data that are shown here.

And mind you, in the first two wells, Twelve and Thirteen, it took the well almost two years -- no, it took the well a year before it reached its maximum pressure, and because the well had been producing for some time. The producing time is given -- is written up in the bottom.

How long did they produce that well? I can't read it from here.

MS. KRISS: 390 days.

A. 390 days, and it took them another 390 days, I think, to come to its maximum pressure.

I shouldn't ask this question because it was in here if I just turn over.

Yes. The well had been producing 188 days, that's on Number Thirteen, and it took 390 days before it came to a maximum pressure. After that it varied a little bit, but it did not add any more pressure.

That's 117, or Exhibit Thirteen.

Fourteen, unfortunately 121 is the next one. Is that the excellent well?

MALE VOICE: Yes.

A. And there they accuse each other of losing the beginning, but after 349 days the well had reached its maximum pressure and it's also at about 1750 to

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1800 pounds.

Q. That's Exhibit Fifteen.

A. Okay, okay, okay. I take it at Fifteen because I've got two numbers and don't know which one to believe.

Q. Okay.

A. Okay, this is Fifteen. Then I have Fourteen, then, which shows build-up time -- the well which has produced 190 days and takes 708 days before he nullifies whatever he has taken out in the 190 days, and after that they shut him in another 400 days, or better than a year, and he doesn't add any pressure to it.

But here we have three wells that in themselves also show that we're talking about limited reservoirs present even in the best part of the field. Mind you, that one has only that little thing in it, you know. That's number two in the -- I think that's number -- the second best well in the field.

Q. Okay. I think now we could go to Exhibit Sixteen and I'd ask you to explain what that exhibit shows.

A. Let me say first, Exhibit Sixteen, the simplest way of explaining it, it is a summary of Exhibit Four, the printout. The printout gives us the total cumulative -- the total gas to be expected from every one of the 2500 wells.

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Sixteen shows in the bottom simply the well number from 100 to 2500, you see. Vertically above it we have given the total gas that's expected from the well. So it shows, it starts from 11.4 and then goes to 10, and then dives under 10, and it goes down to 100--million cubic feet. There we stopped it.

There are some more wells who are not expected to produce a 100-million cubic feet, but we -- the graph stops at 100-million cubic feet.

If you integrate, then the size of the well, and the number, of course, you come to the 5-trillion cubic feet that we expect ultimately out of it.

It is one representation of the variety that exists in the field, because a man would say, well, if I have 15-trillion cubic feet; I expect 2-trillion; do you expect 2-trillion per well. Do you expect 2-trillion per well out of every well that's being infill drilled?

Well, this graph shows you you shouldn't. There are some wells -- if a well is drilled within a billion cubic feet ultimate, you get another well with a billion cubic feet ultimate, but if you have -- you drill a well between wells of 5-billion cubic feet, you don't -- you are just too darned optimistic to expect 5-billion.

So we have used graph 16 to determine how much ultimate can be expected from the infill drilling pro-

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gram.

Now, that graph we cut in three parts. We said, well, it looks as if nobody is going to drill anything that will only give him 400--million. Some people may do it but we said, huh-uh, 500--million is the limit we take. If you don't have 500-million you are not supposed to infill drill it. If some want to risk their money, that's their business, but I'm not going to say that it's profitable.

The cost of 500--million we come up along the curve up to a total of 3-billion over that range. Wells within that range, I expect you could probably do as good as the already existing well, you see, but when you go above 3-billion, then we just cut it off. We said the best you can do is 3-billion from an intermediate well.

And the net result is that the first -- the best group of wells will give you a total additional of 1.2-billion.

The second group, and there are in that group, there are 1700 wells, they will give you an additional 3.2--trillion.

And then the third group, from 500 down, that's only a small amount, but they will give you nothing.

Is that sufficient, sir?

Q. Right. I think, I just need to point out

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to the Commission that the graph on the wall has two "X's" marked on the curve which the hand-outs don't have. These were just put in recently, and obviously the point, in accordance with Mr. Van's testimony, is that he did not in making his calculations compute the best wells in the reservoir. He used a 3-billion gas in place cutoff, and continued it, and then -- recoverable gas in place, and then on the down side of the scale there's another "X" where he, after 500-million, used a cutoff point, too.

So, I'll just make that observation.

A. We could add here, you know, if you're interested, when you have some wells in the field, just find out what number you are on the list that you have, or that is available from El Paso, and you find out which number or where are the people that are larger than or which are the wells smaller than. Then you'll fit into this graph.

It is really a summary of --

Q. Exhibit Four.

A. -- Exhibit Four.

Q. And as everyone knows Exhibit Four is the computer printout, starting with the best well in the field to the worst well in the field.

A. Yes. You can, if you want to find out where a 2-billion well -- 2-billion cubic feet well fill in, simply make a horizontal line through the 2-billion mark on

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the vertical axis. You see there are given -- the axis is given -- so you start on 100-million, 200, 300, 400, up to 1000-million. Then you to to 10-billion again, so you take a horizontal line and then the vertical line downward and there you are, or vice versa, if you want to be number 412, 412, you come up vertically, go horizontal until you intersect; go horizontally and you'll know how big number 412 is.

Q. Okay. Now, Mr. Van, in your opinion what is the amount of additional recoverable gas that will be realized by infill drilling the Basin-Dakota Gas Pool?

A. Well, this question I think I answered. Maybe I talked too fast and I'll answer it again.

Q. Okay.

A. Here we have 4 to 4-1/2-trillion cubic feet on the basis as shown.

Q. In your opinion will it be possible under the infill program for a producer to develop additional reserves, and in this connection I turn your attention to what has been marked as Exhibit Seventeen.

A. Well, Seventeen is a payout schedule for an infill well, and I was told that the initial cost for a well varied a little bit from Two Eighty-five, Two Eighty-six, to Two Sixty-five, depending on whether your talking about the east or the west side of the field.

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It cost a little bit -- it cost another $6,000 to prepare it; $200 was given as an operating cost. And at the price of gas of $2.00, which is apparently the NGPA price, uncorrected for quality and uncorrected for fluids that may come along, fluids are not present everywhere, you can then say, now, depending on how good a well I get, do I get 100,000, do I get 200,000 allowable, or 300,000 allowable per day, depending on that allowable and the cost figures given, the payouts are at most 57 months and at least -- that's the highest figure -- and they could come down to less than a year and a half.

And I think our figures are, as I say, conservative because I have heard that quality and liquid may obtain, please, the $2.00 to as high as $2.40.

Q. Very good. Do you have an opinion as to how the performance in the Basin-Dakota will compare to that which has been experienced in the Mesaverde, and in this connection I turn the Commission's attention to Exhibit Eighteen.

A. Do I have an opinion? Sounds somewhat contrary, you know. We have here in the Basin-Dakota a formation which is definitely tighter than our friends in the Mesaverde, you know, but for infill drilling a tight formation is better, because the tighter the formation, the more you can expect out of it -- additional you can expect

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out of it as a percentage basis.

But to show you what has been accomplished in the past, Number Sixteen, that's him, Number Sixteen is a graph of all wells from the Blanco-Mesaverde which produced as of one month, 1975. That's the yellow rate of production on the graph.

And then the blue wells give you the additional production obtained to date from those wells that were infills.

And as you can see without any further explanation on my part, the production is rising for the first time. For years it has been coming down; it goes down even on the infill wells, but the total production of the field now is coming up, and I think the latest figures show that there's forty percent of all gas of Blanco-Mesaverde coming from infill wells, which are now almost 650 at the end of 1978, 650 have been drilled I think out of a total of, I think, 2500, but that I'm not sure.

Q. This, I think you misspoke, Mr. Van. It's Exhibit Eighteen, not Sixteen, that we're talking about.

A. Yeah, Exhibit Eighteen, you're right. Did I? Oh, well, excuse me.

Q. Okay. In your opinion is it necessary to drill an infill well in the Basin-Dakota Gas Pool in order to efficiently and effectively drain the proration unit?

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A. Very much so. There is gas in this pool and -- or in this formation. The gas that you get by an infill well is gas you will not see at all, never mind how long you wait for it, you know. You'll get the 5-trillion, no doubt about that; you may even get 5-1/2-trillion; but you do not get those 4-trillion I said here, I have mentioned here, because a well is not capable of draining past the 160-acres. You couldn't do it in 320 in ten years, so I am afraid that he cannot do 160 in the time that you can make some money out of it.

Q. In your opinion will the granting of this application be in the interest of the prevention of waste and protection of correlative rights?

A. Yes, sir.

Q. Were Exhibits Three through Eighteen prepared by you or under your supervision?

A. Oh, yes. Yes, sir.

MR. LOPEZ: At this time I'd like to introduce -- or will introduce Exhibits Three through Eighteen.

MR. RAMEY: Exhibits Three through Eighteen will be admitted.

MR. LOPEZ: This concludes our direct.

MR. RAMEY: Okay. We're going to take a fifteen minute recess.

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(Thereupon a recess was taken.)

MR. RAMEY: Are there any questions of Mr. Van Everdingen?

MR. BYRD: Mr. Chairman, I just have a couple questions.

MR. RAMEY: Mr. Byrd.

CROSS EXAMINATION

BY MR. BYRD:

Q. Mr. Van, am I correct from your study that you've concluded that one well will not drain more than 160 acres?

A. Yes.

Q. So that if the Commission approved the infill drilling program as proposed, the second well should recover as much gas as the original well, is that right?

A. Yes, sir, but here I make some reservations, you know, going to drill a well next to an 11-billion well, because there you may not get more than -- I have put it, after talking to myself a long time, at 3-billion.

MR. BYRD: Thank you.

MR. RAMEY: Any other questions of the witness? Mr. Arnold?

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CROSS EXAMINATION

BY MR. ARNOLD:

Q. Mr. Van, you may have said what the average well reserve was in the field by your study on 160-acre spacing. I didn't get it.

A. Now, total reserve as it is now, the total, now I talk reserve, the term is a bit loose, you know, the total ultimate, as it exists now, if 5 or 5.5, if you consider the few locations that still can be drilled without infill drilling, you know, and there you have from 2-billion to 2.2-billion ultimate. Now, the reserve is a different story; simply you deduct what you have, you see, and in the future you have 4.4, you get 5-trillion more from infill drilling.

Now, does that answer the question? That is ultimate production, not necessarily -- well, the infill drilling is all reserves as yet, you know.

Q. What would that give you as the total ultimate recoverable reserve on 160-acre spacing?

A. Well, my graph, Number Eighteen, on that last graph, you know, it depends on where you want to sit on the acreage. There are wells that will not make but 100-million, the lowest one we show there. When you drill in there, you get 100-million, and if you can make a little

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profit off 100-million, you can drill a lot of wells, because he does drain only a limited amount. He is real tight.

The question that, I think that Mr. Chairman asked, 80 acres later, you know, well how do you know; I don't know. I haven't seen enough data on it, but it is possible it has to be considered 25 years from now, 20 years from now. It's possible that we can still get better when we have more wells, more experience, more data.

Makes me think about something. All of the wells that I came across, it's possible from dry data to make a map of it like this. Now I notice that you do not allow to make open flows any more, which is good. I mean that saves the gas. I think it's from you here somewhere. But the well had shut in pressures that are given there, are very, very informative, you know, and you can do a lot with it.

As to logging, we are talking about such mediocre stuff. Excuse me for saying it that way. It's stuff that's sandy all through, you know, and I have been hopped upon by the El Paso people because it's limited. The sand is not so much limited, it is the permeability which is varying a little bit and it varies just slightly and you have nothing left, you know. To me it looks -- assume that you have a lot of -- that you have a square

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mile in the original base, of sand of same calibre. That is just wishful thinking. Can you imagine that there's a sand exists or a sea exists in which all the sand will be 10 feet thick and of exactly the same calibre, or exactly the same grain size, and that the rivers that will bring in that sand never flooded; all of this? Why that is just not in the cards.

I have been instrumental for keeping on in computing work so that we could figure out the water influx, and if you can't compute the water influx, by the way, you don't ever get a water influx here, don't you worry. I mean that is too darned tight to have any water coming in, and you get the first water when you come to the Morrow, but upon the sides, no, sir.

You have to get it out, out of the energy as it sits in the reservoir.

That stuff can be, well, depending how fast it varied, the permeability goes from, let us say, 1 - 2/10ths to something that you can hardly drain, and you need all this sand and it doesn't matter how low a permeability in order to get all the gas there is, and you need it.

So you have to frac your holes, make the best completion you can, in order to come up to the figures we have given. They may be exceeded; I wish we were here

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to look at it, but that's a long time yet. It comes out slow.

I made a promise one time. I promised -- I think it was you -- I promised I make an estimate as to what the pressure is if I take 100,000 cubic feet of gas and how much is the pressure drop at 160 acres. No go. You cannot get 100,000 cubic feet of gas out of 1/10th of a millidarcy unless you make it very, very thick and you get a pressure drop at 160 acres in 10 years.

That thing does not work. That gas equation does not work under the conditions existing here.

You know, I quite often try to explain why, look, that gas is so expandable, and you know how expandable it is, you open a valve and it only has to expand a little bit, it drops out, you know. It does not really have to flow. No, that thing has to go work itself into the formation for a long time, and then you have two systems working for you, one with a low pressure, and one with a high pressure, and Lord, I'm not clever enough to solve it, and whoever says they can solve it, well, it's not on my conscience.

No, I -- this is -- this is such tight formation that unless you do something for it you don't get the gas that's in it.

Now, have I confused you enough?

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Q. Well, using whatever economic cutoffs you were using, did you come up with a total reserve to be added in the pool by going to --

A. Yes, it -- I would put them now at 4-1/2 billion. And to make life simple, I would give them the total of 10--trillion for the whole pool, that's the total ultimate production.

Q. Okay. Thank you.

A. By the way, when I talked about this, it was my point, you have to drill 2500 wells in the field. There are still 100 more to come. But on my graph for infill drilling we used 2120 and there entered the 500--million or less, and I've already been told of people who would gladly drill a 500--million cubic feet well.

So you can add a few more wells to my 2120 that we mentioned there.

Q. Do you think there will be that many infill wells drilled eventually?

A. Oh, yes, very much so. Someone's got to do it. I beg your pardon?

Q. You do have a deliverability point after awhile where maybe it won't be economic.

A. Well, how much does it cost to add one more well or to keep them on, you know, and then the question is, it's not the total or average, it's the question

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how much can I save by taking them off, you know, and I was told that it comes -- the pressure is to go down to 50 pounds and the cost is appreciably less than the $200 I have used, appreciably less, but I was told to stay away from cost because it might not sit well, so I didn't go into detail there.

Q. Did you use a deliverability cutoff on a well and --

A. No, we have used -- no, we have not used deliverability cutoffs. We have used, for the graph over there, which consists of 2100 wells, I think a last figure of 7-million cubic feet of gas per day with all the wells as exist now, if they go down on the percentage decline, there's about 7-million. Now, that's in 2040. By that time I bet the price is not going to be any longer $2.00. It's going to be somewhat more, but anyhow, that's the figure we have used now; on the basis of $2.00, 7-million per day. That means operating the field, roughly, 7-million, that would be $14,000, see, which you can save by shutting down --

Q. You didn't mean 7-million a day.

A. Oh, yes, you have a look at that, 2500 wells at 7-million.

Q. Total field, that would be total field.

A. Yes, sir, total field. That is less than

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the 100,000, oh, yes, way less than the 100,000. 2500 into 7-million, that's about 140 -- 14,000 cubic feet per day per well.

Q. Okay.

MR. RAMEY: Mr. Nutter?

CROSS EXAMINATION

BY MR. NUTTER:

Q. Mr. Van Everdingen, looking at your Exhibit Number Twelve, it would appear that the early wellhead shut-in pressures were something in the neighborhood of 26, 27, 2800 pounds.

A. Yes, sir.

Q. Would that be representative of original wellhead shut-in pressure?

A. Yes. I was told, the graph is not here but we -- did we bring one graph?

We had the initial wellhead pressures per township but had not separated on it per well, and we finally decided to leave it out. The initial wellhead pressures can go, I think, as high as 2800; slightly higher on the east side; 2400 on the west side of the field. As a matter of fact, that you are talking about not one sand but various sand and they vary under different conditions.

You also have the variation in gasoline

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content. I mean how much gasoline do you get, or liquid do you get, and in some cases, even oil do you get, but it's only in parts of the field; other parts I saw there was never a mention of any liquid content.

Q. Well then, if we had an original bottom -- an original wellhead shut-in pressure of 24 on the west and 28 on the east, why do we have here on Exhibit Number Eight, this graph of cumulative production, when you have zero production you only have a wellhead shut-in pressure on it of 1500 pounds on that one?

A. Well, these are the wellhead pressures. These are the pressures measured for the rules and regulations of the 7-day shutin. They were measured once a year, so you have a year of production; in seven days there's no way that you ever get anything representing the average for the reservoir. It gives you a figure, which if you accumulate it over a year, is long enough, it helps you out in determining where you're going, but it's not representative of the actual pressure in that reservoir.

Q. In other words, this is only a 7-day buildup.

A. Oh, yes.

Q. And one of your other exhibits showed a 790-day buildup.

A. That's right, that's what you needed to

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come back to the pressure as it existed after you have produced for a year.

Q Well now, in determining that the production would decline here in the year 2042 to 7-million Mcf per day --

A Is it 7-million Mcf per day?

Q -- 7-million cubic feet.

A Oh, that's different. 7-million --

Q Is this taking it to an economic limit or is this taking it to some reservoir abandonment pressure?

A We took, if I remember properly, less than 50 pounds. It's some economic limit, yes, vaguely now, because it's so far in the future there won't be any around to ask me about it.

Q Well now, where does Exhibit Eight stop? When you have a wellhead pressure here of approximately 700 pounds, the cumulative production is less than 3-trillion.

A Yes, sir.

Q And yet our Exhibit Number Four shows that we already have more than 3-trillion cubic feet. So when was the cutoff point for Exhibit Number Eight?

A We have it at about 5-trillion cubic feet, and it is at 100 pounds or slightly better, because now we are talking about a 7-day shutin pressure, you know, which is -- you should tell the wellhead shutin pressure --

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Q. Well, isn't this what we have already achieved on Exhibit Eight?

A. So far we have achieved 2. -- this thing ends probably in the year '77, because it's no longer required to put in every year to measure wellhead shutin pressure. I think they vary from every other year, you see.

Q. Okay.

A. And that --

Q. In other words, Exhibit Eight is not up to date as far as total production and decline of pressure.

A. No, it gives you all the pressures that were correct, you know, and there are some measurements by El Paso on a hundred wells and they differ materially from what you see here. These are wells -- these are 1000's and more wells that goes into this average and it is just not correct to use a sample that somebody has on his own well that may not be the field over all.

So I had to leave a few figures for '79 -- '78 out.

Q. Because you didn't have them, okay. Now, Exhibit Number Two, this --

A. Yes, sir.

Q. -- listing of the wells, Exhibit Number Four, I'm sorry.

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A. Yes, sir.

Q. The listing of the wells, was this prepared by your office or is this an El Paso --

A. This El Paso did. We have the same wells we have them -- these data are handy, available in the Dwight's yearly -- which are based on the figures you have -- you publish here, you know, you give out here.

Dwight's collects them and gives you a 10-year review in those data. Now that's the one we have used as a basis because right now it's '79, we have nine years of good data and Dwight's gives you the cumulative and they started in 1970, and on that basis, from Dwight's and from the graph you had, I had about, I would say, 70 to -- 70 to 80 percent of the wells that were given in Number Four, also individually worked up by DMN and confirmed with the percentages, are what they show.

Q. Okay --

A. But we have, if anyone doesn't want to take it, we have the map with us and I showed both figures, but I didn't want to show it.

Q. I presume you're acquainted with the El Paso -- with El Paso's Exhibit Number Four and know how it was derived.

A. Yes. They have wells, they have used pressures and the --

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Q. All right, are these original recoverable reserves and cumulative production and remaining reserves based on a production versus pressure decline?

A. Yes, sir.

Q. And what abandonment pressure was used in that calculation?

A. Well, they probably also used close to 500 -- close to 50 or 100 pounds. It's probably less than 50 because abandonment, you take a well in as long as you can, it doesn't cost you much -- it's very difficult to say what you should use. You can use and it's on an average -- well, I think -- where is my production man, what did you quote?

Where is the production from, you people?

A SPECTATOR: 112

MR. LOPEZ: 112.

A. Oh, they took 112.

Q. Okay. Now, Mr. Van Everdingen, assuming that the pool today has 4.9-trillion cubic feet of remaining reserves and another maybe 1/10th of a trillion for additional wells that would be drilled under today's spacing, would give us a total ultimate recoverable reserves of 5-trillion, I think you stated, is that correct?

A. Please, sir, tell me once more, because you used a term reserves. I think you mean we have recovered

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almost 3-trillion.

Q. Yes, and I think --

A. And there's 1.9 to come yet.

Q. Right, so we have approximately 4.9-billion cubic feet of total recoverable reserves in the pool.

A. Yes, sir.

Q. Under today's spacing.

A. Yes, sir.

Q. And then I think you said that there were also some additional locations under today's spacing that had not been drilled --

A. That's right.

Q. -- and the drilling of those would bring the total recoverable reserves in the pool under today's spacing to approximately 5--trillion cubic feet.

A. That, or even 5.5.

Q. 5.5?

A. Yes, sir.

Q. Now you stated that you thought the additional drilling under the proposal here would recover another 4.5-trillion cubic feet?

A. Yes, they allow me to take 5.5 and then this 4.5 come up, right you are.

Q. Okay. I'm slow, Mr Van Everdingen, and I didn't catch it. Would you explain why? Why we're going

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to get 4.5 additional trillion cubic feet of gas from the infill drilling program?

A. Because the wells, as I interpret the pressures, which is the best, to me has always been the most reliable source of information, if I interpret the pressures that have been measured correctly, they show that they do not -- that they do not pertain to what is in the -- in the oil business you use as an infinite reservoir.

You were talking about the limited drainage areas on practically all of the wells.

Q. Is it exemplified, Mr. Van Everdingen, by your Exhibit Number Twelve?

A. Yes, sir.

Q. Where we have No. 212 that was drilled in 1978 right in the middle of a pattern of wells which had been drilled a number of years before, maybe ten years before ---

A. Not all, there are some five year wells; but to say on eight year wells, and then eight year wells, those surrounding wells, have not been capable to reduce the pressure at the location of 212 by a measurable -- to a measurable extent.

Q. And No. 212 recovered what was almost virgin reservoir ---

A. Yes, sir.

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Q -- pressures?

A. Yes, sir. Then I thought, well, that was fairly late, and then we made the map just behind you, that I think is Number Twelve, yeah, same map. It's right behind you on the wall. We found the same two -- we found two wells, 258 and 259, which showed the same picture, and I will bet you if I could take time off and make a map for the entire field, you will find that that phenomenon is not an isolated case; that you will find many more wells when they are drilled later than the surrounders, giving the initial pressure. You get more familiarity, but unfortunately, I was not clever enough to start on that way when the job came up.

Q Well now, digressing just a moment, Mr. Van Everdingen, do you remember in 1974 when you testified in Blanco-Mesaverde --

A Yes, sir.

Q -- case, what were the expected pressures in the undrilled 160-acre tracts supposed to be at that time?

A. This problem did not arise. I do not know. I do not know. The one thing that, when that testimony came up, you know, for the first time we saw there buildups, I think they had a half a dozen, that lasted for two years and the wells were still going, you know. Now,

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I think the most was almost three years, and I never thought about measuring pressures or giving instructions or requiring that the pressures be measured within 24 days, like you have here, MR, whatever you call them, wellhead shutin pressures upon completion.

That's what -- I could have done a better job on that.

Q. I was thinking we were expecting pressures some place in the nature of 75 percent of the original pressures --

A. Leave me out on account of age. I don't recall.

Q. I see.

MR. HUTTER: I believe that's all, thank you.

MR. RAMEY: Any other questions of the witness? He may be excused.

Do you have anything further, Mr. Lopez?

MR. LOPEZ: No, Mr. Chairman. That concludes our case.

(There followed a discussion off the record.)

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MARLAN THOMPSON

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

DIRECT EXAMINATION

BY MR. CARR:

Q. Will you state your name and place of residence?

A. My name is Marlan Thompson. I live in Arlington, Texas.

Q. Mr. Thompson, by whom are you employed and in what capacity?

A. I work for Southland Royalty Company as a reservoir engineer.

Q. Mr. Thompson, have you previously testified before this Commission and had your credentials accepted and made a matter of record?

A. No, sir.

Q. Will you briefly review for the Commission your educational background and work experience?

A. I graduated from the University of Texas in 1963 with a Bachelor of Science degree in petroleum engineering.

I worked for Southland Royalty for the past year as a reservoir engineer. Most of the prior ex-

perience, which totals about fifteen years, I spent with Texaco. About nine out of the fifteen years I worked as a reservoir engineer.

Q. Are you familiar with the subject matter of this case and the Basin-Dakota pool?

A. Yes, I am.

MR. CARR: Are the witness' qualifications acceptable?

MR. RAMEY: They are acceptable.

Q. (Mr. Carr continuing.) Mr. Thompson, as a reservoir engineer does your area of responsibility include the San Juan Basin?

A. Yes, sir.

Q. How many wells does Southland operate in the San Juan Basin?

A. About 600 in the San Juan Basin.

Q. How many of these are in the Basin-Dakota?

A. 172.

Q. Will you please refer to what has been marked for identification as Southland Royalty Company's Exhibit Number One and explain to the Commission what it is and what it shows?

A. Exhibit Number One is a comparison of pressures between recently drilled wells and older offset wells. Not only is the -- the initial shutin pressure is

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shown on both the original -- or both the new and the original well, and also a current or recent shutin pressure on the older wells.

There are six -- six groups of wells that show this pressure comparison, and these wells cover six different townships in the San Juan Basin.

The first four are in the Aztec area and the other two are in the Jicarilla Reservation area.

Looking at -- looking at the first comparison, would be Southland Royalty's Culpepper-Martin No. 17, showing that this well is located in Section 33 of 17 North, 12 West. This well was completed in October of '78; had initial shutin wellhead pressure -- this is a 7-day shutin pressure -- of 1583 pounds.

The offsetting Culpepper-Martin No. 3 Well, drilled in 1966, May of 1966, had initial shutin pressure of 1578.

The new well, Culpepper-Martin 17, the pressure is five pounds higher in the new well than in the older offset well.

Referring to a recent shutin wellhead pressure in the offset well, this number is 780 pounds, which is considerably lower than the -- than the shutin pressure in the recently drilled well, this pressure being 1583 pounds.

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The other five groups of wells have similar comparisons. As you can see, three out of the six, the new well has higher pressures than the older wells, while three have somewhat lower pressures than the older wells.

Another case, the recent, or what we might call a current shutin wellhead pressure was considerably lower than the shutin pressure in the new wells. All these new wells were drilled in 1978 or '79.

Q. Mr. Thompson, what conclusion do you draw from this exhibit?

A. I concluded that from this exhibit, that a well will not drain 320 acres. This pressure -- these pressure comparisons, these small differences in pressure in these newer wells compared to the older wells, indicates that one well will not drain a full 320 acres.

Q. Do you have a recommendation to make to the Commission in this case?

A. Yes. My recommendation is that the infill program, infill Dakota program, as proposed by El Paso be adopted.

Q. Mr. Thompson, do you believe that granting the application of El Paso will result in recovery of gas which otherwise would be left in place?

A. Yes, I do.

MR. CARR: At this time we would offer

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Southland Royalty Company Exhibit Number One.

MR. RAMEY: Southland Royalty Exhibit Number One will be admitted in evidence.

MR. CARR: I have nothing further on direct.

MR. RAMEY: Are there any questions of the witness? Mr. Arnold?

CROSS EXAMINATION

BY MR. ARNOLD:

Q. Mr. Thompson, you're not necessarily saying that you think four out of five of the infill wells you're going to drill are going to have a higher pressure than the first well drilled?

A. No, sir. I'd say they'ld be very nearly the same. I'd say that no drainage had occurred in that particular area.

Q. In fact, if the new well got higher pressure than the old well, must indicate something other than drainage area.

A. There is some small differences. This could be some inaccuracy in measurement. They are only a small amount higher than the older well. I think that's probably measurement inaccuracy, measurement conditions. I'd say they're essentially the same.

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MR. RAMEY: Any other questions of the witness?

MR. VAN DYKERHOLF: I would like to know has he shutin the wells, new wells, for how long and how long were they produced before being shut in.

A. The initial wellhead pressures are 7-day shutin pressures, and the wells had produced only a very short time, the production during the initial testing operation.

Now, the recent shutin wellhead pressures, the wells have been producing a long time.

In fact from the completion date in -- in the case of Culpepper-Martin No. 3, it was completed in 1966, and this recent shutin wellhead pressure was taken in '77.

MR. RAMEY: Any other questions of the witness?

MR. STAMETS: Mr. Ramey.

MR. RAMEY: Mr Stamets.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Thompson, these initial shutin pressures, were those taken after a period of flow? What I'm trying to determine is how close are these to a reservoir

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pressure, or how close are they to actual shutin pressures?

A. They are taken after a period of flow. They are not -- they're all taken on the same basis. We presented the comparison and do not represent them as being the initial reservoir pressures.

Q. So they're not stable?

A. They're not fully built up, no, sir.

Q. So you really don't know whether or not, if they were allowed to stabilize, whether the new tests would show decrease in pressure or increase in pressure?

A. No, sir, they're all taken under the same conditions, so I think when -- when -- I think you can compare them and say that the reservoir conditions are the same.

They're all taken after a flow period and after a shutin -- shutin period, 7-day shutin period.

MR. STAMETS: That's all.

MR. RAMEY: Any other questions of the witness? He may be excused.

MR. CARR: We have nothing further.

MR. RAMEY: Mr. Ryan, would there be some where we could stop in about ten or fifteen minutes?

MR. RYAN: What I was thinking, Mr. Chairman, if we wanted to -- I have some preliminary remarks to make, and if you wanted to do that, I mean I need to qualify

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the witness, and we might do that in advance of the lunch hour.

MR. RAMEY: Okay, let's --

MR. RYAN: Then during the lunch break we can put our exhibits on the board and then we can have those.

L. E. NEIBERGER

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

DIRECT EXAMINATION

BY MR. RYAN:

Q. As sort of a preliminary statement, I'd like to fill in the Commission a little bit about what Amoco's position is in this hearing, and what we purport to show with an expert witness and some exhibits.

Amoco is a major operator in this field. We operate 356 wells and have an interest in an additional 382 wells.

Our net production for December, 1978 was 44-million cubic feet of gas per day.

To the present time, the end of 1978, Amoco's share of the gas has been 777 Bcf, which represents about 22 percent, or 21 percent, of the field.

Amoco is supporting El Paso's application

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to infill drilling, so that the nation needs the gas and the gas is there, and it will not be produced by the existing wells.

In arriving at this, Amoco had done an extensive study, which was presented by Mr. Neiberger in preparation for this hearing. He did an independent study apart from El Paso's study, to arrive at whether Amoco wanted to participate and recommend an infill drilling program.

That study, in anticipation of that, how much money we were going to spend and what we were going to do, we anticipate if this application is granted, that over the next decade we'll drill in the neighborhood of 350 wells so we really anticipate doing infill drilling in practically all -- practically all of our locations, and that will cost at present figures, in excess of $100-million, or we estimate $115-million at the present time.

We do plan to get into the program of drilling as soon as possible if the application is granted, and start certainly next year operating four or five rigs if they're available and during the first part of the 1980's do a great part of our drilling.

Part of the situation that prompted this study that we did was because of the results that we feel that we've had from the Mesaverde infill drilling program.

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Our original forecast in that -- in that program was we thought we would recover an additional .85 Bcf per well and we've recovered far exceeding that by over 1-billion cubic feet of gas.

We expect, as our figures will show in the study, that we anticipate that we will get far better results out of the -- out of the Dakota infill drilling program.

I think our conclusion is that we'll get over 2-billion with the additional wells, and of course, depending on frac techniques, we can even get greater than that.

I would say at this point that the field rules proposed by El Paso, we have no objection to them. We would recommend that those rules be adopted.

I do have one witness and I'd like to qualify him at this time.

Would you please state your name, by whom you're employed, and in what capacity?

A. My name is Lance Neiberger. I'm employed with Amoco Production as a Senior Petroleum Engineer.

Q. First of all, would you spell your last name?

A. N-E-I-B-E-R-G-E-R.

Q. And would you speak up loudly where all

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can here you?

Have you ever testified before this Commission?

A. No.

Q. Would you briefly state your qualifications first as to education and then as to work experience?

A. I graduated from the University of Colorado in December of 1974 with a Bachelor of Science in civil engineering. January of 1975 I began work with Amoco Production as a production engineer in the Casper, Wyoming office. Approximately a year and ten months later I was transferred into Denver as a reservoir engineer and worked there for a little over two years.

For the last six months I've been transferred back up to Casper, Wyoming and an engineering supervisor

I am registered in the State of Colorado as a professional engineer.

Q. During the two years that you were in the Denver office working as a reservoir engineer, was the area that's the subject of this application within your jurisdiction?

A. Yes, sir.

Q. And did you work closely with the Basin-Dakota Field?

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A. Yes, sir.

Q. And in your reservoir study, did you do an extensive study of the field for reservoir purposes?

A. Yes, I did.

Q. And did you compile this field study? That was done by you?

A. Yes.

Q. And that's an extensive reservoir study of the field?

A. Yes, it is.

Q. And did you do that to estimate reserves and to -- to see the feasibility of an infill drilling program within that field?

A. Yes, I did.

Q. And the results of that study, do you have them complete?

A. Yes.

Q. And in preparation for this hearing have you prepared certain exhibits that you are -- are going to introduce in this hearing related with this field and your study?

A. Yes, I have.

MR. RYAN: May he be qualified as an expert witness?

MR. RAMEY: Yes, we'll consider him to be

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qualified.

And with that, let's recess until 1:30.

(Thereupon the noon recess was taken.)

MR. RAMEY: Mr. Ryan, you may continue.

MR. RYAN: Yes. I might explain as a preliminary matter that I think everyone -- we've put the exhibits, we've got a whole stack of them there, there are two stacks of exhibits. The first one is a map marked as Exhibit One. The second one is a packet of exhibits. This contains a total of six exhibits, two of which are multiple page, but I stamped the first page of each exhibit with the official stamp so that will give you an indication of how they are numbered and we'll go through them individually.

Q (Mr. Ryan continuing.) Mr. Neiberger, you are still sworn and did you prepare certain exhibits in this cause?

A Yes, I did.

Q Would you please refer to what the reporter has marked as Exhibit Number One, and I'll ask you to identify that exhibit and explain it, please.

A Exhibit Number One is a map of the Basin-Dakota Field. For the general purposes the wells on here are all BAsin-Dakota wells. This line across the top is a border between Colorado and New Mexico and the town of

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Farmington lies approximately here.

A few things I'll be talking about later on I'd like to point out at this time.

The green dots shown in here are wells on which we ran pressure buildup tests for study.

The small red dots are areas on which I studied in order to condense my study instead of studying all of our Amoco wells in the field. I broke it down into a two township area to our main study area, Township 29 North, Range 12 West, and Township 30 North, Range 12 West.

In addition to this two township area there are model wells in each of the other areas as shown by the red dots.

In addition there are two red arrows on the map. These arrows indicate locations which simulate infill drillings. I'll explain later.

Q. Now, on Exhibit One, that basically shows all of the wells that have been drilled to date in this formation?

A. Yes, it does.

Q. Is there anything else on Exhibit One at this time?

A. I don't believe so.

Q. Now, you've indicated that you have

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done a study, a complete study in your opinion, on this field in preparation for this hearing?

A. Yes, I have.

Q. Are you prepared at this time to go through a step by step version of some of the things that you did in the study?

A. Yes, I am.

Q. And are those shown by the exhibits?

A. Yes, they are.

Q. Can we now look at what the reporter has marked as Exhibit Number Two. Is that a four-page exhibit?

A. Yes, it is. Exhibit Number Two is four pages. These are material/balance graphs on the four subject wells on which we are --

Q. Would you identify what wells they are by which dots they are on Exhibit One.

A. These are the green dots on Exhibit One. These wells are the Pan American Gas Com. "B" No. 1, Section 31, Township 30 North, Range 11 West; Sullivan Gas Com. "D" No. 1, Section 26, Township 29 North, 11 West; the Gallegos Canyon Unit No. 173, Section 29, Township 29 North, Range 12 West; and the L.C. Kelly No. 1, Section 5, Township 30 North, Range 12 West.

Q. Now, let's look first at Page 1 of Exhibit Two, and I will ask that you state what went into that

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exhibit.

A. This exhibit, as I stated earlier, is a material/balance prediction for the well. The real data I wanted to show with the use of the exhibit was the fact, that was mentioned earlier by Mr. Van Everdingen, that pressure data, true static pressure of a reservoir, is not measured acurately by the seven-day test as required by the State. The three or four circled areas begin with a previous State seven-day deliverability BHP/Z points. All of the triangles were data that were gathered from our pressure buildup tests. The tests range in length from twenty-four days to fifty-six days and a method of extrapolating to a static reservoir pressure was used. The bottom triangle in each case is the pressure that was measured the seven-day period so as to correlate with the State test.

The next triangle up was the pressure as it was last measured on each well and I might say here that the pressure was increasing on each well as the bombs were pulled. The highest pressure there, the highest triangle, is the extrapolated static reservoir pressure on this well.

These four buildup surveys were run in order to try and get a correlation between the seven-day deliverability test and the static reservoir pressure.

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Because of fracture effected data on all wells accept for this Pan American Gas Com. "B" only a conservative estimate of reservoir pressure could be obtained. In other words the fracture data had effected the mathematical methods of obtaining the true reservoir pressure.

Because only one well yielded the results I was looking for, I considered this method for my study and my determination for gas in place as not conclusive.

Q. Now, pages 2, 3, and 4 of Exhibit Number Two are similar graphs for those individual wells?

A. Yes, they are.

Q. And what did you conclude on this study that you did on these wells?

A. I concluded that I could not use this method throughout my report to determine gas in place --

Q. On a field wide basis?

A. -- on a field wide basis.

Q. Did you at that time think it would be necessary to consider another method of calculating gas in place on a field wide basis?

A. Yes, I did.

Q. And what method was that?

A. I went to a computerized mathematical model which was developed by a Mr. Carter of Amoco's

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Tulsa Research Center especially for extremely tight gas reservoirs.

Q. Do you feel that that was necessary step? That the information that you gained from the wells on Exhibit Two would indicate that the reservoir was tight and that it was necessary to go to another method?

A. Yes, I do.

Q. Is Exhibit Three, marked by the reporter, some of the factors that were considered in the gas reservoir model?

A. Yes, these are.

Q. Could you give us a little background on the model and what went into that.

A. Okay. Through a computer analysis of log and core data certain formation characteristics were determined. These characteristics were all -- well, the net pay, water saturation, porosity under the input data. In order to run the model all of the input data and the variables were put into the computer. The computer by matching a point in time cumulative at this point in time and a producing rate at this point in time, all three factors gave future performance predictions or performance predictions. They gave rate versus time predictions, production -- cumulative production versus time and a reservoir pressure versus time. By changing the

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variables a match was then obtained on each well after probably an average of thirty to forty runs per well, which actually overlaid the actual production of the well.

Q. How many wells did you use in the study?

A. I used seventy-eight wells of which they were all in these study areas, as previously mentioned.

Q. So you took the seventy-eight wells and used the input data that you indicated on Exhibit Three to arrive a situation that is comparable to that well?

A. Yes, I did.

Q. And then is that the method that you used to project future reserves?

A. Yes, this method gives a rate versus time history and so it can actually be used not only to match actual production but to project future production.

Q. Has Amoco used this method in the past?

A. Amoco has used this method very successfully in the past.

Q. Have they been pleased with the results?

A. We have been very pleased.

Q. Is there anything else you wish to indicate on Exhibit Number Three?

A. I do not believe so.

Q. Now, what has been marked as Exhibit Number

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Four, are those individual wells that follow through with the study you talked about on Exhibit Three?

A. Yes. Exhibit Number Four is a ten-page exhibit. These are actually model history matches of five wells. Each well has two pages. The first page being a rate versus time code. The actual production is shown along with the model production. The second page on each well shows little dots on there, those are the average productions for each year and the line that is drawn through those is the projection as made by a computerized model. By changing the parameters this model projection might lie anywhere on this page. However, until the reservoir formation characteristics are in a range which approximates the formation characteristics the model projection will not overlie the actual production.

Q. For example, if you look at page 1 of Exhibit Number Four could you indicate by the two symbols there of how you arrived at the model production versus the actual production.

A. Oh, the model production and the actual? Okay. The actual production is historical data on each of these wells. Each well had certain input data that were held constant by varying both the permeability of the well and the spacing pattern of the well. The model projection varied until these two parameters were found for this well

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that gave this overlying history match. I did not feel that I had formation characteristics that were reliable.

Q. Now, page one of that exhibit indicates a comparison of the model production from the actual production, and page two then is the -- is the future estimate of reserves.

A. Yes, it is.

Q. Well, what's the spacing factor that is considered?

A. Okay, originally the spacing was stated at 320 acres per well; however, as I said, it varied on each well once I got into matching wells.

The average drainage area for the wells that was modeled turned out to be approximately 195 acres, given a well life of 101 years.

Q. Before we get into that next exhibit, are the remaining pages of Exhibit Number Four similar situations, just using different wells?

A. Yes, they are.

Q. Did you feel by -- by -- and these are, the five wells you've used and shown here on Exhibit Number Five, are they indicative of -- of the wells that you used in this study?

A. Yes, these are typical wells used in the study.

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Q. It wasn't limited to the five, though. You did the study ---

A. No.

Q. -- with seventy-eight wells.

A. We did the study with seventy-eight wells.

Q. And were the wells picked at various parts in the reservoir and in the field to give some sort of indication to what the total situation would be?

A. Yes,they are.

Q. And you feel that you have a pretty acurate study as far as this type of study is concerned?

A. I feel I do.

Q. Now, are the results of this study with the seventy-eight wells shown on what has been marked as Exhibit Five?

A. Yes, they are.

Q. Now, could you look at that exhibit and explain what that exhibit is?

A. Exhibit Five is a tabulation of the results of my modeled data. This is the data as determined for the average well of the seventy-eight as modeled. Barring no problems with corrosions or anything that would shorten the wells natural life the study indicated that the wells would actually produce up to one hundred one years. This average well would produce forty-eight percent of the

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three hundred twenty-acre gas in place and drain one hundred ninety-five acres. The average well would produce 4.2 BCF and with the present spacing one hundred twenty-five acres would be untouched by the present well.

Because of corrosion problems and Amoco has had a lot of problems with corrosion and had to abandon a number of wells. The purpose of my study -- I limit the well life to fifty years. With a fifty-year well life the average well presently producing with my seventy-eight would recover forty percent of the three hundred twenty acre gas in place, would drain one hundred sixty-thre acres, recover 3.5 BCF, and leave undrained one hundred fifty-seven acres.

If we were allowed to drill a second well with a one hundred one year well life my modeled data indicates that the average well would have 2.68 BCF additional recoverable reserves. Based on the fifty-year well life my model indicates 3.36 BCF per well additional recoverable reserves.

Because of the vast differences in a field this large I applied a seventy percent factor to take care of the differences which have not been obtained through the use of modeling different areas of the field. Applying the seventy percent to these previous numbers you come up with, for the one hundred one well life again,

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1.88 BCF of additional reserves. For the fifty-year well life 2.36 BCF of additional reserves.

Q. I have a couple of questions before you go on. Is it your opinion that you needed to get away from the one hundred one years because probably the well would not last that long as far as the casing is concerned and other factors --

A. That is right.

Q. -- and that fifty years is more realistic for the total life of the well.

A. The asterisk as shown on reserves will give us a range of additional reserves based on form drilling of the present system in Basin Dakota of 1.88 BCF per well. This model predicts that there is 4.6 TCF of additional recoverable reserves which could be obtained by infill drilling and 3.36 BCF per well that could be as much as 8.2 TCF additional recoverable reserves. This just shows the range by infill drilling the reserves would be increased, the whole field by at least 4.6 TCF and as much as 8.2 TCF.

Q. Now, when you apply the seventy percent factor to the second well, does that a conservative figure in your opinion?

A. Yes, I believe it is.

Q. And that is taking in the factors that you

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can't predict at this point.

A. Exactly.

Q. But even using that figure it is your prediction that the additional recovery from the infill drilling program will be 4.6 TCF additional recoverable reserves.

A. That's right.

Q. And you are talking about under that system 2.3 BCF additional reserves from a three hundred twenty-acre spacing as it now exists.

A. Yes, sir.

Q. Now, that would indicate that that is more than what is -- you've come to realize from the Mesaverde, is that correct?

A. Yes, it is.

Q. Is there anything else on that exhibit?

A. No, I think that is it.

Q. Now, in your opinion is the models that you have graphed to come up with these conclusions -- do you feel confident about that study?

A. Yes, I feel very confident about it. As I have said, we have used this method in numerous other tight gas reservoirs and we have gone back and double-checked the data years later and the data we have on reservoirs we've seen have predicted performance very good.

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Q. Now, did you do an additional study to simulate actual well conditions?

A. Yes. The modeling told us that we were not getting full drainage of the area so in order to further prove this we -- Amoco drilled two wells to simulate infill drilling.

Q. Now, are those wells and the results thereof shown on what the reporter has marked Exhibit Number Six?

A. Yes, they are.

Q. And that is a four-page exhibit.

A. Yes.

Q. And are the first -- pages one and three on the board there?

A. Pages one and three, yes.

Q. Why don't you explain what went into those pages of the exhibit.

A. The well that Amoco drilled here is the Federal Gas Com No. 4, Southeast quarter of Section 23, Township 29 North, Range 10 West. This is legal 320 location and the previous Amoco well here had been plugged and abandoned because of corrosion problems. The offset wells are shown here. The drainage radiuses calculated for these wells are the shaded areas encompassed by the circle. When drilling this well, because of the fact that the drainage radiuses had not reached into this area

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virgin pressure or pressure approaching virgin pressure was expected. On page 3 of the same exhibit we have the Lopez Gas Com No. 1, the Northwest quarter, Section 2, Township 29 North, Range 9 West. This well is on a undrilled tract. It was drilled basically between two of Amoco's wells again. We felt that this simulated an infill drilling location.

Q. Now, pages 2 and 4 of Exhibit Number Six, those are the pressure data?

A. Yes, they are.

Q. And how much time did you use in getting the pressure?

A. On the Federal Gas Com No. 4 one hundred fifty hours was used to obtain pressure. On the Lopez one hundred ten hours was used.

Q. And the pressure on page 2 of the exhibit for the Federal Gas Com No. 4 well, what was your final pressure at the end of one hundred fifty hours?

A. At the end of one hundred fifty hours we had 2,569 PSI.

Q. Now, does that seem to approach virgin pressure?

A. Yes, it does.

Q. Now, what about the other well, the Lopez?

A. The other well at the end of one hundred ten

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hours we reached 1,982 PSI, which again I feel approaches virgin reservoir pressure.

Q. That certainly is higher than existing pressure in the field of surrounding wells.

A. Yes, it is, quite a bit.

Q. So this exhibit by drilling these two wells, and those wells were drilled not as infill wells but actual unit wells.

A. Yes.

Q. As on page one of Exhibit Six, to fill in for a well that was plugged and abandoned, is that correct?

A Yes, sir, that is.

Q But it ended up on 160-acre pattern?

A. Yes.

Q And your conclusion is that the -- you did reach approximate virgin pressure with those wells.

A. Yes.

Q Now, going back just for a minute to -- to the conclusions of your modeled study, even though the wells in this field were -- if they were capable of being produced for over 100 years, you indicated that they wouldn't drain the entire 320-acre unit, is that correct?

A That is correct.

Q At the end of this study that you made do you have any recommendations to make?

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A. I would recommend infill drilling as proposed by El Paso. I believe that we cannot fully drain the reservoir without a second well.

Q. So in your opinion a second well in each 320-acre tract is necessary to efficiently and effectively drain the proration unit of 320 acres?

A. Yes, it is necessary.

Q. In your opinion if additional wells are not drilled in the 320-acre spacing, will certain amounts of gas be undrained from that 320-acre spacing unit?

A. Yes, sir, they will be left where they are.

Q. And will not be produced at all?

A. That's right.

Q. In your opinion would that be physical waste of gas?

A. Yes, it would be.

Q. In your opinion can a second well be drilled in each of these 320-acre spacing units without violating the correlative rights of offsetting operators?

A. They can.

Q. The second well will not drain beyond the drilling spacing unit.

A. No.

Q. In your opinion is the granting of this

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application in the best interest of conservation?

A. Yes, it is.

Q. Certainly the country needs the gas, don't they?

A. I think so.

Q. It would be good for the economy of the country and of New Mexico.

A. Yes.

Q. Certainly of the area around Farmington where this field is located.

A. Yes, it would.

Q. Were exhibits One through Six prepared by you or under your direct supervision?

A. Yes, they were.

MR. RYAN: I offer the exhibits into evidence at this time.

MR. RAMEY: Exhibits One through Six will be admitted

Do you have anything further, Mr. Ryan?

MR. RYAN: In my opening remarks I indicated that Amoco has a program of drilling additional wells. Is that your understanding that it is being planned in the next few years to drill in the neighborhood of three hundred fifty wells?

A. Yes.

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Q. And we are going to get really serious in this program?

A. Yes, Amoco is very serious about it.

Q. That is all I have

MR. RAMEY: Any questions of Mr. Neiberger? Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q. Mr. Neiberger, as I understand it you used seventy-eight wells and then designed your computer program so that you get production versus time decline curve and then move that thing up and down until it fitted the actual decline curve.

A. Yes, by changing the variables the modeled prediction changes.

Q. And then based on that seventy-eight -- that was based on seventy-eight wells?

A. Yes.

Q. The results of the seventy-eight wells then are tabulated right here on Exhibit Five, is that it?

A. Yes, sir, that is the average of the seventy-eight wells.

Q. Now, are those seventy-eight wells good wells, bad wells, average wells, or what?

A. We took great lengths to try to obtain

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a good average over the field of wells. So they are good, bad, and medium wells in that average.

Q. Well, what were your average recoverable reserves for those seventy-eight wells?

A. I don't have that number off of the top of my head, but it would just simply be seventy-eight times the reserves as shown on here.

Q. Now, on Exhibit Five where you show recoverable reserves 4.2 BCF upon a 101-year basis, are those the recoverable reserves under the 195 acres?

A. Yes, sir.

Q. So that's not the full 320?

A. No, it is not.

Q. The total number of reserves under the 320-acre tract then would be the 4.2 plus the 2.68?

A. Yes.

Q. And was the 7 BCF then an average 320-acre tract?

A. A little over 6 BCF.

Q. It would be 7. Almost 7. 4.2 plus 2.7 is 6.9.

A. Oh, okay. Excuse me, I was looking at the wrong column. Yes, you are correct.

Q. Is 7 BCF typical of a Dakota well over there as far as the reserves under 320 acres?

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A. Well, based on the wells that I used, yes, they were.

Q. Based on your seventy-eight?

A. Based on my seventy-eight wells.

Q. Have you converted this additional reserve to be obtained under the 50-year or the 100-year program to the field as a whole so that we know what additional reserves we need for the entire field?

A. No. What I have done here is the asterisk as shown on Exhibit Number Five showed a range for the total field. In other words, using the lowest figure of the recoverable reserves for a second well of 1.88 BCF per well, I would say that at least 4.6 TCF could be recovered and using the highest number in those 4, 3.36 BCF per well, possibly as much as 8.2 TCF could be recovered.

Q. Now, the 8.2 is not based on seventy percent?

A. No, this is just a range.

Q. I believe that is all.

MR. RAMEY: Are there any other questions? You may be excused. Is there anything further, Mr. Ryan?

MR. RYAN: That is all of the testimony I have.

MR. RAMEY: Mr. Tully, do you have a

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witness?

MR. TULLY: No, sir, I would just like to make a statement for the record at the proper point in the procedure.

MR. RAMEY: I think we are ready for statements so you can start now, Mr. Tully.

MR. TULLY: Dugan Production Corp. wishes to state its support of El Paso Natural Gas Company's application for infill Dakota well. The approval of this application by the Division will provide an opportunity for natural gas operators to recover additional natural gas from the Dakota formation which would not be recovered from one Dakota well and the currently established 320-acre proration unit. Without wishing to cloud the issues presented to the Division by El Paso Natural Gas we wish to draw the Divisions attention to certain circumstances now existing for the Basin-Dakota Pool. We agree with El Paso's testimony that the existing Dakota Proration Unit should not be disturbed. However, there are situations where an operator may own the Dakota operating rights for only 160 acres.

We wish to submit for your consideration that this Division, in rendering its decision, provided for an administrative approval procedure for a Dakota well on a 160-acre proration unit, for a 320-acre Dakota proration

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unit does not presently exist.

Thank you for your consideration of the above comments. Respectfully submitted, Thomas A. Dugan, President.

MR. RAMEY: Mr. Carr, do you have anything?

MR. CARR: I have Mr. Morris, Vice President of Southland Royalty Company, who would like to make a statement.

MR. MORRIS: I would like to re-emphasize what our testimony was by Mr. Marlon Thompson. We are in support of El Paso's position to drill a second well on the 320-acre spacing in this pool.

MR. RAMEY: Thank you, Mr. Morris. Mr. Byrd do you have anything?

MR. BYRD: Mr. Chairman, no prepared statement, but we do want the record to reflect that the Mesa Petroleum does support the application .

My questions on cross examination of the witnesses were to point out some possible alternate language that you might consider in those two sections that I questioned.

MR. RAMEY: Thank you, Mr. Byrd.

Mr. Stogner?

MR. STOGNER: Yes, sir.

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I have a statement to read into the record. Consolidated Oil and Gas, Inc. concurs with El Paso Natural Gas Company's application to ammend Order R-1670 and R-1670-C to permit the optional drilling and production of an additional well on roration units in the Basin-Dakota gas pool of San Juan and Rio Arriba Counties, New Mexico, and for the assignments of allowables for such additional wells and proration units.

Consolidated is currently operating 69 wells in the Basin-Dakota pool and has been operating gas wells in the San Juan Basin for over 20 years. Based on its experience with the Basin-Dakota formation, Consolidated has concluded that one well will not effectively and efficiently drain the existing 320-acre proration units and that the drilling of additional wells will be necessary in order to drain those portions of the proration units which can not be drained by the existing wells.

MR. RAMEY: Thank you, Mr. Stogner. Mr. Arora.

MR. ARORA: My name is Sudesh Arora. I am the Manager of Reserves and Evaluation of Supron Energy Corporation.

Supron Energy Corporation owns and operates a substantial number of gas wells producing from the Basin-Dakota gas pool of San Juan and Rio Arriba

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Counties, New Mexico. Each of these wells has been drilled on a 320-acre spacing unit in accordance with previously effective spacing rules of the Oil Conservation Commission pertaining to the Basin-Dakota gas pool.

Supron Energy Corporation has reviewed the pending application of El Paso Natural Gas Company in this case seeking an amendment of the existing spacing rules to permit the drilling of an additional infill Dakota well on each established 320-acre spacing unit. Our company concurs with the views expressed by El Paso Natural Gas Company with respect to the desirability and necessity of additional infill Dakota formation wells in the San Juan Basin and supports the application of El Paso Natural Gas Company in that regard.

MR. RAMEY: Thank you, Mr. Arora. Mr. Gibb.

MR. GIBB: Tenneco Oil Company recommends approval of the application for infill drilling presented by El Paso Natural Gas Company today.

We feel that the testimony presented, as well as our own studies, shows that infill drilling in the Basin-Dakota is necessary to efficiently and effectively drain the remaining reserves.

MR. RAMEY: Thank you, Mr. Gibb. Mr. Brown.

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MR. BROWN: Getty Oil Company wishes to go on record as supporting the application of El Paso Natural Gas Company for infill drilling in the Basin-Dakota pool in San Juan and Rio Arriba Counties, New Mexico.

MR. RAMEY: Anyone else have a statement? Well, the Commission will take the case under advisement, and the Hearing is adjourned.

(Hearing adjourned.)

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REPORTER'S CERTIFICATE

I, SALLY WALTON BOYD, a Court Reporter, DO HEREBY CERTIFY that the foregoing and attached Transcript of Hearing before the Oil Conservation Division was reported by me; that said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability, knowledge, and skill, from my notes taken at the time of the hearing.

Sally W. Boyd, C.S.R.

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STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
State Land Office Building
Santa Fe, New Mexico
30 April 1979

COMMISSION HEARING

IN THE MATTER OF:

Application of El Paso Natural Gas Company for the amendment of Orders Nos. R-1670 and R-1670-C, Basin-Dakota Pool, San Juan and Rio Arriba Counties, New Mexico. CASE 6533

BEFORE: Commissioner Ramey
Commissioner Arnold

TRANSCRIPT OF HEARING

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For Consolidated Oil & Gas:	Tracy Stogner, Esq. Denver, Colorado
For Supron Energy:	Sudesh Arora Dallas, Texas
For Tenneco:	Bob Gibb, Esq. Denver, Colorado
For Getty Oil:	Gerry Brown, Esq. Denver, Colorado

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MR. RAMEY: The hearing will come to order. We have one case on the docket this morning, Case 6533.

MR. PADILLA: Application of El Paso Natural Gas Company for the amendment of Orders Numbers R-1670 and R-1670-C, Basin Dakota Pool, San Juan and Rio Arriba Counties, New Mexico.

MR. RAMEY: Ask for appearances at this time.

MR. LOPEZ: May it please the Commission, my name is Owen Lopez, with the law firm of Montgomery, Andrews, and Hannahs, Santa Fe, New Mexico, appearing on behalf of the applicant, El Paso Natural Gas Company, and I have two witnesses to be sworn.

MR. RAMEY: Any other appearances?

MR. LOPEZ: Mr. Chairman, if I may, I'd also like to introduce Dave Burleson, who's from the Office of General Counsel from El Paso Natural Gas Company, who is appearing with me here today; Mr. Dane Adams, who's Director of the Reservoir Engineering Department for El Paso Natural Gas Company, and Mr. John McGruder, who's in charge of the Proration Department for El Paso.

MR. RYAN: My name is Gordon D. Ryan, I'm an attorney at law for Amoco Production Company, Denver, Colorado, appearing on behalf of Amoco Production Company.

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we're also appearing in association with the firm of Kellahin and Kellahin and Malone, Roswell, New Mexico.

MR. RAMEY: Do you have any witnesses, Mr. Ryan?

MR. RYAN: Yes, I have one witness to be sworn.

MR. CARR: May it please the Commission, I am William F. Carr, appearing for Mesa Petroleum Company. I'm appearing today in association with Richard C. Byrd of Ottaway, Kansas, who will participate in this hearing for Mesa Petroleum.

I'm also appearing for Southland Royalty Company. I have one witness.

MR. BYRD: And Mesa will not have a witness.

MR. RAMEY: Do you have a witness, did you say, Mr. Carr?

MR. CARR: Yes, sir.

MR. TULLY: Richard Tully, General Counsel, Dugan Production Corp. Possibly counsel, myself, might wish to read a statement into the record.

MR. STOGNER: Tracy Stogner for Consolidated Oil and Gas. We will read a statement into the record.

MR. ARORA: Sudesh Arora, Supron Energy in Dallas. I'd like to read a statement into the record, please.

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MR. RAMEY: What was your name again?

MR. ARORA: Sudesh Arora, A-R-O-R-A.

MR. GIBB: My name is Bob Gibb. I'm from Tenneco Oil Company in Denver. I'd like to read a statement into the record.

MR. BROWN: Gerry Brown from Getty Oil Company, Denver. We want to read a statement into the record.

MR. RAMEY: Any other appearances?

Ask that all witnesses stand at this time and be sworn.

(Witnesses sworn.)

MR. RAMEY: You may proceed, Mr. Lopez.

MELVIN A. EHRLICH

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

DIRECT EXAMINATION

BY MR. LOPEZ:

Q Please state your name and place of residence.

A Melvin A. Ehrlich. I reside in El Paso, Texas.

Q By whom are you employed and in what capa-

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city?

A. By El Paso Natural Gas Company as a Vice President.

Q. As a Vice President for El Paso, for what area of activity are you responsible?

A. My responsibility covers the gas supply of El Paso Natural, which includes gas purchases, reservoir engineering, and gas proration.

In addition I am responsible for the marketing of natural gas through our Customer Affairs Department.

Q. Have you previously testified before this Commission and had your qualifications accepted?

A. No.

Q. Would you please describe your educational background and employment experience?

A. In 1950 I received a degree in commercial science from Enid Business College in Enid, Oklahoma.

I was thereupon employed by Phillips Petroleum Company in Bartlesville, Oklahoma, where I was responsible for coordinating the requirements of Phillips' Accounting Department with certain activities of Phillips' Natural Gas Department.

In June of 1955 I accepted employment with Pacific Northwest Pipeline Corporation as Director of their

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Natural Gas Accounting Department. I remained employed with this company until their merger with El Paso on December 31, 1959.

I might also mention that for the last two years prior to the merger I was Director of their Gas Marketing Department and Regulatory Affairs Department, Pacific Northwest Pipeline.

From 1960 until August of 1968 my chief responsibilities for El Paso pertained to gas marketing and customer relations for El Paso's Northwest Division. My responsibilities in this area covered the implementation and evaluation of market surveys, the negotiations of agreements for the sale of gas and other responsibilities in connection with the Northwest Division System marketing activities.

Starting in the fall of 1968 my chief responsibilities were in the same area but were expanded to include the Southern Division System, first as Manager, and then as Director of Gas Marketing and Customer Relations.

The Northwest Division and Southern Division together included the entire El Paso system.

In 1974 I became an Assistant Vice President and was in addition to Gas Marketing and Customer Relations, put in charge of Reservoir Engineering, Proration, and Gas Purchase Departments.

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In 1977 I was promoted to full Vice President.

Q. Have you previously testified before other regulatory bodies?

A. Yes. I have on numerous occasions testified before the Federal Energy Regulatory Commission, formerly the Federal Power Commission, the California Public Utilities Commission, the Arizona Corporation Commission, and the Nevada Public Service Commission.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this case is to introduce and explain the proposed rule -- pool rule changes we wish to be implemented by the Commission in the event our application is granted.

In addition, I propose to show that the El Paso system has sufficient capacity to transport all additional recoverable reserves that will be realized as a result of an infill drilling program.

Q. Are you familiar with El Paso's application in this case?

A. Yes, I am.

MR. LOPEZ: Mr. Chairman, are the qualifications of the witness acceptable?

MR. RAMEY: Consider him qualified.

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Q (Mr. Lopez continuing.) Mr. Ehrlich, please state briefly what El Paso is seeking in this case.

A El Paso is seeking to change the existing rules governing the drilling and producing of gas wells in the Basin-Dakota Gas Pool of San Juan and Rio Arriba Counties, New Mexico, to permit, at the option of the operator of each 320 acre proration unit, the drilling of a second well on that unit, with the prorated allowable for that unit being calculated according to the same formula that is now in use, exceptthat the deliverability of the unit will be calculated by adding together the deliverability of the two wells on the unit.

We are also asking that in considering wells as marginal or non-marginal, and in balancing overproduction or under-production, both wells' production be considered as being produced from one proration unit.

We further seek a finding by the Commission that a second well on each 320-acre proration unit in the Basin-Dakota Gas Pool is necessary to efficiently and effectively drain the proration unit; that the drilling of an infill well in the Basin-Dakota Gas Pool will increase the recovery of reserves from each proration unit in the pool; will result in more efficient use of reservoir energy; and will tend to insure greater ultimate recovery of gas from the pool.

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Q All right, now I hand you what has been marked for identification as El Paso's Exhibit Number One, and ask you to identify it.

A This exhibit sets forth El Paso's proposed rule changes to Order R-1670, as supplemented by Order R-1670-C, which, if the application is granted, would be applicable to the Basin-Dakota Gas Pool in San Juan and Rio Arriba Counties, New Mexico.

Q Without going into detail, would you describe to the Commission the essential changes the proposed rules seek to effect as they pertain to the Basin-Dakota Gas Pool?

A ere are essentially two areas where if the application is approved the rule should be changed.

The first deals with the well location and acreage requirements which would pertain to the infill well. In this connection I would draw the Commission's attention to Exhibit Two, which consists of two pages, on which a theoretical 320-acre proration unit is set forth on each page.

The first page of the exhibit shows rectangular and square areas within which a well must be located within the proration unit pursuant to present pool rules.

Q Mr. Ehrlich, if I could interrupt, I think

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probably everyone should get a copy of Exhibit Two who wants one so they can follow your testimony.

Q. Okay, if you'll proceed.

A. The second page shows the same theoretical 320-acre unit, but shows square areas within which, according to the proposed rules, an initial well or an infill well must be located.

It should also be mentioned that if a well already exists within an existing proration unit in the Basin-Dakota Gas Pool, then any infill well must be drilled on the opposite 160-acre quarter section within the proration unit.

Again, of course, within the square areas reflected on page two of Exhibit Two, distances from various boundaries are also shown on the exhibit.

Q. Did El Paso consider requesting 160-acre spacing rather than the option of drilling a second well on the existing 320-acre proration unit?

A. Yes. We gave that full consideration but we decided against it because this would disturb the equities in present proration units, some of which have been in existence for more than eighteen years.

Q. Mr. Ehrlich, I believe you stated that there were two essential changes that need to be effected by the proposed rules set forth in Exhibit One.

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Would you now please discuss the second major change?

A. The second essential change in the rules has to do with the allocation formula.

The present formula grants allowable to wells in two parts. Sixty percent of the allowable is calculated by using the ratio of the well's acreage to the total acreage of the pool, and forty percent of the allowable is calculated by using the ratio of that well's deliverability, as determined by the State deliverability test, to the total pool deliverability, which is adjusted by the acreage factor.

With the drilling of a second well in a proration unit there would be the same allowable factor based on acreage, but for the deliverability portion of the formula, the deliverability of two wells on a proration unit would be added together. This sum would be the value used to calculate that portion of allowable related to deliverability.

Q. Mr. Ehrlich, would you explain why the deliverability of the second well should be added to the first in calculating the deliverability factor to be used in the allocation formula?

A. As the spacing would remain 320 acres, adding the deliverability of both wells for the purpose of

calculating the allowable for the proration unit would permit an operator the opportunity to recover his total reserves. This is the same method currently being followed in the Blanco Mesaverde Gas Pool.

Q Does Exhibit One have any additions, deletions, or corrections contained in it that are different from the proposed rule changes that were contained in Exhibit A, attached to El Paso's application for this hearing?

A Yes, it does. For the most part the changes contained in Exhibit One are as a result of minor typographical errors or grammatical mistakes that were made in the Exhibit A attached to El Paso's application.

I have here an errata sheet that shows where these changes were made, and will be glad to distribute them to those who are interested.

In addition I should mention that the only possible significant change is the addition of Rule 10(D), which you will find set forth at the bottom of page 4 and top of page 5 of Exhibit One.

This is a new rule that we would like to see incorporated into the proposed rules so that the testing procedures are up to date with what is necessary for completion test requirements for each new well on the proration units.

Q With the exception of the addition of

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Rule 10(D), in your opinion do any of these changes really modify or change any of the rules set forth in Exhibit A attached to El Paso's application?

A. No, sir. These corrections were made in an effort to cause the proposed rules contained in Exhibit One to be as correct as possible and to parallel as nearly as possible the other general rules and special rules which have been set out in Order R-1670, as supplemented by Order R-1670-T, which set forth the special rules for infill drilling in the Blanco Mesaverde Pool.

Q. Mr. Ehrlich, do you have an opinion as to the gas price applicable to the gas produced from the Dakota infill wells?

A. Our evidence, to be presented by Mr. Van Everdingen, will show that the infill wells are required in the Basin-Dakota Gas Pool to efficiently and effectively drain the gas reserves underlying the present 320-acre proration units.

Under the regulations recently adopted pursuant to the Natural Gas Policy Act, the Dakota infill wells will be in a category similar to the Blanco-Mesaverde infill wells, and subject to the State of New Mexico issuing an order, similar to the order issued for the Blanco-Mesaverde Gas Pool, will qualify for the gas price prescribed under Section 103 of the Act for new onshore production

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gas wells.

Q How much gas can El Paso's facilities in the San Juan Basin handle on a daily basis?

A. El Paso's facilities are presently designed to handle 1,400-million cubic feet of wellhead gas per day. After deducting shrinkage, fuel, and field use, these facilities have the capability of delivering approximately 1,300-million cubic feet a day to our mainline.

During 1978 the field production attached to El Paso's system averaged approximately 1,100-million cubic feet.

Q Mr. Ehrlich, assuming that this application would be granted to permit infill drilling the Blanco-Mesa -- the Basin-Dakota Gas Pool, would El Paso have the capability to handle these additional gas volumes, including the projected gas supply from infill wells drilled in the Blanco-Mesaverde Gas Pool?

A. Yes. Production estimated to become available to El Paso from the infill drilling of both formations would essentially normalize the decline of both -- excuse me, would essentially normalize the decline in deliverability and maintain the production essentially level over the next several years. This volume will be necessary for El Paso to meet its customers' high priority needs.

Q If this application is granted, do you

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foresee that El Paso would be required to reduce its take from existing wells?

A. Production from the wells in the San Juan Basin have been on the decline for many years, and El Paso firmly believes that it will be able to take all of the additional gas made available to us in the San Juan Basin, whether this additional gas results from other development wells in existing fields or from infill well programs.

Q. Mr. Ehrlich, in your opinion would the granting of the application in this case be in the interest of the prevention of waste and protection of correlative rights?

A. Yes. Under the proposed rules each operator would have the opportunity to increase his recoverable reserves and deliverability underlying this 320-acre proration unit, thereby preventing waste and protecting correlative rights.

Q. In your opinion what are the principal advantages to be gained by the proposed infill program?

A. There are many advantages which will result from this program, but I think the most important advantage is the increase in the gas recovery and availability from the Basin-Dakota Gas Pool, which Mr. Van Everdingen will discuss more fully in his testimony.

By virtue of the increased production and

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increased recoverable reserves, more gas will be produced at a time when our country desperately needs the gas. Further, because the facilities will be fully loaded, the consumer could get the gas cheaper since the unit volume costs them less.

Also, by utilizing the existing facilities more fully, and taking advantage of the available reservoir energy, this type of waste would be prevented. The producer would benefit from this infill program, as it would afford them an opportunity to increase their recoverable reserves. The royalty owners would be substantial beneficiaries from the proposed program. These would include the State of New Mexico and the Federal government.

The State of New Mexico would benefit through increased taxes brought about from the increased production, plus the increase in business activity fostered by the approval of the infill program.

I believe, in summary, that there are a great many benefits to be gained from an infill program and many recipients of these benefits.

Q. Mr. Ehrlich, were Exhibits One and Two prepared by you or under your supervision?

A. Yes.

MR. LOPEZ: At this time we'll move El Paso's Exhibits One and Two be received in evidence.

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MR. RAMEY: They will be admitted.

MR. LOPEZ: Mr. Chairman, this concludes our direct of this witness.

MR. RAMEY: Any questions of the witness?

MR. BYRD: Mr. Chairman, I have a couple questions I'd like to ask.

MR. RAMEY: Mr. Byrd.

CROSS EXAMINATION

BY MR. BYRD:

Q. Mr.Ehrlich, referring to proposed new rule 2(C), do I understand that -- I do understand that's the same provision that's in the Mesaverde order, is that right?

A. Yes, sir.

Q. Could you tell me what you mean by economically -- as long as it's economically feasible to do?

A. Well, we feel that both wells should be produced. We think that under today's conditions it's difficult to predict just when it will not be economically feasible to produce a well; therefore, we suggest that -- that both wells be produced for just as long as it's economically possible.

Q. So the purpose, your intended purpose of the provisions of rule 2(C) is to make sure that both wells

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remain on production as long as they're producing.

A. Yes, sir.

Q. Also, referring to your proposed rule 9(E), there, as I understand your proposal, the unit allowable may be produced from both wells, is that correct?

A. Yes, sir.

Q. And that provision is exactly the same as is presently in the Mesaverde, is that right?

A. Yes, sir.

Q. Could you accomplish the purpose of Rule 2(C), guaranteeing production from both wells, by providing that the unit allowable be produced proportionately from the two wells on the unit, based on their deliverability?

A. I suppose you could; however, that's not what we are proposing here today.

Q. I -- I understand that. You also made the statement in your direct testimony that in your opinion the infill well will be entitled to a 103 price under the Natural Gas Policy Act, providing you received an order from the State Commission similar to the one that you received in Mesaverde.

Isn't it true that in addition to that order the FERC requires an affidavit from the producer and the pipeline that the well will be produced based according to their ability to produce into your pipeline?

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A. Let me ask you -- I wasn't following your question. Who requires this?

Q. Doesn't the Federal Energy Regulatory Commission require that in the Mesaverde Pool --

A. Yes, sir, that's correct.

Q. And isn't the purpose of that affidavit to make sure that the wells are produced in accordance in affect, to the deliverability?

A. Yes, sir, I'm sure that they would frown on shutting in only one, if that's what you're driving at, with the lower price in order to collect the -- the higher price under the allowable formula.

Q. Thus the provision in the State Commission's rule requiring that deliverability of the two wells determine how the production is going to be distributed within the unit would eliminate the necessity of that affidavit, wouldn't it?

A. I'm not sure whether it would eliminate it, but I'd think that it would certainly eliminate a lot of stumbling blocks we might otherwise have.

MR. BRYD: Thank you.

MR. RAMEY: Any other questions of the witness?

MR. RYAN: Just a few questions, if I might.

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CROSS EXAMINATION

BY MR. RYAN:

Q Mr. Ehrlich, you've indicated that if this application is granted that there'll be additional wells and that El Paso has the facilities to process that gas, that additional gas, is that correct?

A Yes, sir.

Q If that gas is produced does El Paso have a market for the gas?

A Yes sir. I -- I could go into considerable detail, but let me just tell you this, that we have a transmission capacity of roughly 3.9-billion, for which we have a market demand of at least that figure. We're now supplying about 2.9-billion to that market. In other words, we have roughly a billion cubic feet a day cut off of our system every day.

Q So if -- if these additional wells that are being considered would be drilled and it could be marketed, it wouldn't need to be left in the ground.

A Be no question.

MR. RAMEY: Any other questions? Mr. Arnold, do you have a question?

MR. ARNOLD: Yes.

CROSS EXAMINATION

BY MR. ARNOLD:

Mr. Ehrlich, when the original proration order was written in the Basin-Dakota Pool, there had to be a finding that the deliverability was related to the reserve in the pool in order to justify the proration factor, deliverability factor.

A Yes, sir.

Q How do you relate add-on deliverability to reserves in the tract?

A I'm not sure, Mr. Commissioner, I understand the question. There would be an additional deliverability and additional recoverable reserves, as a result of the second well, and what we're suggesting here today is that -- that the deliverability of the two wells be added together in order to determine the forty percent of that deliverability.

Q Wouldn't you reach a point some place in drilling infill wells where you know -- where the relationship no longer -- what if you drilled a third well?

A That might be possible. I think after we get on with this program for a few years we might take a look at that, but I think here today we're convinced that

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the second well would be -- to be drilled, without any question, and I think, to answer your question, it's going to depend largely on economics, and the shortage of gas in this country is so great and the decline of deliverability is so great each year, that I don't know how far down we will lower our gathering pressures at some time just to keep residential load on, but that's going to have a big important part in this.

Q. Right, the only issue I was making -- making of question was the relationship between deliverability and reserves in a proration formula when you drill additional wells on a proration unit.

A. Well, that's probably a question better answered by Mr. Van Everdingen, but it would seem to me that deliverability probably will decline faster than the reserves will.

MR. RAMEY: Any other questions of the witness? Mr. Nutter?

CROSS EXAMINATION

BY MR. NUTTER:

Q. The proration department of El Paso Natural Gas Company has always maintained to the Commission that wells classified as marginal are put on the line and left on the line at all times.

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Now, in the Blanco-Mesaverde, if we have a unit that is classified as non-marginal and subject to limitation to the allowable, but one of the wells is a poor well, is that well put on the line and left on the line at all times and the unit's production curtailed from the better well only?

A. No, sir, as I -- as I understand it, if it's classified as non-marginal we attempt to follow the proration rules, or the proration -- the allowable for that particular well, and it's --

Q. So all of the -- the poor well is also subject to curtailment, then?

A. No, sir, the marginal wells we leave on at all times.

Q. No, I'm talking about the poor well, which would be a marginal well, but it's on a unit where there's a good well and the unit is not marginal, is the poor well left on at all times?

A. Yes, sir, it will.

Q. So the brunt of curtailment falls on the good well only.

A. Yes, sir, as long as it's non-marginal.

Q. Okay. Now, in what respect does the rule proposed by El Paso in Exhibit One differ from the Mesa-verde rules that we have at the present time?

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Now, I don't mean different from the Mesaverde rules, because I realize we've got a different allowable formula, for instance, 60-40 compared to 25-75.

A. Yes, sir.

Q. But in what respect do the changes in these rules from the present Dakota rules differ from the changes that we have embodied in 1670-T, which was the infill drilling rule for the Mesaverde?

A. The only major change that I recall is the -- let me see if I can find it -- well, I guess it was the 10-D that I mentioned in my earlier testimony, that, well, sets out the testing, I guess you'd say, to better clarify the testing procedures when you complete a new or infill well.

Q. Okay, 10-D is a new rule, then, that is not included in the Mesaverde pool?

A. Yes, sir.

Q. And in effect does 10-D provide that in the event one of the wells on the unit would be classified an exempt marginal well and the other well is a testable well, that both wells would have to be tested? So you could get a true deliverability picture of the unit?

A. The old well, not necessarily if it's had a current test, it would not require a further test until the next appropriate time. The new well would.

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Q If the new well required testing, the old well requires testing also, is that it?

And the old well would never fall into an exempt marginal status.

A If I understand what we proposed here, the -- if the old well has had a current test recently and still in effect, we would not have to have a new test for that old well. You would on a new one.

Q Okay, for the current test.

A Right.

Q Now, for future testing requirements, if one required testing would the other require testing?

A Yes.

Q Also?

A Yes, sir, that's correct.

Q Okay, and then is there also a change in Rule 15-B, which is different from the Mesaverde rules?

A Yes. As I recall, on the Dakota-Mesaverde, that 500 Mcf per month in order to keep a well on, I believe that's 1000 in the -- in the Mesaverde.

Q I believe, Mr. Ehrlich, that the Rule 15-B for the Mesaverde reads that a well that's subject to shut-in would receive 500 Mcf, and it's been interpreted that both wells would receive the 500 Mcf on the unit.

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A. Oh, I see.

Q. It's been reworded so the unit itself --

A. Well, I stand corrected. When I read that I thought you could add the two together.

Q. Here we're limiting it to 500 Mcf per unit.

A. Yes, sir, right. I think this probably clears up an area that probably would have been cleared up in the Mesaverde.

Q. All right.

MR. NUTTER: Okay, thank you, Mr. Ehrlich.

MR. RAMEY: Any other questions of the witness?

He may be excused.

MR. LOPEZ: Mr. Chairman, at this time I'd like to call Mr. Van Everdingen to the stand.

In this connection I might point out, all the exhibits that Mr. Van Everdingen plans to tender are set forth on the walls, beginning with Exhibit Three.

Exhibit Four is a computer printout of reserves in the Basin-Dakota Pool. We do not have extra copies of this exhibit. The Commission has a copy and they will have a working copy which people can check with, but I do not have any extra copies of Exhibit Four, which is the computer printout.

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these packets, and we might as well distribute those to those who do not have copies of exhibits, contain all the exhibits that are on the wall, except for Exhibit Three and Exhibit Four.

In addition, we don't have on the wall some photographs that are also contained in an exhibit, which is Exhibit Ten, three parts, A, B, and C.

So, with that little -- oh, incidentally, I'd also like to introduce Ms. Kyla Kriss, Mr. Van Everdingen's assistant, and I think I'll have her point to things on the charts and let Mr. Van keep his chair.

A. F. VAN EVERDINGEN ,

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

DIRECT EXAMINATION

BY MR. LOPEZ:

Q Would you please state your name and where you reside?

A I am A. F. Van Everdingen and I reside in Dallas, Texas.

Q By whom are you employed and in what capacity?

A I'm a Senior Vice President of DeGolyer

and MacNaughton.

Q. Mr. Van, have you previously testified before this Commission and had your qualifications accepted as a matter of record?

A. Yes. I have testified in the case of the Mesaverde formations on the same subject we are talking about here.

MR. LOPEZ: Mr. Chairman, I'd ask the Commission to take administrative notice of Mr. Van's qualifications as set forth in the Blanco-Mesaverde application.

MR. RAMEY: The Commission will consider the witness qualified.

Q. (Mr. Lopez continuing.) Mr.Van, since you testified in that Mesaverde case, have you had an occasion to do any further studies with respect to reservoir behavior?

A. Yes. I mean reservoir behavior has been always, it seems always in my blood, and we did at D&MN, awhile after the Mesaverde was out, and published a paper from the last meeting in Houston, the big SPE meeting, and that paper deals with the same subject. It was written by myself, I should say and Myla Kriss, on the same subject we are talking about now.

Q. Okay. And you are familiar with El Paso's

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application in this case?

A. Very much so, sir.

Q. And the Commission has already ruled that you are qualified to testify here, so we'll get on with it.

In connection with your testimony that you plan to give today, have you made a study of the possible results that might be realized by doubling the well density in the Basin-Dakota Gas Pool?

A. Yes, I have.

Q. And what are some of the factors you feel you must consider?

A. I feel you should look, take a look at the ultimate production, at the amount of gas which is in place, and the reservoir characteristics of the formation.

Q. Now, in this connection, I turn your attention to what has been marked as Exhibit Three, El Paso Exhibit Three, and ask you to identify it.

A. Exhibit Three is a map giving all the locations of all existing wells in the Basin-Dakota, and of some -- in red, some of the figures of the units that exist, all of the units that exist.

MR. LOPEZ: If the Commission needs them we have some extra copies of ExhibitThree. Would you like to have them right now? I don't think we're going to be referring to Exhibit Three that much.

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MR. RAMEY: I think we can pretty well see it.

MR. LOPEZ: You can see it over there?

Q. (Mr. Lopez continuing.) Have you done a study of the estimated recoverable reserves under present field rules, and the estimated additional reserves that might be recovered if the application is granted?

A. Yes, I have.

Q. At this time I turn your attention to --

A. Exhibit Four.

Q. -- Exhibit Four, and ask you to explain what it is and what it shows. If you could discuss from --

A. I think I can.

Q. Okay.

A. Exhibit Four gives for all the existing wells in the field, in order of magnitude, the total of the amount yet to be recovered, and the reserve formation --

Q. Remaining reserves.

A. Remaining reserves, which is the amount yet to be recovered as of 1/1/79, and so -- well, that's all there is to it.

Q. Right. Now, as I understand it, this is a computer run prepared by the El Paso Reservoir Engineering Department. Did DeGolyer and MacNaughton, under your supervision prepare a similar study of the estimated reserves in

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the Basin-Dakota Pool, and were you able to compare the two?

A We prepared, we have, and always keep up to date, a similar one for individual wells, and we compared almost eighty percent of the wells that are listed here to our own figures, finding out that the differences were only negligible. So we have accepted the figure that is shown in this, the total ultimate given here as 5-trillion cubic feet.

Q Now, If I understand your testimony, then, you say that this exhibit shows that the estimated recoverable reserves, according to the calculations, under present pool rules in the Basin-Dakota, is approximately 5-trillion cubic feet.

A You are quite right, sir.

Q Okay. Now I'd turn your attention to what has been marked for identification as El Paso's Exhibits Five, Six, Seven, and Eight, and ask you to identify each exhibit and explain what they show.

A Now ExhibitFive -- before I go into exhibits, I felt it was necessary, not only to go on the basis of only wells and their behavior, the pressure behavior, or whatever you have on individual wells, but we also should take an overall view of the field.

Exhibit Five gives you the total production of the Basin-Dakota, and this one, it's plotted on

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similar paper, and it's one of the easiest graphs that can be made, can be extrapolated down to an economic limit, and it yields about 4.9, 5-trillion cubic feet ultimate.

Number --

Q Six.

A -- Six is the same graph as Number Five, except that we are not convinced that seven years on which we have data, and a little portion to come, to see what that means, if you say you can extrapolate it out and produce it, because it brings us to the year 2042 before all that gas will be recovered.

And now we come -- I can't see which one?

Q Exhibit Seven.

A I can't see it because I'm on the end, you know.

Q Average line pressure.

MR. KRISS: Average line pressure.

A Now, in making the graph of the rate of production, it is shown on Exhibit Seven that during the time that the graph -- the data were assemblied, there was some drilling going on in the Basin-Dakota, and also, the line pressure decreased from around 300 to 200 pounds, which means that the factors favorable, which justify -- which would really put the question of 5-trillion in some doubt. And so we also have made the Number Eight, which

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gives you the P/Z curve for the field as a whole, and which undoubtedly indicates that on that basis you would expect about 6-trillion cubic feet.

So that our answer on the whole thing in summary is you can rely on 5-trillion cubic feet as the amount of gas as is coming out today.

Q Okay. Now, as I understand it, as you just explained, Exhibits Five through Eight address the amount of recoverable gas under present pool rules.

A Yes.

Q Have you done any calculations with respect to the amount of gas in place in the Basin-Dakota Gas Pool?

A Yes, we have done quite a lot of work on it. As a matter of fact, El Paso estimated, by what they call high grading electric logs, that there would be slightly over 10-trillion cubic feet of gas in place.

Now, that's nice, except the high grading makes you feel there should be more gas in place. So we went off the logs once again, only to find out that any logging engineer with a lot of experience will give you more, though they say that this is the very minimum that you can see. It is the quantity on all the sands where there is no dispute possible, but there is other sand where there is a dispute. You do not know what you have, whether --

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or how much gas comes out of the less permeable sands that are not present over the entire -- that are not present well developed over the entire structure.

Therefore, we had to give up the assembly of additional data on logs, and we went to a lot of core data for which -- of which a lot of are available, all taken before 1965. Those core data were analyzed and they are reviewed on our Number Nine.

Q Exhibit Nine.

A On Exhibit Nine, where is it?

Q It's the last one down there. Now, as I understand it, Mr. Van, you said that you and El Paso both examined various electric logs, as well as core data -- or you took the core data --

A Yes, sir.

Q -- and analyzed it.

A Yes, sir.

Q Could you tell us how many and, for how many wells?

A Oh, we had fifteen wells on which core data on the Basin-Dakota were available, and those fifteen wells are given here on this map. I think they are the wells marked in red in the better portions of the field.

Well, here they are. They're not.

Q Now these core data were taken from fif-

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teen wells and the wells are indicated on the Exhibit Three.

A. This -- these wells were chosen because they both, we thought, are in the middle of the field, in the better portions, and so we could rely that whatever we get out of it, that is available over there.

There is only in that field -- Hyla, point to --

There is one other portion in the field that is real good; that's the one on the top where the best well in the field had been drilled. A well from Number Five, from Exhibit Five -- Four, that shows 11-trillion.

Here on the Huerfano wells there is one that has 10-trillion. It's where the core data are coming from.

So we feel that we had a representative sample of core data for the field as a whole.

Q. I believe you said 10-trillion; you meant 10-billion.

A. Oh, definitely.

Q. Okay. Now, I think we ought to go back to your Exhibit Nine and explain what it represents and how you came up with even more gas in place than El Paso is willing to predict.

A. Well, El Paso almost did. They almost indicated there is more gas by their descriptions high-

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grading it, you know. So we first checked the highgrading, was it correct, and it is correct. We checked that in the office. We don't always take a client's word for granted.

And then we did some additional work that showed there is more than they have given. Now that work was done by the core data, and grouping them in 2 percent porosities.

So the first set was from zero to 2, which you might say is practically not -- has no gas in it, but from 2 to 4 there is some gas in it; from 4 to 6, et cetera, up to 14 to 16.

Some samples were not permeable, and by permeable we mean they -- they had the porosity and permeability of 1/10th of a millidarcy or less, and we knocked those out.

But all of the samples given here, even the 2 to 4 percent had a permeability, which is only 1/2, which is 1/2 of the average for the reservoir. The permeabilities are given in the -- in column four, enclosure 9.

And remarkable, the average is less than 1/10th of a millidarcy, and this makes the -- the field almost the least permeable I've ever come in my fifty years, you know, come across in my fifty years.

You see another characteristic, which is to be expected. The number of impermeable samples decreases

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when the total porosity goes up.

You see the 2-to-4 had 40 permeable samples, which is less than -- which is 40 percent, but if you come to the 8-to-10 class, there's only 40 out of a total 150 more impermeable, and later on in the 14-to-16 group, everybody is permeable.

Now, you can add up these figures. We had to make some kind of an assumption as to how should we use these figures, and we have assumed that like El Paso did it in the 10.3-trillion, they took 6 percent porosity as the base. Anything less than 6 percent was knocked out. And they took 50 percent water as a base. Anything more than 50 percent was knocked out.

Unfortunately, I don't have data for water, but I have, of course, plenty of data for porosity, and that showed that out of the total percentages porosity that we have analyzed, there was 1,056 samples and they together contained 8000 percentages porosity, which is kind of a hybrid form to express it in. And those percentages of porosity, only 5000 were present in formations with more than 6 percent porosity and less than 50 percent water.

No, for 6 porosity; on the water I am quiet.

Consequently, it showed, that analysis showed, that there is 50 percent more pore space available.

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I'm saying pore space available that could be filled with gas that you would obtain from the basis on which El Paso has worked.

Now, 50 percent, you -- you don't have always to accept the highest figure possible. You could say well, I do not care to know the lower figures.

No. I was told to go slow or I mess it up, and now I don't want to mess it up.

Q Well, this area you're discussing, Mr. Van --

A Yes, sir.

Q -- you're talking about El Paso used a 6 percent cutoff and you're saying that in calculating the gas in place you decided that the area between 2 and 6 percent porosity had the same permeability, so you couldn't just necessarily discount that, isn't that right?

A Not necessarily. You could discount it some. You must discount it some or it's not as good as the top above 10 percent, and we didn't know just how to handle it, you know. I mean because we don't have from core data the exact water percentages.

But you can take out of the figures that's shown on this Nine, you can make up comparisons and one of them would give you an additional 20 percent, which is darned sure that it is 20 percent higher than El Paso had

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given us, you see.

So, now you have a gain as normal in cases like this. You are talking about two sets of figures, one, the highest; one -- and you could, out of the fifty percent more, you can put 15-trillion initial in place.

Out of the twenty percent more you can put 12, 12-1/2-trillion in place.

And I can only say, take your choice. Probably the truth sits somewhere in the middle but we cannot define it.

Now, that gives you one figure which is higher than the 10-trillion given by El Paso, mentioned before, and therefore it makes an estimate of additional recovery more amenable.

Now, in order to get an impression, may I now introduce --

Q Exhibits Ten A, B, and C, sure.

A C, which give you -- let me go back. There were available some thin sections. Now, a thin section, I think the geologists know what they are, but these thin sections, that always impresses me, were one-ten-thousandth of an inch thick. So when I heard that, I thought there might be some porosity visible in it.

So we went out to the thin sections, checked about 25 of them, and had some photographs made of

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them, you know.

Now, you do this by -- by going to the university and ask -- they have the best of equipment -- could they please make you a color picture, and they give you a slide on it at that time. And those slides, you magnify, Xerox does it for you, and then you get the graphs out like you see here, which on Number Eight is a graph of -- gives an indication the various minerals. White is always quartz, but how much other minerals you will find in it, you know, how many, and if you -- that does not give you much detail, but on B, where we have blown it up to 100 and better, you know, you see that the grains have grown together. Look at the blue one; now look at the forms that comes in there. It was not feasible for us, or not possible for us to find any holes in it until we come to 10-C, which gives you a slight indication of a fracture present, and since I talk about the fracture, there are, for anybody who has the core data on it, core data really show one-half of the cores to be fractured, and if a thing is fractured, you think the gas just walks out.

Now, we have listed fracd permeabilities and unfracd permeabilities separately. And for the classes given we always find that fractured, as described in core data, and unfractured, are exactly the same.

So that put to rest the idea that frac-

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ture, if a man talks fractured permeability, or fractured core date, he will have a better than average well.

The wells, or the fracture -- the fractured wells or the fractured average was just the same, 1/10th of a millidarcy as it was in the non-fractured wells.

Q. Okay, Mr. Van, I know that you've covered this, but I just want to make sure the record is complete.

In your opinion are the core samples that you studied from the fifteen wells in the Basin-Dakota Gas Pool well representative of the Basin's characteristics?

A. Yes. I think they are very representative of it.

Q. Okay, good.

Now, I think in addition to studies of the core samples and their respective permeabilities and porosities, did you do any other studies to support your estimate of the effects of the infill drilling program, and in this connection I'd ask you to turn your attention to El Paso's Exhibits Eleven and Twelve.

A. Yes. You know, when you are talking first about 10-trillion, and you are talking about those tight formations that existing -- exist, that there's nothing but tight formations, then you doubt whether infill drilling can be -- can be very effective, because it's so tight you wouldn't expect much more than 50 percent in the

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first go around. That's a nice recovery.

But it turns out there is, let us simply say, 14-trillion that is waiting for production, or waiting to be let out, total. So to do that we went back to simple reservoir engineering and made the build-up tests. We collected all the tests we could find, and here is a well, 212 on the map here -- okay, that's 212 -- drilled in '78 in which the first build-up gave us 2650 pounds, which is exactly the build-up that this well had shut-in pressure, which is about equal to the build-up pressures found when the first well in that neighborhood was drilled ten years ago.

Now, what that log tells me, ten years of production and we have not been able to decrease the pressure perceptibly, or at all. I won't fight for five pounds if somebody wants to bring it up, but this is, I would say, is an indication that it's not being drained.

Now, wellhead pressures are, to me, they are good, but just to be safe, there was also measured the bottom hole pressure, and if you put the weight of the gas and the total depth of the well together, bottom hole pressure just confirms the wellhead pressure that was given.

There's also on the graph a little hump, which is, of course, somebody went haywire there. I can't -- I can't explain it. But he came back to normal pressures

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again for the bottom hole.

Now this is about 2600 at that spot. Then I ought to show -- it's just now an isolated spot, because it's somewhat meagre to go on one, and told me first, let's make another in that neighborhood, which Hyla is right now next to it, and our Well 212 is right there in the black -- in blue. That's 212.

Q Now she's pointing to Exhibit Twelve.

A Yes. And now Exhibit Twelve shows that all of a sudden showed that 258 and 259, also shown in blue, they're exactly the same. You find initial pressures back on all those wells that were drilled in 200 on the present spacing of 320, and they are also surrounded by wells that are ten years old.

So this gives you the idea that there is no drainage at those points. Now that idea is not entirely new because when you look at the -- well, back to Number Eleven, when you go to those old wells you will see that the pressure is -- the pressure line, Hyla, on Number Eleven. You see, the downhole pressure assumes a horizontal position, which is one characteristic of a reservoir of a well that has reached the highest pressure it can possibly get in that reservoir.

The logical conclusion comes then, if

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that's the highest pressure and then you haven't been able to do anything for it in the ten years that you produced the well, that's what we call a limited, a bounded, or whatever terms you wish to use, it's not covering the acreage, 320.

There is here room for infill drilling. Yes, sir.

Q Okay. Now I turn to -- I turn your attention to what has been marked for identification as Exhibits Thirteen, Fourteen, and Fifteen, and ask you now to explain how these exhibits also support your conclusion that the drilling of infill wells will result in recovery of substantial additional gas reserves.

A I will start on Twelve, Thirteen, Fourteen, just one second.

Mind that in the Number Eleven that big pressures have been reached. You might say the turning point in pressures has been reached in less than ten hours. I think seven or eight hours is where the curve turns over and becomes practically horizontal.

Now go to Eleven, Twelve, and Thirteen, those are the Huerfano wells on which good pressure build-ups were available, and I mean by good pressure build-ups El Paso has had permission to shut the well in, and some were shut in for two or three years, you know, to get the

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data that are shown here.

And mind you, in the first two wells, Twelve and Thirteen, it took the well almost two years -- no, it took the well a year before it reached its maximum pressure, and because the well had been producing for some time. The producing time is given -- is written up in the bottom.

How long did they produce that well? I can't read it from here.

MS. KRISS: 390 days.

A. 390 days, and it took them another 390 days, I think, to come to its maximum pressure.

I shouldn't ask this question because it was in here if I just turn over.

Yes. The well had been producing 188 days, that's on Number Thirteen, and it took 390 days before it came to a maximum pressure. After that it varied a little bit, but it did not add any more pressure.

That's 117, or Exhibit Thirteen.

Fourteen, unfortunately 121 is the next one. Is that the excellent well?

MALE VOICE: Yes.

A. And there they accuse each other of losing the beginning, but after 349 days the well had reached its maximum pressure and it's also at about 1750 to

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1500 pounds.

Q That's Exhibit Fifteen.

A Okay, okay, okay. I take it at Fifteen because I've got two numbers and don't know which one to believe.

Q Okay.

A Okay, this is Fifteen. Then I have Fourteen, then, which shows build-up time -- the well which has produced 190 days and takes 708 days before he nullifies whatever he has taken out in the 190 days, and after that they shut him in another 400 days, or better than a year, and he doesn't add any pressure to it.

But here we have three wells that in themselves also show that we're talking about limited reservoirs present even in the best part of the field. Mind you, that one has only that little thing in it, you know. That's number two in the -- I think that's number -- the second best well in the field.

Q Okay. I think now we could go to Exhibit Sixteen and I'd ask you to explain what that exhibit shows.

A Let me say first, Exhibit Sixteen, the simplest way of explaining it, it is a summary of Exhibit Four, the printout. The printout gives us the total cumulative -- the total gas to be expected from every one of the 2500 wells.

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Sixteen shows in the bottom simply the well number from 100 to 2500, you see. Vertically above it we have given the total gas that's expected from the well. So it shows, it starts from 11.4 and then goes to 10, and then dives under 10, and it goes down to 100-million cubic feet. There we stopped it.

There are some more wells who are not expected to produce a 100-million cubic feet, but we -- the graph stops at 100-million cubic feet.

If you integrate, then the size of the well, and the number, of course, you come to the 5-trillion cubic feet that we expect ultimately out of it.

It is one representation of the variety that exists in the field, because a man would say, well, if I have 15-trillion cubic feet; I expect 2-trillion; do you expect 2-trillion per well. Do you expect 2-trillion per well out of every well that's being infill drilled?

Well, this graph shows you you shouldn't. There are some wells -- if a well is drilled within a billion cubic feet ultimate, you get another well with a billion cubic feet ultimate, but if you have -- you drill a well between wells of 5-billion cubic feet, you don't -- you are just too darned optimistic to expect 5-billion.

So we have used graph 16 to determine how much ultimate can be expected from the infill drilling pro-

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gram.

Now, that graph we cut in three parts. We said, well, it looks as if nobody is going to drill anything that will only give him 400-million. Some people may do it but we said, huh-uh, 500-million is the limit we take. If you don't have 500-million you are not supposed to infill drill it. If some want to risk their money, that's their business, but I'm not going to say that it's profitable.

The cost of 500-million we come up along the curve up to a total of 3-billion over that range. Wells within that range, I expect you could probably do as good as the already existing well, you see, but when you go above 3-billion, then we just cut it off. We said the best you can do is 3-billion from an intermediate well.

And the net result is that the first -- the best group of wells will give you a total additional of 1.2-billion.

The second group, and there are in that group, there are 1700 wells, they will give you an additional 3.2-trillion.

And then the third group, from 500 down, that's only a small amount, but they will give you nothing.

Is that sufficient, sir?

Q Right. I think, I just need to point out

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to the Commission that the graph on the wall has two "X's" marked on the curve which the hand-outs don't have. These were just put in recently, and obviously the point, in accordance with Mr. Van's testimony, is that he did not in making his calculations compute the best wells in the reservoir. He used a 3-billion gas in place cutoff, and continued it, and then -- recoverable gas in place, and then on the down side of the scale there's another "X" where he, after 500-million, used a cutoff point, too.

So, I'll just make that observation.

A. We could add here, you know, if you're interested, when you have some wells in the field, just find out what number you are on the list that you have, or that is available from El Paso, and you find out which number or where are the people that are larger than or which are the wells smaller than. Then you'll fit into this graph.

It is really a summary of --

Q. Exhibit Four.

A. -- Exhibit Four.

Q. And as everyone knows Exhibit Four is the computer printout, starting with the best well in the field to the worst well in the field.

A. Yes. You can, if you want to find out where a 2-billion well -- 2-billion cubic feet well fill in, simply make a horizontal line through the 2-billion mark on

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the vertical axis. You see there are given -- the axis is given -- so you start on 100-million, 200, 300, 400, up to 1000-million. Then you to to 10-billion again, so you take a horizontal line and then the vertical line downward and there you are, or vice versa, if you want to be number 412, 412, you come up vertically, go horizontal until you intersect; go horizontally and you'll know how big number 412 is.

Q Okay. Now, Mr. Van, in your opinion what is the amount of additional recoverable gas that will be realized by infill drilling the Basin-Dakota Gas Pool?

A Well, this question I think I answered. Maybe I talked too fast and I'll answer it again.

Q Okay.

A Here we have 4 to 4-1/2-trillion cubic feet on the basis as shown.

Q In your opinion will it be possible under the infill program for a producer to develop additional reserves, and in this connection I turn your attention to what has been marked as Exhibit Seventeen.

A Well, Seventeen is a payout schedule for an infill well, and I was told that the initial cost for a well varied a little bit from Two Eighty-five, Two Eighty-six, to Two Sixty-five, depending on whether your talking about the east or the west side of the field.

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It cost a little bit -- it cost another $6,000 to prepare it; $200 was given as an operating cost. And at the price of gas of $2.00, which is apparently the NGPA price, uncorrected for quality and uncorrected for fluids that may come along, fluids are not present everywhere, you can then say, now, depending on how good a well I get, do I get 100,000, do I get 200,000 allowable, or 300,000 allowable per day, depending on that allowable and the cost figures given, the payouts are at most 57 months and at least -- that's the highest figure -- and they could come down to less than a year and a half.

And I think our figures are, as I say, conservative because I have heard that quality and liquid may obtain, please, the $2.00 to as high as $2.40.

Q. Very good. Do you have an opinion as to how the performance in the Basin-Dakota will compare to that which has been experienced in the Mesaverde, and in this connection I turn the Commission's attention to Exhibit Eighteen.

A. Do I have an opinion? Sounds somewhat contrary, you know. We have here in the Basin-Dakota a formation which is definitely tighter than our friends in the Mesaverde, you know, but for infill drilling a tight formation is better, because the tighter the formation, the more you can expect out of it -- additional you can expect

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out of it as a percentage basis.

But to show you what has been accomplished in the past, Number Sixteen, that's him, Number Sixteen is a graph of all wells from the Blanco-Mesaverde which produced as of one month, 1975. That's the yellow rate of production on the graph.

And then the blue wells give you the additional production obtained to date from those wells that were infills.

And as you can see without any further explanation on my part, the production is rising for the first time. For years it has been coming down; it goes down even on the infill wells, but the total production of the field now is coming up, and I think the latest figures show that there's forty percent of all gas of Blanco-Mesaverde coming from infill wells, which are now almost 650 at the end of 1978, 650 have been drilled I think out of a total of, I think, 2500, but that I'm not sure.

Q This, I think you misspoke, Mr. Van. It's Exhibit Eighteen, not Sixteen, that we're talking about.

A Yeah, Exhibit Eighteen, you're right. Did I? Oh, well, excuse me.

Q Okay. In your opinion is it necessary to drill an infill well in the Basin-Dakota Gas Pool in order to efficiently and effectively drain the proration unit?

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A. Very much so. There is gas in this pool and -- or in this formation. The gas that you get by an infill well is gas you will not see at all, never mind how long you wait for it, you know. You'll get the 5-trillion, no doubt about that; you may even get 5-1/2-trillion; but you do not get those 4-trillion I said here, I have mentioned here, because a well is not capable of draining past the 160-acres. You couldn't do it in 320 in ten years, so I am afraid that he cannot do 160 in the time that you can make some money out of it.

Q. In your opinion will the granting of this application be in the interest of the prevention of waste and protection of correlative rights?

A. Yes, sir.

Q. Were Exhibits Three through Eighteen prepared by you or under your supervision?

A. Oh, yes. Yes, sir.

MR. LOPEZ: At this time I'd like to introduce -- or will introduce Exhibits Three through Eighteen.

MR. RAMEY: Exhibits Three through Eighteen will be admitted.

MR. LOPEZ: This concludes our direct.

MR. RAMEY: Okay. We're going to take a fifteen minute recess.

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(Thereupon a recess was taken.)

MR. RAMEY: Are there any questions of Mr. Van Everdingen?

MR. BYRD: Mr. Chairman, I just have a couple questions.

MR. RAMEY: Mr. Byrd.

CROSS EXAMINATION

BY MR. BYRD:

Q Mr. Van, am I correct from your study that you've concluded that one well will not drain more than 160 acres?

A Yes.

Q So that if the Commission approved the infill drilling program as proposed, the second well should recover as much gas as the original well, is that right?

A Yes, sir, but here I make some reservations, you know, going to drill a well next to an 11-billion well, because there you may not get more than -- I have put it, after talking to myself a long time, at 3-billion.

MR. BYRD: Thank you.

MR. RAMEY: Any other questions of the witness? Mr. Arnold?

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CROSS EXAMINATION

BY MR. ARNOLD:

Q Mr. Van, you may have said what the average well reserve was in the field by your study on 160-acre spacing. I didn't get it.

A Now, total reserve as it is now, the total, now I talk reserve, the term is a bit loose, you know, the total ultimate, as it exists now, if 5 or 5.5, if you consider the few locations that still can be drilled without infill drilling, you know, and there you have from 2-billion to 2.2-billion ultimate. Now, the reserve is a different story; simply you deduct what you have, you see, and in the future you have 4.4, you get 5-trillion more from infill drilling.

Now, does that answer the question? That is ultimate production, not necessarily -- well, the infill drilling is all reserves as yet, you know.

Q What would that give you as the total ultimate recoverable reserve on 160-acre spacing?

A Well, my graph, Number Eighteen, on that last graph, you know, it depends on where you want to sit on the acreage. There are wells that will not make but 100-million, the lowest one we show there. When you drill in there, you get 100-million, and if you can make a little

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profit off 100-million, you can drill a lot of wells, because he does drain only a limited amount. He is real tight.

The question that, I think that Mr. Chairman asked, 80 acres later, you know, well how do you know; I don't know. I haven't seen enough data on it, but it is possible it has to be considered 25 years from now, 20 years from now. It's possible that we can still get better when we have more wells, more experience, more data.

Makes me think about something. All of the wells that I came across, it's possible from dry data to make a map of it like this. Now I notice that you do not allow to make open flows any more, which is good. I mean that saves the gas. I think it's from you here somewhere. But the well had shut in pressures that are given there, are very, very informative, you know, and you can do a lot with it.

As to logging, we are talking about such mediocre stuff. Excuse me for saying it that way. It's stuff that's sandy all through, you know, and I have been hopped upon by the El Paso people because it's limited. The sand is not so much limited, it is the permeability which is varying a little bit and it varies just slightly and you have nothing left, you know. To me it looks -- assume that you have a lot of -- that you have a square

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mile in the original base, of sand of same calibre. That is just wishful thinking. Can you imagine that there's a sand exists or a sea exists in which all the sand will be 10 feet thick and of exactly the same calibre, or exactly the same grain size, and that the rivers that will bring in that sand never flooded; all of this? Why that is just not in the cards.

I have been instrumental for keeping on in computing work so that we could figure out the water influx, and if you can't compute the water influx, by the way, you don't ever get a water influx here, don't you worry. I mean that is too darned tight to have any water coming in, and you get the first water when you come to the Morrow, but upon the sides, no, sir.

You have to get it out, out of the energy as it sits in the reservoir.

That stuff can be, well, depending how fast it varied, the permeability goes from, let us say, 1 - 2/10ths to something that you can hardly drain, and you need all this sand and it doesn't matter how low a permeability in order to get all the gas there is, and you need it.

So you have to frac your holes, make the best completion you can, in order to come up to the figures we have given. They may be exceeded; I wish we were here

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to look at it, but that's a long time yet. It comes out slow.

I made a promise one time. I promised -- I think it was you -- I promised I make an estimate as to what the pressure is if I take 100,000 cubic feet of gas and how much is the pressure drop at 160 acres. No go. You cannot get 100,000 cubic feet of gas out of 1/10th of a millidarcy unless you make it very, very thick and you get a pressure drop at 160 acres in 10 years.

That thing does not work. That gas equation does not work under the conditions existing here.

You know, I quite often try to explain why, look, that gas is so expandable, and you know how expandable it is, you open a valve and it only has to expand a little bit, it drops out, you know. It does not really have to flow. No, that thing has to go work itself into the formation for a long time, and then you have two systems working for you, one with a low pressure, and one with a high pressure, and Lord, I'm not clever enough to solve it, and whoever says they can solve it, well, it's not on my conscience.

No, I -- this is -- this is such tight formation that unless you do something for it you don't get the gas that's in it.

Now, have I confused you enough?

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A Well, using whatever economic cutoffs you were using, did you come up with a total reserve to be added in the pool by going to --

A Yes, it -- I would put them now at 4-1/2 billion. And to make life simple, I would give them the total of 10-trillion for the whole pool, that's the total ultimate production.

Q Okay. Thank you.

A By the way, when I talked about this, it was my point, you have to drill 2500 wells in the field. There are still 100 more to come. But on my graph for infill drilling we used 2120 and there entered the 500-million or less, and I've already been told of people who would gladly drill a 500-million cubic feet well.

So you can add a few more wells to my 2120 that we mentioned there.

Q Do you think there will be that many infill wells drilled eventually?

A Oh, yes, very much so. Someone's got to do it. I beg your pardon?

Q You do have a deliverability point after awhile where maybe it won't be economic.

A Well, how much does it cost to add one more well or to keep them on, you know, and then the question is, it's not the total or average, it's the question

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how much can I save by taking them off, you know, and I was told that it comes -- the pressure is to go down to 50 pounds and the cost is appreciably less than the $200 I have used, appreciably less, but I was told to stay away from cost because it might not sit well, so I didn't go into detail there.

Q. Did you use a deliverability cutoff on a well and --

A. No, we have used -- no, we have not used deliverability cutoffs. We have used, for the graph over there, which consists of 2100 wells, I think a last figure of 7-million cubic feet of gas per day with all the wells as exist now, if they go down on the percentage decline, there's about 7-million. Now, that's in 2040. By that time I bet the price is not going to be any longer $2.00. It's going to be somewhat more, but anyhow, that's the figure we have used now; on the basis of $2.00, 7-million per day. That means operating the field, roughly, 7-million, that would be $14,000, see, which you can save by shutting down --

Q. You didn't mean 7-million a day.

A. Oh, yes, you have a look at that, 2500 wells at 7-million.

Q. Total field, that would be total field.

A. Yes, sir, total field. That is less than

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the 100,000, oh, yes, way less than the 100,000. 2700 into 7-million, that's about 140 -- 14,000 cubic feet per day per well.

Q Okay.

MR. RAMEY: Mr. Hutter?

CROSS EXAMINATION

BY MR. HUTTER:

Q Mr. Van Everdingen, looking at your Exhibit Number Twelve, it would appear that the early wellhead shut-in pressures were something in the neighborhood of 26, 27, 2800 pounds.

A Yes, sir.

Q Would that be representative of original wellhead shut-in pressure?

A Yes. I was told, the graph is not here but we -- did we bring one graph?

We had the initial wellhead pressures per township but had not separated on it per well, and we finally decided to leave it out. The initial wellhead pressures can go, I think, as high as 2800; slightly higher on the east side; 2400 on the west side of the field. As a matter of fact, that you are talking about not one sand but various sand and they vary under different conditions.

You also have the variation in gasoline

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content. I mean how much gasoline do you get, or liquid do you get, and in some cases, even oil do you get, but it's only in parts of the field; other parts I saw there was never a mention of any liquid content.

Q Well then, if we had an original bottom -- an original wellhead shut-in pressure of 24 on the west and 28 on the east, why do we have here on Exhibit Number Eight, this graph of cumulative production, when you have zero production you only have a wellhead shut-in pressure on it of 1500 pounds on that one?

A Well, these are the wellhead pressures. These are the pressures measured for the rules and regulations of the 7-day shutin. They were measured once a year, so you have a year of production; in seven days there's no way that you ever get anything representing the average for the reservoir. It gives you a figure, which if you accumulate it over a year, is long enough, it helps you out in determining where you're going, but it's not representative of the actual pressure in that reservoir.

Q In other words, this is only a 7-day buildup.

A Oh, yes.

Q And one of your other exhibits showed a 790-day buildup.

A That's right, that's what you needed to

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come back to the pressure as it existed after you have produced for a year.

Q Well now, in determining that the production would decline here in the year 2042 to 7-million Mcf per day --

A Is it 7-million Mcf per day?

Q -- 7-million cubic feet.

A Oh, that's different. 7-million --

Q Is this taking it to an economic limit or is this taking it to some reservoir abandonment pressure?

A We took, if I remember properly, less than 50 pounds. It's some econonic limit, yes, vaguely now, because it's so far in the future there won't be any around to ask me about it.

Q Well now, where does Exhibit Eight stop? When you have a wellhead pressure here of approximately 700 pounds, the cumulative production is less than 3-trillion.

A Yes, sir.

Q And yet our Exhibit Number Four shows that we already have more than 3-trillion cubic feet. So when was the cutoff point for Exhibit Number Eight?

A We have it at about 5-trillion cubic feet, and it is at 100 pounds or slightly better, because now we are talking about a 7-day shutin pressure, you know, which is -- you should tell the wellhead shutin pressure --

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Q Well, isn't this what we have already achieved on Exhibit Eight?

A So far we have achieved 2. -- this thing ends probably in the year '77, because it's no longer required to put in every year to measure wellhead shutin pressure. I think they vary from every other year, you see.

Q Okay.

A And that --

Q In other words, Exhibit Eight is not up to date as far as total production and decline of pressure.

A No, it gives you all the pressures that were correct, you know, and there are some measurements by El Paso on a hundred wells and they differ materially from what you see here. These are wells -- these are 1000's and more wells that goes into this average and it is just not correct to use a sample that somebody has on his own well that may not be the field over all.

So I had to leave a few figures for '79 -- '78 out.

Q Because you didn't have them, okay. Now, Exhibit Number Two, this --

A Yes, sir.

Q -- listing of the wells, Exhibit Number Four, I'm sorry.

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A. Yes, sir.

Q. The listing of the wells, was this prepared by your office or is this an El Paso --

A. This El Paso did. We have the same wells we have them -- these data are handy, available in the Dwight's yearly -- which are based on the figures you have -- you publish here, you know, you give out here.

Dwight's collects them and gives you a 10-year review in those data. Now that's the one we have used as a basis because right now it's '79, we have nine years of good data and Dwight's gives you the cumulative and they started in 1970, and on that basis, from Dwight's and from the graph you had, I had about, I would say, 70 to -- 70 to 80 percent of the wells that were given in Number Four, also individually worked up by DMN and confirmed with the percentages, are what they show.

Q. Okay --

A. But we have, if anyone doesn't want to take it, we have the map with us and I showed both figures, but I didn't want to show it.

Q. I presume you're acquainted with the El Paso -- with El Paso's Exhibit Number Four and know how it was derived.

A. Yes. They have wells, they have used pressures and the --

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Q. All right, and those original recoverable reserves and cumulative production and remaining reserves based on a production versus pressure decline?

A. Yes, sir.

Q. And what abandonment pressure was used in that calculation?

A. Well, they probably also used close to 500 -- close to 50 or 100 pounds. It's probably less than 50 because abandonment, you take a well in as long as you can, it doesn't cost you much -- it's very difficult to say what you should use. You can use and it's on an average -- well, I think -- where is my production man, what did you quote?

Where is the production from, you people?

A SPECTATOR: 112

MR. LOPEZ: 112.

A. Oh, they took 112.

Q. Okay. Now, Mr. Van Everdingen, assuming that the pool today has 4.9-trillion cubic feet of remaining reserves and another maybe 1/10th of a trillion for additional wells that would be drilled under today's spacing, would give us a total ultimate recoverable reserves of 5-trillion, I think you stated, is that correct?

A. Please, sir, tell me once more, because you used a term reserves. I think you mean we have recovered

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almost 5-trillion.

Q Yes, and I think --

A And there's 1.9 to come yet.

Q Right, so we have approximately 4.9-billion cubic feet of total recoverable reserves in the pool.

A Yes, sir.

Q Under today's spacing.

A Yes, sir.

Q And then I think you said that there were also some additional locations under today's spacing that had not been drilled --

A That's right.

Q -- and the drilling of those would bring the total recoverable reserves in the pool under today's spacing to approximately 5-trillion cubic feet.

A That, or even 5.5.

Q 5.5?

A Yes, sir.

Q Now you stated that you thought the additional drilling under the proposal here would recover another 4.5-trillion cubic feet?

A Yes, they allow me to take 5.5 and then this 4.5 come up, right you are.

Q Okay. I'm slow, Mr. Van Everdingen, and I didn't catch it. Would you explain why? Why we're going

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to get 4.5 additional billion cubic feet of gas from the infill drilling program?

A Because the wells, as I interpret the pressures, which is the best, to me has always been the most reliable source of information, if I interpret the pressures that have been measured correctly, they show that they do not -- that they do not pertain to what is in the -- in the oil business you use as an infinite reservoir.

You were talking about the limited drainage areas on practically all of the wells.

Q Is it exemplified, Mr. Van Everdingen, by your Exhibit Number Twelve?

A Yes, sir.

Q Where we have No. 212 that was drilled in 1978 right in the middle of a pattern of wells which had been drilled a number of years before, maybe ten years before --

A Not all, there are some five year wells; but to say on eight year wells, and then eight year wells, those surrounding wells, have not been capable to reduce the pressure at the location of 212 by a measurable -- to a measurable extent.

Q And No. 212 recovered what was almost virgin reservoir --

A Yes, sir.

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-- pressures?

A Yes, sir. Then I thought, well, that was fairly late, and then we made the map just behind you, that I think is Number Twelve, yeah, same map. It's right behind you on the wall. We found the same two -- we found two wells, 238 and 239, which showed the same picture, and I will bet you if I could take time off and make a map for the entire field, you will find that that phenomenon is not an isolated case; that you will find many more wells when they are drilled later than the surrounders, giving the initial pressure. You get more familiarity, but unfortunately, I was not clever enough to start on that way when the job came up.

Q Well now, digressing just a moment, Mr. Van Everdingen, do you remember in 1974 when you testified in Blanco-Mesaverde --

A Yes, sir.

Q -- case, what were the expected pressures in the undrilled 160-acre tracts supposed to be at that time?

A This problem did not arise. I do not know. I do not know. The one thing that, when that testimony came up, you know, for the first time we saw there buildups, I think they had a half a dozen, that lasted for two years and the wells were still going, you know. Now,

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I think the last one where there was, and I never thought about measuring pressures or giving instructions or requiring that the pressures be measured within 24 days, like you have here, WH, whatever you call them, wellhead shutin pressures upon completion.

That's what -- I could have done a better job on that.

Q. I was thinking we were expecting pressures some place in the nature of 75 percent of the original pressures --

A. Leave me out on account of age. I don't recall.

Q. I see.

MR. HUTTER: I believe that's all, thank you.

MR. RAMEY: Any other questions of the witness? He may be excused.

Do you have anything further, Mr. Lopez?

MR. LOPEZ: No, Mr. Chairman. That concludes our case.

(There followed a discussion off the record.)

MARLAN THOMPSON

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

DIRECT EXAMINATION

BY MR. CARR:

Q. Will you state your name and place of residence?

A. My name is Marlan Thompson. I live in Arlington, Texas.

Q. Mr. Thompson, by whom are you employed and in what capacity?

A. I work for Southland Royalty Company as a reservoir engineer.

Q. Mr. Thompson, have you previously testified before this Commission and had your credentials accepted and made a matter of record?

A. No, sir.

Q. Will you briefly review for the Commission your educational background and work experience?

A. I graduated from the University of Texas in 1963 with a Bachelor of Science degree in petroleum engineering.

I worked for Southland Royalty for the past year as a reservoir engineer. Most of the prior ex-

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positions, which totals about fifteen years, I spent with Texaco. About nine out of the fifteen years I worked as a reservoir engineer.

Q Are you familiar with the subject matter of this case and the Basin-Dakota pool?

A Yes, I am.

MR. CARR: Are the witness' qualifications acceptable?

MR. RAMEY: They are acceptable.

Q (Mr. Carr continuing.) Mr. Thompson, as a reservoir engineer does your area of responsibility include the San Juan Basin?

A Yes, sir.

Q How many wells does Southland operate in the San Juan Basin?

A About 600 in the San Juan Basin.

Q How many of these are in the Basin-Dakota?

A 172.

Q Will you please refer to what has been marked for identification as Southland Royalty Company's Exhibit Number One and explain to the Commission what it is and what it shows?

A Exhibit Number One is a comparison of pressures between recently drilled wells and older offset wells. Not only is the -- the initial shutin pressure is

shown on both the original -- or both the new and the original well, and also a current or recent shutin pressure on the older wells.

There are six -- six groups of wells that show this pressure comparison, and these wells cover six different townships in the San Juan Basin.

The first four are in the Aztec area and the other two are in the Jicarilla Reservation area.

Looking at -- looking at the first comparison, would be Southland Royalty's Culpepper-Martin No. 17, showing that this well is located in Section 33 of 17 North, 12 West. This well was completed in October of '78; had initial shutin wellhead pressure -- this is a 7-day shutin pressure -- of 1583 pounds.

The offsetting Culpepper-Martin No. 3 Well, drilled in 1966, May of 1966, had initial shutin pressure of 1578.

The new well, Culpepper-Martin 17, the pressure is five pounds higher in the new well than in the older offset well.

Referring to a recent shutin wellhead pressure in the offset well, this number is 780 pounds, which is considerably lower than the -- than the shutin pressure in the recently drilled well, this pressure being 1583 pounds.

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The other five groups of wells have similar comparisons. As you can see, three out of the six, the new well has higher pressures than the older wells, while three have somewhat lower pressures than the older wells.

Another case, the recent, or what we might call a current shutin wellhead pressure was considerably lower than the shutin pressure in the new wells. All those new wells were drilled in 1978 or '79.

Q Mr. Thompson, what conclusion do you draw from this exhibit?

A I concluded that from this exhibit, that a well will not drain 320 acres. This pressure -- these pressure comparisons, those small differences in pressure in these newer wells compared to the older wells, indicates that one well will not drain a full 320 acres.

Q Do you have a recommendation to make to the Commission in this case?

A Yes. My recommendation is that the infill program, infill Dakota program, as proposed by El Paso be adopted.

Q Mr. Thompson, do you believe that granting the application of El Paso will result in recovery of gas which otherwise would be left in place?

A Yes, I do.

MR. CARR: At this time we would offer

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Southland Royalty Company Exhibit Number One.

MR. RAMEY: Southland Royalty Exhibit Number One will be admitted in evidence.

MR. CARR: I have nothing further on direct.

MR. RAMEY: Are there any questions of the witness? Mr. Arnold?

CROSS EXAMINATION

BY MR. ARNOLD:

Q Mr. Thompson, you're not necessarily saying that you think four out of five of the infill wells you're going to drill are going to have a higher pressure than the first well drilled?

A No, sir. I'd say they'ld be very nearly the same. I'd say that no drainage had occurred in that particular area.

Q In fact, if the new well got higher pressure than the old well, must indicate something other than drainage area.

A There is some small differences. This could be some inaccuracy in measurement. They are only a small amount higher than the older well. I think that's probably measurement inaccuracy, measurement conditions. I'd say they're essentially the same.

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MR. RAMEY: Any other questions of the witness?

MR. VAN EVERDINGEN: I would like to know has he shutin the wells, new wells, for how long and how long were they produced before being shut in.

A The initial wellhead pressures are 7-day shutin pressures, and the wells had produced only a very short time, the production during the initial testing operation.

Now, the recent shutin wellhead pressures, the wells have been producing a long time.

In fact from the completion date in -- in the case of Culpepper-Martin No. 3, it was completed in 1966, and this recent shutin wellhead pressure was taken in '77.

MR. RAMEY: Any other questions of the witness?

MR. STAMETS: Mr. Ramey.

MR. RAMEY: Mr. Stamets.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Thompson, these initial shutin pressures, were those taken after a period of flow? What I'm trying to determine is how close are these to a reservoir

pressure, or how close are they to actual shutin pressures?

A. They are taken after a period of flow. They are not -- they're all taken on the same basis. We presented the comparison and do not represent them as being the initial reservoir pressures.

Q. So they're not stable?

A. They're not fully built up, no, sir.

Q. So you really don't know whether or not, if they were allowed to stabilize, whether the new tests would show decrease in pressure or increase in pressure?

A. No, sir, they're all taken under the same conditions, so I think when -- when -- I think you can compare them and say that the reservoir conditions are the same.

They're all taken after a flow period and after a shutin -- shutin period, 7-day shutin period.

MR. STAMETS: That's all.

MR. RAMEY: Any other questions of the witness? He may be excused.

MR. CARR: We have nothing further.

MR. RAMEY: Mr. Ryan, would there be some where we could stop in about ten or fifteen minutes?

MR. RYAN: What I was thinking, Mr. Chairman, if we wanted to -- I have some preliminary remarks to make, and if you wanted to do that, I mean I need to qualify

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the witness, and we might do that in advance of the lunch hour.

MR. RAMEY: Okay, let's --

MR. RYAN: Then during the lunch break we can put our exhibits on the board and then we can have those.

L. E. NEIBERGER

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

DIRECT EXAMINATION

BY MR. RYAN:

Q As sort of a preliminary statement, I'd like to fill in the Commission a little bit about what Amoco's position is in this hearing, and what we purport to show with an expert witness and some exhibits.

Amoco is a major operator in this field. We operate 356 wells and have an interest in an additional 382 wells.

Our net production for December, 1978 was 44-million cubic feet of gas per day.

To the present time, the end of 1978, Amoco's share of the gas has been 777 Bcf, which represents about 22 percent, or 21 percent, of the field.

Amoco is supporting El Paso's application

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to infill drilling, so that the nation needs the gas and the gas is there, and it will not be produced by the existing wells.

In arriving at this, Amoco had done an extensive study, which was presented by Mr. Neiberger in preparation for this hearing. He did an independent study apart from El Paso's study, to arrive at whether Amoco wanted to participate and recommend an infill drilling program.

That study, in anticipation of that, how much money we were going to spend and what we were going to do, we anticipate if this application is granted, that over the next decade we'll drill in the neighborhood of 350 wells, so we really anticipate doing infill drilling in practically all -- practically all of our locations, and that will cost at present figures, in excess of $100-million, or we estimate $115-million at the present time.

We do plan to get into the program of drilling as soon as possible if the application is granted, and start certainly next year operating four or five rigs if they're available and during the first part of the 1980's do a great part of our drilling.

Part of the situation that prompted this study that we did was because of the results that we feel that we've had from the Mesaverde infill drilling program.

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Our original forecast in that -- in that program was we thought we would recover an additional .85 Bcf per well and we've recovered far exceeding that by over 1-billion cubic feet of gas.

We expect, as our figures will show in the study, that we anticipate that we will get far better results out of the -- out of the Dakota infill drilling program.

I think our conclusion is that we'll get over 2-billion with the additional wells, and of course, depending on frac techniques, we can even get greater than that.

I would say at this point that the field rules proposed by El Paso, we have no objection to them. We would recommend that those rules be adopted.

I do have one witness and I'd like to qualify him at this time.

Would you please state your name, by whom you're employed, and in what capacity?

A. My name is Lance Neiberger. I'm employed with Amoco Production as a Senior Petroleum Engineer.

Q. First of all, would you spell your last name?

A. N-E-I-B-E-R-G-E-R.

Q. And would you speak up loudly where all

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can here you?

Have you ever testified before this Commission?

A. No.

Q. Would you briefly state your qualifications first as to education and then as to work experience?

A. I graduated from the University of Colorado in December of 1974 with a Bachelor of Science in civil engineering. January of 1975 I began work with Amoco Production as a production engineer in the Casper, Wyoming office. Approximately a year and ten months later I was transferred into Denver as a reservoir engineer and worked there for a little over two years.

For the last six months I've been transferred back up to Casper, Wyoming and an engineering supervisor.

I am registered in the State of Colorado as a professional engineer.

Q. During the two years that you were in the Denver office working as a reservoir engineer, was the area that's the subject of this application within your jurisdiction?

A. Yes, sir.

Q. And did you work closely with the BAsin-Dakota Field?

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A Yes, sir.

Q And in your reservoir study, did you do an extensive study of the field for reservoir purposes?

A Yes, I did.

Q And did you compile this field study? That was done by you?

A Yes.

Q And that's an extensive reservoir study of the field?

A Yes, it is.

Q And did you do that to estimate reserves and to -- to see the feasibility of an infill drilling program within that field?

A Yes, I did.

Q And the results of that study, do you have them complete?

A Yes.

Q And in preparation for this hearing have you prepared certain exhibits that you are -- are going to introduce in this hearing related with this field and your study?

A Yes, I have.

MR. RYAN: May he be qualified as an expert witness?

MR. RAMEY: Yes, we'll consider him to be

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qualified.

And with that, let's recess until 1:30.

(Thereupon the noon recess was taken.)

MR. RAMEY: Mr. Ryan, you may continue.

MR. RYAN: Yes. I might explain as a preliminary matter that I think everyone -- we've put the exhibits, we've got a whole stack of them there, there are two stacks of exhibits. The first one is a map marked as Exhibit One. The second one is a packet of exhibits. This contains a total of six exhibits, two of which are multiple page, but I stamped the first page of each exhibit with the official stamp so that will give you an indication of how they are numbered and we'll go through them individually.

Q (Mr. Ryan continuing.) Mr. Neiberger, you are still sworn and did you prepare certain exhibits in this cause?

A Yes, I did.

Q Would you please refer to what the reporter has marked as Exhibit Number One, and I'll ask you to identify that exhibit and explain it, please.

A Exhibit Number One is a map of the Basin-Dakota Field. For the general purposes the wells on here are all BAsin-Dakota wells. This line across the top is a border between Colorado and New Mexico and the town of

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Farmington lies approximately here.

A few things I'll be talking about later on I'd like to point out at this time.

The green dots shown in here are wells on which we ran pressure buildup tests for study.

The small red dots are areas on which I studied in order to condense my study instead of studying all of our Amoco wells in the field. I broke it down into a two township area to our main study area, Township 29 North, Range 12 West, and Township 30 North, Range 12 West.

In addition to this two township area there are model wells in each of the other areas as shown by the red dots.

In addition there are two red arrows on the map. These arrows indicate locations which simulate infill drillings. I'll explain later.

Q. Now, on Exhibit One, that basically shows all of the wells that have been drilled to date in this formation?

A. Yes, it does.

Q. Is there anything else on Exhibit One at this time?

A. I don't believe so.

Q. Now, you've indicated that you have

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done a study, a complete study in your opinion, on this field in preparation for this hearing?

A. Yes, I have.

Q. Are you prepared at this time to go through a step by step version of some of the things that you did in the study?

A. Yes, I am.

Q. And are those shown by the exhibits?

A. Yes, they are.

Q. Can we now look at what the reporter has marked as Exhibit Number Two. Is that a four-page exhibit?

A. Yes, it is. Exhibit Number Two is four pages. These are material/balance graphs on the four subject wells on which we are --

Q. Would you identify what wells they are by which dots they are on Exhibit One.

A. These are the green dots on Exhibit One. These wells are the Pan American Gas Com. "B" No. 1, Section 31, Township 30 North, Range 11 West; Sullivan Gas Com. "D" No. 1, Section 26, Township 29 North, 11 West; the Gallegos Canyon Unit No. 173, Section 29, Township 29 North, Range 12 West; and the L.C. Kelly No. 1, Section 5, Township 30 North, Range 12 West.

Q. Now, let's look first at Page 1 of Exhibit Two, and I will ask that you state what went into that

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exhibit.

A. This exhibit, as I stated earlier, is a material/balance prediction for the well. The real data I wanted to show with the use of the exhibit was the fact, that was mentioned earlier by Mr. Van Everdingen, that pressure data, true static pressure of a reservoir, is not measured acurately by the seven-day test as required by the State. The three or four circled areas begin with a previous State seven-day deliverability BHP/Z points. All of the triangles were data that were gathered from our pressure buildup tests. The tests range in length from twenty-four days to fifty-six days and a method of extrapolating to a static reservoir pressure was used. The bottom triangle in each case is the pressure that was measured the seven-day period so as to correlate with the State test.

The next triangle up was the pressure as it was last measured on each well and I might say here that the pressure was increasing on each well as the bombs were pulled. The highest pressure there, the highest triangle, is the extrapolated static reservoir pressure on this well.

These four buildup surveys were run in order to try and get a correlation between the seven-day deliverability test and the static reservoir pressure.

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Because of fracture effected data on all wells accept for this Pan American Gas Com. "B" only a conservative estimate of reservoir pressure could be obtained. In other words the fracture data had effected the mathematical methods of obtaining the true reservoir pressure.

Because only one well yielded the results I was looking for, I considered this method for my study and my determination for gas in place as not conclusive.

Q. Now, pages 2, 3, and 4 of Exhibit Number Two are similar graphs for those individual wells?

A. Yes, they are.

Q. And what did you conclude on this study that you did on these wells?

A. I concluded that I could not use this method throughout my report to determine gas in place --

Q. On a field wide basis?

A. -- on a field wide basis.

Q. Did you at that time think it would be necessary to consider another method of calculating gas in place on a field wide basis?

A. Yes, I did.

Q. And what method was that?

A. I went to a computerized mathematical model which was developed by a Mr. Carter of Amoco's

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Tulsa Research Center especially for extremely tight gas reservoirs.

Q. Do you feel that that was necessary step? That the information that you gained from the wells on Exhibit Two would indicate that the reservoir was tight and that it was necessary to go to another method?

A. Yes, I do.

Q. Is Exhibit Three, marked by the reporter, some of the factors that were considered in the gas reservoir model?

A. Yes, these are.

Q. Could you give us a little background on the model and what went into that.

A. Okay. Through a computer analysis of log and core data certain formation characteristics were determined. These characteristics were all -- well, the net pay, water saturation, porosity under the input data. In order to run the model all of the input data and the variables were put into the computer. The computer by matching a point in time cumulative at this point in time and a producing rate at this point in time, all three factors gave future performance predictions or performance predictions. They gave rate versus time predictions, production -- cumulative production versus time and a reservoir pressure versus time. By changing the

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variables a match was then obtained on each well after probably an average of thirty to forty runs per well, which actually overlaid the actual production of the well.

Q. How many wells did you use in the study?

A. I used seventy-eight wells of which they were all in these study areas, as previously mentioned.

Q. So you took the seventy-eight wells and used the input data that you indicated on Exhibit Three to arrive a situation that is comparable to that well?

A. Yes, I did.

Q. And then is that the method that you used to project future reserves?

A. Yes, this method gives a rate versus time history and so it can actually be used not only to match actual production but to project future production.

Q. Has Amoco used this method in the past?

A. Amoco has used this method very successfully in the past.

Q. Have they been pleased with the results?

A. We have been very pleased.

Q. Is there anything else you wish to indicate on Exhibit Number Three?

A. I do not believe so.

Q. Now, what has been marked as Exhibit Number

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Four, are those individual wells that follow through with the study you talked about on Exhibit Three?

A. Yes. Exhibit Number Four is a ten-page exhibit. These are actually model history matches of five wells. Each well has two pages. The first page being a rate versus time code. The actual production is shown along with the model production. The second page on each well shows little dots on there, those are the average productions for each year and the line that is drawn through those is the projection as made by a computerized model. By changing the parameters this model projection might lie anywhere on this page. However, until the reservoir formation characteristics are in a range which approximates the formation characteristics the model projection will not overlie the actual production.

Q. For example, if you look at page 1 of Exhibit Number Four could you indicate by the two symbols there of how you arrived at the model production versus the actual production.

A. Oh, the model production and the actual? Okay. The actual production is historical data on each of these wells. Each well had certain input data that were held constant by varying both the permeability of the well and the spacing pattern of the well. The model projection varied until these two parameters were found for this well

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that gave this overlying history match. I did not feel that I had formation characteristics that were reliable.

Q Now, page one of that exhibit indicates a comparison of the model production from the actual production, and page two then is the -- is the future estimate of reserves.

A Yes, it is.

Q Well, what's the spacing factor that is considered?

A Okay, originally the spacing was stated at 320 acres per well; however, as I said, it varied on each well once I got into matching wells.

The average drainage area for the wells that was modeled turned out to be approximately 195 acres, given a well life of 101 years.

Q Before we get into that next exhibit, are the remaining pages of Exhibit Number Four similar situations, just using different wells?

A Yes, they are.

Q Did you feel by -- by -- and these are, the five wells you've used and shown here on Exhibit Number Five, are they indicative of -- of the wells that you used in this study?

A Yes, these are typical wells used in the study.

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Q. It wasn't limited to the five, though. You did the study --

A. No.

Q. -- with seventy-eight wells.

A. We did the study with seventy-eight wells.

Q. And were the wells picked at various parts in the reservoir and in the field to give some sort of indication to what the total situation would be?

A. Yes,they are.

Q. And you feel that you have a pretty acurate study as far as this type of study is concerned?

A. I feel I do.

Q. Now, are the results of this study with the seventy-eight wells shown on what has been marked as Exhibit Five?

A. Yes, they are.

Q. Now, could you look at that exhibit and explain what that exhibit is?

A. Exhibit Five is a tabulation of the results of my modeled data. This is the data as determined for the average well of the seventy-eight as modeled. Barring no problems with corrosions or anything that would shorten the wells natural life the study indicated that the wells would actually produce up to one hundred one years. This average well would produce forty-eight percent of the

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three hundred twenty-acre gas in place and drain one hundred ninety-five acres. The average well would produce 4.2 BCF and with the present spacing one hundred twenty-five acres would be untouched by the present well.

Because of corrosion problems and Amoco has had a lot of problems with corrosion and had to abandon a number of wells. The purpose of my study -- I limit the well life to fifty years. With a fifty-year well life the average well presently producing with my seventy-eight would recover forty percent of the three hundred twenty acre gas in place, would drain one hundred sixty-thre acres, recover 3.5 BCF, and leave undrained one hundred fifty-seven acres.

If we were allowed to drill a second well with a one hundred one year well life my modeled data indicates that the average well would have 2.68 BCF additional recoverable reserves. Based on the fifty-year well life my model indicates 3.36 BCF per well additional recoverable reserves.

Because of the vast differences in a field this large I applied a seventy percent factor to take care of the differences which have not been obtained through the use of modeling different areas of the field. Applying the seventy percent to these previous numbers you come up with, for the one hundred one well life again,

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1.88 BCF of additional reserves. For the fifty-year well life 2.36 BCF of additional reserves.

Q. I have a couple of questions before you go on. Is it your opinion that you needed to get away from the one hundred one years because probably the well would not last that long as far as the casing is concerned and other factors --

A. That is right.

Q. -- and that fifty years is more realistic for the total life of the well.

A. The asterisk as shown on reserves will give us a range of additional reserves based on form drilling of the present system in Basin Dakota of 1.88 BCF per well. This model predicts that there is 4.6 TCF of additional recoverable reserves which could be obtained by infill drilling and 3.36 BCF per well that could be as much as 8.2 TCF additional recoverable reserves. This just shows the range by infill drilling the reserves would be increased, the whole field by at least 4.6 TCF and as much as 8.2 TCF.

Q. Now, when you apply the seventy percent factor to the second well, does that a conservative figure in your opinion?

A. Yes, I believe it is.

Q. And that is taking in the factors that you

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can't predict at this point.

A. Exactly.

Q. But even using that figure it is your prediction that the additional recovery from the infill drilling program will be 4.6 TCF additional recoverable reserves.

A. That's right.

Q. And you are talking about under that system 2.3 BCF additional reserves from a three hundred twenty-acre spacing as it now exists.

A. Yes, sir.

Q. Now, that would indicate that that is more than what is -- you've come to realize from the Mesaverde, is that correct?

A. Yes, it is.

Q. Is there anything else on that exhibit?

A. No, I think that is it.

Q. Now, in your opinion is the models that you have graphed to come up with these conclusions -- do you feel confident about that study?

A. Yes, I feel very confident about it. As I have said, we have used this method in numerous other tight gas reservoirs and we have gone back and double-checked the data years later and the data we have on reservoirs we've seen have predicted performance very good.

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Q. Now, did you do an additional study to simulate actual well conditions?

A. Yes. The modeling told us that we were not getting full drainage of the area so in order to further prove this we -- Amoco drilled two wells to simulate infill drilling.

Q. Now, are those wells and the results thereof shown on what the reporter has marked Exhibit Number Six?

A. Yes, they are.

Q. And that is a four-page exhibit.

A. Yes.

Q. And are the first -- pages one and three on the board there?

A. Pages one and three, yes.

Q. Why don't you explain what went into those pages of the exhibit.

A. The well that Amoco drilled here is the Federal Gas Com No. 4, Southeast quarter of Section 23, Township 29 North, Range 10 West. This is legal 320 location and the previous Amoco well here had been plugged and abandoned because of corrosion problems. The offset wells are shown here. The drainage radiuses calculated for these wells are the shaded areas encompassed by the circle. When drilling this well, because of the fact that the drainage radiuses had not reached into this area

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virgin pressure or pressure approaching virgin pressure was expected. On page 3 of the same exhibit we have the Lopez Gas Com No. 1, the Northwest quarter, Section 2, Township 29 North, Range 9 West. This well is on a undrilled tract. It was drilled basically between two of Amoco's wells again. We felt that this simulated an infill drilling location.

Q. Now, pages 2 and 4 of Exhibit Number Six, those are the pressure data?

A. Yes, they are.

Q. And how much time did you use in getting the pressure?

A. On the Federal Gas Com No. 4 one hundred fifty hours was used to obtain pressure. On the Lopez one hundred ten hours was used.

Q. And the pressure on page 2 of the exhibit for the Federal Gas Com No. 4 well, what was your final pressure at the end of one hundred fifty hours?

A. At the end of one hundred fifty hours we had 2,569 PSI.

Q. Now, does that seem to approach virgin pressure?

A. Yes, it does.

Q. Now, what about the other well, the Lopez?

A. The other well at the end of one hundred ten

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hours we reached 1,982 PSI, which again I feel approaches virgin reservoir pressure.

Q. That certainly is higher than existing pressure in the field of surrounding wells.

A. Yes, it is, quite a bit.

Q. So this exhibit by drilling those two wells, and those wells were drilled not as infill wells but actual unit wells.

A. Yes.

Q. As on page one of Exhibit Six, to fill in for a well that was plugged and abandoned, is that correct?

A Yes, sir, that is.

Q But it ended up on 160-acre pattern?

A Yes.

Q And your conclusion is that the -- you did reach approximate virgin pressure with those wells.

A Yes.

Q Now, going back just for a minute to -- to the conclusions of your modeled study, even though the wells in this field were -- if they were capable of being produced for over 100 years, you indicated that they wouldn't drain the entire 320-acre unit, is that correct?

A That is correct.

Q At the end of this study that you made do you have any recommendations to make?

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A. I would recommend infill drilling as proposed by El Paso. I believe that we cannot fully drain the reservoir without a second well.

Q. So in your opinion a second well in each 320-acre tract is necessary to efficiently and effectively drain the proration unit of 320 acres?

A. Yes, it is necessary.

Q. In your opinion if additional wells are not drilled in the 320-acre spacing, will certain amounts of gas be undrained from that 320-acre spacing unit?

A. Yes, sir, they will be left where they are.

Q. And will not be produced at all?

A. That's right.

Q. In your opinion would that be physical waste of gas?

A. Yes, it would be.

Q. In your opinion can a second well be drilled in each of these 320-acre spacing units without violating the correlative rights of offsetting operators?

A. They can.

Q. The second well will not drain beyond the drilling spacing unit.

A. No.

Q. In your opinion is the granting of this

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application in the best interest of conservation?

A. Yes, it is.

Q. Certainly the country needs the gas, don't they?

A. I think so.

Q. It would be good for the economy of the country and of New Mexico.

A. Yes.

Q. Certainly of the area around Farmington where this field is located.

A. Yes, it would.

Q. Were exhibits One through Six prepared by you or under your direct supervision?

A. Yes, they were.

MR. RYAN: I offer the exhibits into evidence at this time.

MR. RAMEY: Exhibits One through Six will be admitted

Do you have anything further, Mr. Ryan?

MR. RYAN: In my opening remarks I indicated that Amoco has a program of drilling additional wells. Is that your understanding that it is being planned in the next few years to drill in the neighborhood of three hundred fifty wells?

A. Yes.

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Q. And we are going to get really serious in this program?

A. Yes, Amoco is very serious about it.

Q. That is all I have

MR. RAMEY: Any questions of Mr. Neiberger? Mr. Nutter.

CROSS EXAMINATION

BY MR. NUTTER:

Q. Mr. Neiberger, as I understand it you used seventy-eight wells and then designed your computer program so that you get production versus time decline curve and then move that thing up and down until it fitted the actual decline curve.

A. Yes, by changing the variables the modeled prediction changes.

Q. And then based on that seventy-eight -- that was based on seventy-eight wells?

A. Yes.

Q. The results of the seventy-eight wells then are tabulated right here on Exhibit Five, is that it?

A. Yes, sir, that is the average of the seventy-eight wells.

Q. Now, are those seventy-eight wells good wells, bad wells, average wells, or what?

A. We took great lengths to try to obtain

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a good average over the field of wells. So they are good, bad, and medium wells in that average.

Q. Well, what were your average recoverable reserves for those seventy-eight wells?

A. I don't have that number off of the top of my head, but it would just simply be seventy-eight times the reserves as shown on here.

Q. Now, on Exhibit Five where you show recoverable reserves 4.2 BCF upon a 101-year basis, are those the recoverable reserves under the 195 acres?

A. Yes, sir.

Q. So that's not the full 320?

A. No, it is not.

Q. The total number of reserves under the 320-acre tract then would be the 4.2 plus the 2.68?

A. Yes.

Q. And was the 7 BCF then an average 320-acre tract?

A. A little over 6 BCF.

Q. It would be 7. Almost 7. 4.2 plus 2.7 is 6.9.

A. Oh, okay. Excuse me, I was looking at the wrong column. Yes, you are correct.

Q. Is 7 BCF typical of a Dakota well over there as far as the reserves under 320 acres?

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A. Well, based on the wells that I used, yes, they were.

Q. Based on your seventy-eight?

A. Based on my seventy-eight wells.

Q. Have you converted this additional reserve to be obtained under the 50-year or the 100-year program to the field as a whole so that we know what additional reserves we need for the entire field?

A. No. What I have done here is the asterisk as shown on Exhibit Number Five showed a range for the total field. In other words, using the lowest figure of the recoverable reserves for a second well of 1.88 BCF per well, I would say that at least 4.6 TCF could be recovered and using the highest number in those 4, 3.36 BCF per well, possibly as much as 8.2 TCF could be recovered.

Q. Now, the 8.2 is not based on seventy percent?

A. No, this is just a range.

Q. I believe that is all.

MR. RAMEY: Are there any other questions? You may be excused. Is there anything further, Mr. Ryan?

MR. RYAN: That is all of the testimony I have.

MR. RAMEY: Mr. Tully, do you have a

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witness?

MR. TULLY: No, sir, I would just like to make a statement for the record at the proper point in the procedure.

MR. RAMEY: I think we are ready for statements so you can start now, Mr. Tully.

MR. TULLY: Dugan Production Corp. wishes to state its support of El Paso Natural Gas Company's application for infill Dakota well. The approval of this application by the Division will provide an opportunity for natural gas operators to recover additional natural gas from the Dakota formation which would not be recovered from one Dakota well and the currently established 320-acre proration unit. Without wishing to cloud the issues presented to the Division by El Paso Natural Gas we wish to draw the Divisions attention to certain circumstances now existing for the Basin-Dakota Pool. We agree with El Paso's testimony that the existing Dakota Proration Unit should not be disturbed. However, there are situations where an operator may own the Dakota operating rights for only 160 acres.

We wish to submit for your consideration that this Division, in rendering its decision, provided for an administrative approval procedure for a Dakota well on a 160-acre proration unit, for a 320-acre Dakota proration

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unit does not presently exist.

Thank you for your consideration of the above comments. Respectfully submitted, Thomas A. Dugan, President.

MR. RAMEY: Mr. Carr, do you have anything?

MR. CARR: I have Mr. Morris, Vice President of Southland Royalty Company, who would like to make a statement.

MR. MORRIS: I would like to re-emphasize what our testimony was by Mr. Marlon Thompson. We are in support of El Paso's position to drill a second well on the 320-acre spacing in this pool.

MR. RAMEY: Thank you, Mr. Morris. Mr. Byrd do you have anything?

MR. BYRD: Mr. Chairman, no prepared statement, but we do want the record to reflect that the Mesa Petroleum does support the application .

My questions on cross examination of the witnesses were to point out some possible alternate language that you might consider in those two sections that I questioned.

MR. RAMEY: Thank you, Mr. Byrd.

Mr. Stogner?

MR. STOGNER: Yes, sir.

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I have a statement to read into the record. Consolidated Oil and Gas, Inc. concurs with El Paso Natural Gas Company's application to ammend Order R-1670 and R-1670-C to permit the optional drilling and production of an additional well on roration units in the Basin-Dakota gas pool of San Juan and Rio Arriba Counties, New Mexico, and for the assignments of allowables for such additional wells and proration units.

Consolidated is currently operating 69 wells in the Basin-Dakota pool and has been operating gas wells in the San Juan Basin for over 20 years. Based on its experience with the Basin-Dakota formation, Consolidated has concluded that one well will not effectively and efficiently drain the existing 320-acre proration units and that the drilling of additional wells will be necessary in order to drain those portions of the proration units which can not be drained by the existing wells.

MR. RAMEY: Thank you, Mr. Stogner. Mr. Arora.

MR. ARORA: My name is Sudesh Arora. I am the Manager of Reserves and Evaluation of Supron Energy Corporation.

Supron Energy Corporation owns and operates a substantial number of gas wells producing from the Basin-Dakota gas pool of San Juan and Rio Arriba

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Counties, New Mexico. Each of these wells has been drilled on a 320-acre spacing unit in accordance with previously effective spacing rules of the Oil Conservation Commission pertaining to the Basin-Dakota gas pool.

Supron Energy Corporation has reviewed the pending application of El Paso Natural Gas Company in this case seeking an amendment of the existing spacing rules to permit the drilling of an additional infill Dakota well on each established 320-acre spacing unit. Our company concurs with the views expressed by El Paso Natural Gas Company with respect to the desirability and necessity of additional infill Dakota formation wells in the San Juan Basin and supports the application of El Paso Natural Gas Company in that regard.

MR. RAMEY: Thank you, Mr. Arora. Mr. Gibb.

MR. GIBB: Tenneco Oil Company recommends approval of the application for infill drilling presented by El Paso Natural Gas Company today.

We feel that the testimony presented, as well as our own studies, shows that infill drilling in the Basin-Dakota is necessary to efficiently and effectively drain the remaining reserves.

MR. RAMEY: Thank you, Mr. Gibb. Mr. Brown.

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REPORTER'S CERTIFICATE

I, SALLY WALTON BOYD, a Court Reporter, DO HEREBY CERTIFY that the foregoing and attached Transcript of Hearing before the Oil Conservation Division was reported by me; that said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability, knowledge, and skill, from my notes taken at the time of the hearing.

Sally W. Boyd, C.S.R.

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. _____ heard by me on _____ 19____;

_____, Examiner
Oil Conservation Division

MR. BROWN: Getty Oil Company wishes to go on record as supporting the application of El Paso Natural Gas Company for infill drilling in the Basin-Dakota pool in San Juan and Rio Arriba Counties, New Mexico.

MR. RAMEY: Anyone else have a statement?

Well, the Commission will take the case under advisement, and the Hearing is adjourned.

(Hearing adjourned.)

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