STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

25 September 1985

EXAMINER HEARING

IN THE MATTER OF:

Application of Kimbell Oil Company of Texas for Hardship Gas Well Classification, Rio Arriba County, New Mexico. CASE 8712

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Jeff Taylor
Attorney at Law
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

MR. STOGNER: We will now call Case Number 8712.

MR. TAYLOR: Application of Kimbell Oil Company of Texas for Hardship Gas Well Classification, Rio Arriba County, New Mexico.

MR. STOGNER: At the applicant's request, Case Number 8712 will be continued to the Examiner Hearing scheduled for October 23rd, 1985.

(Hearing concluded.)

C E R T I F I C A T E

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

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 8712, heard by me on 25 September 1985.

Oil Conservation Division, Examiner

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

23 October 1985

EXAMINER HEARING

IN THE MATTER OF:

Disposition of cases without testimony from the docket for 23 October 1985.

CASES 8777
8730, 8731
8733, 8711
8719, 8735
8736, 8737
8733, 8712
8721, 8689
8739, 8732

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Jeff Taylor
Legal Counsel to the Division
Oil Conservation Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

6 November 1985

EXAMINER HEARING

IN THE MATTER OF:

Application of Kimbell Oil Company of Texas for hardship gas well classification, Rio Arriba County, New Mexico. CASE 8712

BEFORE: David Catanach, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Jeff Taylor
Attorney at Law
Legal Counsel to the Division
Energy and Minerals Dept.
Santa Fe, New Mexico 87501

For the Applicant: Scott Hall
Attorney at Law
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P. O. Box 2208
Santa Fe, New Mexico 87501

I N D E X

E X H I B I T S

MR. CATANACH: Call Case 8712.

MR. TAYLOR: The application of Kimbell Oil Company of Texas for hardship gas well classification, Rio Arriba County, New Mexico.

MR. CATANACH: Are there appearances in this case?

MR. HALL: Mr. Examiner, my name is Scott Hall from the law firm of Campbell and Black, Santa Fe, on behalf of the applicant.

We have one witness this morning.

MR. CATANACH: Are there any other appearances in this case?

Will the witness stand and be sworn in, please?

(Witness sworn.)

SUE E. UMSHLER,

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

DIRECT EXAMINATION

BY MR. HALL:

Q For the record please state your name.

A Sue Umshler.

Q And where do you live?

A 1504 Camino Imparo, Northwest, Albuquerque, New Mexico.

Q How are you employed?

A I'm presently the President and Chief Engineer of Gulram, Incorporated, a consulting firm, and in this case we're engaged as a consultant to Kimbell Oil Company of Texas.

Q All right. I'm going to hand you what's been marked as Applicant's Exhibit One and ask you to identify that, please?

A This is a copy of my professional resume.

Q Ms. Umshler, have you previously testified before the Division?

A No, I have not.

Q If you'll refer to Exhibit One, would you please give us a brief summary of your background and qualifications?

A I received my Bachelor of Science degree from New Mexico Institute of Mining and Technology in 1975 and my Master of Science in civil engineering from UNM in 1979.

I've also attended various institutes in

petroleum engineering.

I'm a Registered Professional Engineer with the State of New Mexico, Number 7307.

I have worked for approximately nine years for the U. S. Geological Survey Conservation Division as a Petroleum Engineer or Supervisory Petroleum Engineer.

That organization became the Minerals Management Service and Bureau of Land Management by my title and official duties did not change.

And in 1975 -- excuse me, in 1985 I started my own consulting firm.

Q All right, Miss Umshler, are you familiar with the application in this case and the subject well?

A Yes.

MR. HALL: Mr. Examiner, at this time we tender the witness as a qualified expert.

MR. CATANACH: The witness is so qualified.

Q Miss Umshler, I'm going to hand you what's been marked as Applicant's Exhibit Two and I'd ask you to identify that, please.

A This is a copy of the various applications that have been filed in this particular request. It consists of three parts.

The first part is the administrative re-

quest which was filed with the NMOCD on August 20th, 1985, requesting that this well be allowed to produce for a limited period of time each month to remove water.

This was followed on August 30th, 1985, with the completion and filing of the form application itself, which was also filed with the Aztec Office.

And then this was supplemented by additional material and a request for temporary relief on September 10th, 1985, in Aztec, and September 12th, 1985, in Santa Fe.

Q And was the temporary relief granted?

A No, it was not. It was denied on 9-26-85.

Q All right. I'd ask you to refer to the plat contained in Exhibit Two, which is the last page, and if you would, please, identify the subject well on that plat.

A The subject well is the Salazar Well No. 4-E, which is located in the southeast quarter northwest quarter of Section 34, Township 25 North, 6 West.

Q In what pool is this well completed?

A The Basin Dakota.

Q And is this a prorated pool?

A Yes, it is.

Q What is the present status of the well?

A This well was over-produced by a volume of 317,158 MCF in June of 1985.

Q All right, what acreage is dedicated to the well?

A It's dedication is the north half of Section 34, Township 25 North, 6 West.

Q And is that a standard unit?

A Yes, this is standard.

Q All right. Looking at the plat again does it show the offsetting operators?

A Yes, the plat does.

Q All right, and has notice -- has notice been given to the offset operators?

A Yes, it has.

Q All right. This time I'll hand you what's been marked as Applicant's Exhibit Three and ask you to identify that, please.

A This is a set of copies of the notices that were sent. Two of them were sent by Kimbell Oil Company of Texas and two were sent by counsel to the offset operators and to the purchaser.

Q All right, and did the notice contain the minimal sustainable producing rate which you seek --

A Yes.

Q -- which you seek in the case?

A Yes, it contains that in the form application.

Q Okay, and what is that rate?

A The rate we're requesting is 13,550 MCF per month.

Q Could you explain to the Examiner how this rate was derived?

A The calculation of this minimum flow rate, which we feel is required to prevent damage, was performed by studying a pressure drop resulting from skin damage or formation damage to zero in the radial flow equation for gas.

The other data used in the formula are from the completion report and the June, 1985, pressure and flow tests. The results of this calculation are discussed in the engineering report, dated August 15th, 1985, which is a part of Exhibit Two and was submitted in the application originally.

Q All right, in your opinion will underground waste occur if production from this well is curtailed below the recommended producing rate?

A Yes. I believe that underground waste will occur.

Q And how will that occur?

A The Salazar 4-E was completed as a high

productive potential well. It was produced fully upon completion to remove the excess frac water immediately from the well (inaudible). This resulted in the overproduced status which cause the well to be shut in in June, 1985; however, this portion of the Basin Dakota Pool is subject to potential irreversible formation damage, or skin damage, caused by in situ water interaction with the clay constituents of the reservoir rock, reducing the permeability of the reservoir face in the wellbore.

The exact mechanism of damage is the subject of many studies but the effect, irretrievable loss of producable reserves, is consistently documented.

It has also been shown that workovers of damaged wells cannot completely recover the lost permeability and producability of these wells. The best cure of this type of damage is prevention and the preventative measure that we seek for this well is regular production at sufficient volumes to effectively remove the water.

This is our objective in our request for hardship well classification. By preventing irreversible damage to the well, we seek to prevent the underground waste of reserves.

To support our request we will be presenting an analysis of productive histories of four Dakota wells in the immediate offset spacing unit to the Salazar 4-

E. Our conclusion is that three of these wells have suffered formation damage which has resulted in premature abandonment of two of them. One of the wells has not been damaged because it has had regular production throughout its life with the longest shut-in time period of four months.

Q All right, at this time I'll hand you what's been marked as Exhibit Four and ask you to identify that, please.

A This package contains the analysis material for the four offsetting wells and a summary of the well history of the Salazar 4-E.

The first page on this exhibit is a plat that I've identified each of the subject wells I'll be discussing by a colored dot, and the first thing I would like to do is review the production history of the Salazar 4-E, which is the well in question and is the red dot on this plat.

The Salazar Well No. 4-E was completed on February 21st, 1984, with an initial potential of 4,98 MCF per day.

It began producing on May 12th, 1984, and was shut-in in June, 1985 being over-produced.

Pressure tests in 1984 and 1985, respectively, shut-in casing pressure of 1,337 and 1,332 psi, indicate that this well had not experienced irreversible form-

ation damage as of June of this year.

The cumulative production has been 586,993 MCF with an average production rate of 1,947 MCF per day and 4.5 barrels of water per day. The gas/water ratio is 2.17 barrels per 1000 MCF.

The complete production table and plot are part of the initial application. Using a BHP/z versus cumulative production plot and a volumetric analysis of the existing data results in estimated original gas in place of 3.95 to 4.45 BCF. Assuming 85 percent recovery we estimate recoverable reserves to be 3.35 to 3.78 BCF.

If this well remains shut-in until the overproduction is reduced to zero, estimated to be approximately 12 additional months, damage could occur and reserves would be lost. This well has already been shut-in for the longest time period of any of the offset wells we examined, considering that damage has apparently occurred with lost reserves in three of these offsets, our conclusion is that the Salazar 4-E will experience irreversible damage, if it has not already done so this month, and it will certainly have formation damage if it continues to be shut-in for the twelve month period.

Based upon this analysis we feel that this well and the other wells in this area should not even have a single month of total shut-in.

The next well I would like to examine is the Salazar No. 4. This is the green dot on Plat II.

This well was completed on October 23rd, 1958, with an initial potential of 2,878 MCF per day and was abandoned in 1983 with a cumulative production of 1.32 BCF.

This well is particularly interesting because it is the first well in the spacing unit to which the 4-E is dedicated as an infill well. One would expect a strong correlation between the production characteristics of the 4 and the 4-E.

The records available in the early life of this well indicate that it was allowed to produce a minimum of one to two days prolonged shut-in periods with only two months of total shut-in prior to 1965.

From 1965 to 1982 it had no months with a total shut-in. The production decline was sharp but not irregular.

In latter 1981 the well began to log off repeatedly and a swabbing unit was moved in. A swab test indicated that excessive water was coming into the wellbore, probably from a casing leak. The well was open but continually logged off during 1982 and '83. Production dropped dramatically from an average of 40.6 MCF per day in 1981 to 7 MCF per day in the 1982, and 1.14 MCF per day in 1983, and the zone was abandoned in March, 1983.

This well was lost because the water could not be effectively removed from the wellbore. A BHP/z versus cumulative plot analysis indicates that the gas in place for this well is 1.75 BCF, which results in recoverable reserves of 1.4875 BCF, assuming an 85 percent recovery. This well actually produced 1.3176 BCF. That means that we lost approximately .1699 BCF, or 11.4 percent of the potentially producable reserves from this well.

This analysis is followed by the plots, the decline curves, and the production table for this well.

The next well I'd like to examine is the Federal Well No. 3, the blue dot on the plat.

This well was completed on October 26th, 1963, in the northwest quarter southwest quarter Section 34. It had an initial potential of 6,152 MCF.

This well has shown erratic production since 1981 because of the irregular shut-in periods, but overall has experienced a normal decline. The longest total shut-in period for this well has been four months and that occurred in 1983, but in its early life it was never shut-in for more than one month.

In 1968 this well developed casing leaks and was repaired by squeeze cementing. A production packer was installed at 6,403 feet to keep the water separated from the Dakota formation if other leaks developed.

A decline curve analysis indicates that recovery has not yet been impaired for this well and that the preventative measures of 1968 and the regular production to date have been effective at preventing irreversible water damage to the producing zones.

The estimated gas in place is 8.5 BCF, which would be recoverable reserves of about 7.25, assuming 85 percent recovery.

The decline analysis shows that recoverable production should be about 17.78 BCF, so this well has not been damaged to date.

These analyses indicate that this well has not lost productive potential despite erratic production since 1981. Regularity of production during prolonged shut-in periods, which has occurred throughout the life of this well, adn the production packer, has prevented formation damage by effectively removing the water and separating it from the formation face.

This well demonstrates that regular production dictated by individual well characteristics during low demand periods and water removal from the wellbore can prevent irreversible formation damage and protect full potential of the well.

This analysis is also supplemented with the actual calculations and charts.

The next well I'd like to examine is the Federal Well No. 3-E, which is the black -- the brown dot on the plat.

This well was completed in June of 1980 in the northeast southeast quarter of Section 34. It had an initial potential of 2,227 MCF per day.

This well has experienced very erratic production with several four-month total shut-in periods. This appeared to have affected this well adversely as compared to the No. 3 with four-month shut-in periods, possibly because it is a new well, it is more sensitive to the extended shut-in period.

Comparing this well to the Salazar Well No. 4-E, which is also a new infill well, a four-month or greater shut-in period would be damaging, so the Salazar 4-E is on the verge of experiencing irreversible damage.

A BHP/z versus cumulative production analysis for this well indicates that gas in place is 1.1 BCF and this may be low because the pressure information for this well is limited at this time.

This would yield a .935 recoverable reserve with an 85 percent recovery.

The decline plot, which is also hampered by the erratic production, indicates that recovery will only be about .677 BCF. This means this well will have a pre-

dicted loss of .258 BCF, or 27.6 percent of its producable reserves. This would indicate that this well is not being produced for long enough periods at sufficient volumes on a regular basis to remove the water adequately.

And the last well that I'd like to examine is the Farming E Well No. 3-E, which is the yellow dot on the plat.

This well is located in the northwest quarter northwest quarter of Section 2, Township 24 North, Range 6 West. It was comleted in 1981 and the completion data was unavailable for analysis.

We had a single flow test reported on April of 1981, which indicated a flow rate of 11,720 MCF per day and a shut-in casing pressure of 1,445 psi.

This well only produced five months in 1981 and one month in 1982 before the zone was abandoned. It's cumulative production was 134,421 MCF, 1100 barrels of oil, and 20,000 barrels of water.

Obviously this well was severely water damaged and had to be prematurely abandoned. Based on the single pressure test and the slope of the BHP/z plot to the Federal Well No. 3, which is the closest infill well drilled about the same time, one may conclude that the gas in place for this well was hypothetically .95 BCF. With an 85 percent recovery, this means that producable reserves would

have been .8075 BCF. This results in a loss to this well of

The attached plat, which is a part of this exhibit, indicates that this well was surrounded by much higher potential wells and that there is no geologic reason why it was a poor quality well. The producing offsets have averaged recovery of 1.74 BCF at the close of 1983, and the two wells that are on the same geologic trend to the northwest produce an average of 2.75 BCF.

The Salazar 4-E Well, the well in question, which was drilled in 1984 after this well was abandoned, as we have seen also has a potential of 4.0 BCF and all of these offset wells are still producing; therefore this well had an excellent potential for production. There is no other apparent reason for the poor performance except irreversible damage caused by the water alteration of the reservoir rock.

This well also proves that water damage is possible and probably in this portion of the Basin Dakota Pool if the water cannot be effectively removed from the wellbore and will result in the premature abandonment of these damaged wells.

Q Miss Umshler, what reasonable and economic attempts have been made by the operator to try to remedy the water situation on the 4-E?

A Well, the initial attempt to protect this

well was to produce it fully to remove the excess frac water, and this would prevent foreign water intrusion into the producing zone.

Our current attempts have been directed toward establishing a minimum regular production rate, because this is the most econmic and effective method to remove the potentially damaging formation water. This well has not been damaged in June of 1985 so no workover of completion equipment were necessary or justified. Prevention by production, which is our goal, is the most cost effective method to protect the reserves of this well.

Q All right, if you would refer back to Exhibit Two again, I believe there's a wellbore sketch in there. Are there any mechanical conditions that might limit the ability of the operator to eliminate the problem without a hardship classification?

A Not at this time. This well is a standard Dakota completion and I do not know of any mechanical operation or equipment which would prevent potential damage to this well at this time. The damage will be caused by excessively long shut-in periods that will be inadequate removal of the formation water and only production can solve the problem at this time.

If the well remains shut-in and is damaged then corrective operations and equipment will be con-

sidered.

Q Now if the application for hardship classification is not granted for the 4-E, could it result in the premature abandonment of the well?

A Yes, I believe so, as evidenced by the Salazar Well No. 4 and the Farming E Well No. 3-E, as we just examined.

Q All right, and what are the reserves that would be lost if the application is not granted?

In that connection I'll show you what's been marked as Exhibit Five and ask you to identify that, please.

A Exhibit Five is a summary of the material that we just went over for the four wells that we examined. This summarizes the losses that each of the wells has actually suffered or are projected to suffer based upon the calculations I've done.

Based upon the results of these wells I projected the loss of reserves for the Salazar Well No. 4-E at varying percentages.

At 10 percent the loss to this well would be 335,000 MCF.

At 15 percent there would be 502,500 MCF.

And at 20 percent it would be 670,000 MCF of loss. I believe that this is the probably range of loss

to the Salazar 4-E based upon the results of the wells we analyzed, if the Salazar Well 4-E is to remain totally shut-in.

Q Now, Miss Umshler, in your opinion has Kimbell Oil Company acted in a responsible and prudent manner to eliminate the problems which will result from curtailing production from the subject well prior to requesting the hardship classification?

A Yes, I believe so.

Q And will the granting of this application prevent underground waste of natural gas?

A Yes.

Q Will the granting of the application be in the best interest of the conservation of gas?

A Yes.

Q Have all the offsetting operators been notified of this application the production rate sought?

A Yes, they have.

Q Okay. Were Exhibits One through Five prepared by you or through your direction and supervision?

A Yes, they were.

MR. HALL: Mr. Examiner, at this time we'd move the admission of Exhibits One through Five.

MR. CATANACH: Exhibits One

through Five will be admitted in evidence.

MR. HALL: And at this time this concludes our direct presentation.

QUESTIONS BY MR. CHAVEZ:

Q Miss Umshler, what is the current over-produced status of the well?

A I do not have the exact allowable figures but based on approximately 25,000 MCF as its allowable, and five months of shut-in, it's still overproduced by approximately 200 -- by approximately 100,000 MCF.

Q What is the average allowable for the month for this well?

A I do not have that information.

Q How did you calculate the time required for making up the over production without that information?

A That projection was given to us in June of 1985, that the well would be shut-in for eighteen months and that was given to us by other sources. The producer himself determined that and passed that information on to --

Q You referred to documentation that -- concerning formaton damage that had occurred to wells, I guess Dakota wells in the San Juan Basin.

What documentation are you referring to?

A Excuse me, I don't --

Q You said that the history of formation damage was documented.

A Oh, the --

Q What documentation are you --

A The documentation I was referring to was just the general literature on formation damage to wells that have clay constituents in the formation rock and have formation water associated with them.

Q Did you ask for permission to produce the well monthly under the proration rules that allow a well to produce up to 500 MCF a month?

A No, I do not believe we made that request.

Q You referred to a suspicion of a casing leak in the Well No. 4, the Salazar No. 4, and you said that there may have been water that came in from this casing leak.

A Yes.

Q Do you have an idea of where this water may have come from, what formation?

A No. No tests were run and I do not believe that the operator had any other information. I was privy to the entire well jacket and there was no information on where that water came from.

Q Could this well -- this water have caused

the formation damage?

A Certainly the water did cause the formation damage. Whatever its source, the fact that that water could not be removed was the damaging factor. That is our fear with the Salazar 4-E is that if formation water is left to accumulate on the well face that damage will occur even though it is not coming from some other intrusive force.

Q But if the water had been coming from a casing leak in the No. 4 it would have been foreign water to the Dakota formation, is that right?

A Yes, but then the Salazar 4 was never shut-in for an extended period of time, either, so there would not have been damage from that source.

But the Salazar 4 showed that water damage to the face can occur if that water is allowed to accumulate by any source.

Q Do other Dakota wells in this area appear to be approaching an 85 percent recovery rate?

A Yes, they do.

Q You said that in the Federal E No. 3-E Well on your Exhibit Number Four, I think it was, yes, had obviously been damaged by water, and that's not operated by Salazar, is it -- I'm sorry, by Kimbell?

A No, that was a Getty operated well and it has been recompleted.

Q Did you get any information from Getty as to their opinion why the wellbore had been damaged?

A No. I was unable to obtain any information about this Dakota completion. A lot of people have misplaced their records because the well only produced for six months and they didn't keep a lot of the information around.

The well had such a tremendous volume of water that was produced, it certainly had to be a situation where it was water damaged.

Q You said there was no geologic reason why the -- why the well was a poor producer. Did you examine any logs on the 3-E to determine if they'd -- if they'd been completed in the water productive interval of the Dakota?

A What I examined was a general geologic picture of the area and my conclusion was that the Basin Dakota reservoir potential for that was equivalent to the other wells based on that general report. I did not do any in depth geologic analysis of this well, and as I said, there was no apparent geologic reason why this well was a poor producer to me.

Q Did you do an analysis of the logs on the subject well, the Salazar 4-E, to determine whether or not it had been perforated or completed in a water bearing interval?

A No, I did not.

Q If that could be determined, let's say a lower interval or some intervals were water productive in that zone, wouldn't it be possible, to perhaps squeeze those intervals?

A If that were possible but I believe from the operator's report and the production history of the Salazar 4-E that it is not making an excessive amount of water as compared to other Dakota wells in the area. So I do not believe that they've even considered that possibility.

Q Have you looked to see whether the non-water productive Dakota wells in the area have not been perforated in a zone that the Salazar 4-D is perforated?

A The analysis that I conducted showed that most of the wells in this area in the Dakota completions do produce some water. I did not examine non-water producing wells.

Q You said that the Salazar 4-E had been produced at a high rate to prevent foreign water intrusion.

A Initially.

Q Foreign water, what would be foreign water to you?

A The initial -- the initial activity was to remove any excessive frac water that may have still been in the wellbore.

Q So not necessarily remove foreign water.

A Just to remove the frac water.

Q The water that would be causing the problem, then, would be water from the Dakota formation, itself.

A Right.

Q Why over time has not this water already damaged the formation?

A The problem that we're dealing here with is a reduction of the permeability at the well face. It's not the formation is being damaged internally to the formation, but that when you have penetrated the formation and created a new face the water can accumulate there and reduce the permeability of the gas to the wellbore right at the face of the well. It only occurs within the first few feet of the well itself. That's why the shut-in of the -- shut-in nature of the well causes the water accumulation to occur at that well face.

In situ or formation water can be damaging because it does alter the ionic characteristic of the clay constituents at that face. It doesn't have an impact very far radially from the wellbore itself.

Q If that's the case, then why doesn't the workover reduce that, say an acid job or a re-frac that would penetrate through the face?

A The reports that I read indicate that you

can get some recovery re-established but you'd never be able to get 100 percent; that no matter what type of operation or mechanical device, you are only able to re-establish up to about 85 percent of the original permeability after damage has occurred.

Those are the results of tests on wells across the country and I don't know of any specific test that has been done in this area.

Q One of the main bases that you use for determining there may be damage is the radial flow equation on your Exhibit Two.

A Uh-huh.

Q Where did you get the figures for -- that you used as the variables in this equation?

A Most of them came from the completion report or the June, 1985, deliverability forecast for this well.

Q Okay, then original gas in place calculated cubic feet, where did that figure come from?

A I conducted a BHP/z versus cumulative production analysis based on the pressure points that I had. Of course that's limited because we only have two pressure points, but it was a fairly conservative line and it was also analogous to slopes of other BHP/z analyses for wells in the area.

Q And porosity?

A Porosity was -- the porosity -- I don't know if we needed porosity in the calculation. No, it was not a factor in the calculation.

Q In calculating the original gas in place, though, you did not go through the plot of porosities, water saturation, and use those in your BHP/z plots?

A No. I simply did a gas pressure and production.

Q Did you compare that with the equation shown on Exhibit Two to determine if water saturation levels might change the original gas in place computation?

A The BHP/z analysis is independent of water saturations and no, I did not do any comparative work.

Q Wouldn't such a comparison perhaps confirm or deny the water saturations that you seem to be experiencing?

A Well, in both of these equations the attempt is to determine what the pressure and producability impact are. The radial flow equation is an attempt to determine what the pressure drop would be if formation damage had occurred. The pressure drop is the final result of damage because as your pressures decrease, your producability is reduced.

Therefore the analysis is aimed at those

factors which would influence that pressure and that pres sure drop. Water saturation does not enter into that equa tion, however.

Q The radius flow equation is generally set up to predict producability of the wells, is it not?

A That's correct.

Q Has it been determined that the equation can be altered to actually predict damage that may occur or change in the permeability calculations?

A Since damage is a factor in that equation, if the other variables are known, yes, I think it would be an effective pool for predicting what potential damage might be.

Q In your experience with the Dakota formation have you experienced production through fractures that occur in the Dakota formation?

A I don't really understand the question.

Q In looking at the history of the Dakota formation there is some indication that the Dakota will not produce unless there are natural fractures.

Have you come across that?

A In a general sense probably, but I did not use that in this specific analysis.

Q If -- if this high productivity of the well could be attributed to natural fracturing, would not

that change some of the variables in the rate of flow equation, such as effect of wellbore radius and other variables?

A It depends upon what -- how far you're reaching out. This equation is designed simply to analyze the effect of what's going on right around the wellbore, and that's an altered environment that is not consistent with what the general characteristics of the formation might be. So what you're trying to examine is what the altered environment at the wellbore is experiencing and how it is being impacted by the various things that are occurring there, such as the well being drilled itself will have an influence on the characteristics of the reservoir at that particular location.

Q How did you derive at the porosity and other variables used in the reservoir equation?

A Well, porosity is not a variable in the equation. Most of the material came from the completion report and the pressure test from the well in June of 1985.

The only general assumed factor was the permeability, which I used the general reservoir permeability average as it was reported in the literature.

Q What literature is this now?

A The Four Corners Geological Analysis. This material is referenced in the engineering report as a reference as a source of information for these calculations.

MR. CHAVEZ: I have no more questions at this time.

CROSS EXAMINATION

BY MR. CATANACH:

Q Miss Umshler, has there ever been any kind of logoff test run on this well?

A Not since -- the last test was the June, 1985 pressure and deliverability test and we have not tested it since.

Q Has Kimbell Oil considered changing the mechanical configuration of the well to help relieve this situation?

A Not at this time. It was not -- since the well was not damaged there did not appear to be any reason to change the mechanical configuration and we know of no change that would prevent this damage from occurring at this time.

Q Couldn't the water be pumped off?

A Certainly, but you would have to be producing it to do that.

MR. CATANACH: I have no further questions.

MR. HALL: I have a couple of follow-up questions, if I might, Mr. Examiner.

REDIRECT EXAMINATION

BY MR. HALL:

Q Miss Umshler, are the calculations made by you an effective and reliable engineering method to ascertain probable or likely skin damage to a degree of certainty?

A Yes, I believe they are.

Q All right. In your opinion would it be prudent for an operator to wait until actual damage or waste occurred before submitting an application for a hardship order?

A No, I do not believe that that would be a prudent action.

MR. HALL: I have nothing further.

MR. PAUL BURCHELL: Mr. Examiner, my name is Paul Burchell. I'm with El Paso Natural Gas Company. We're the purchaser of the gas from this particular well in question.

I'd like to point out my company's position in this and it is that we're not too terribly fond of taking hardship gas. It interferes with the problem of ratable take on our system. it interferes with our flexibility in pipeline operation.

However. we do recognize in many cases that a hardship status should be granted certain wells, particularly if it's going to eventually end up in the ultimate loss of gas and underground waste.

So whatever the Commission decides in this particular matter, we're more than willing to take whatever volumes of gas you determine is necessary to keep this well from suffering damage.

At the present time we have this well shut in and if the Commission so desires, we will put this well back on production immediately, upon one phone call, if you think we should do that to give you time to weigh and ponder the evidence in this particular prayer.

Thank you.

MR. CATANACH: Thank you, Mr. Burchell.

Are there any other questions of the witness?

If not, she may be excused.

Is there anything further in Case 8712?

If not, it will be taken under advisement.

(Hearing concluded.)

C E R T I F I C A T E

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

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 8712, heard by me on November 6 19 85.

David Catanach, Examiner
Oil Conservation Division

NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING

SANTA FE, NEW MEXICO

Hearing Date NOVEMBER 6, 1985 Time: 8:00 A.M.

NAME	REPRESENTING	LOCATION
Joel Carson	Losee & Carson P.A.	Artesia
John Warren	Warren, Inc.	Albuquerque
Robert Lupe	Amerada Hess	Denver
Gregory Morton	Amerada Hess	Denver
Paul W. Benchell	Mobil Natural Gas Co	El Paso, TX
Grant L. Pattillo	Pattillo & Snyder	Santa Fe.
Sue E. Urnshlor	GULRAM, INC	Albuquerque
Paul Thompson	Northwest Pipeline	Farmington
Scott Hall	Campbell & Black	SF
Frank D. Chavez	OCD	Aztec
W. Thomas Kellahin	Monsanto Oil Co	Midland
Jason Kellahin	Kellahin & Kellahin	Santa Fe
Al Green	Benson Montin Greer	Farmington
Dan Nutter	Cons. Engr	Santa Fe