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

25 May 1988

EXAMINER HEARING

IN THE MATTER OF:

Application of Exxon Corporation for an unorthodox gas well location, down hole commingling, hydrocarbon storage authority and relief from the reporting requirements of Division General Rule 1131, Eddy County, New Mexico. CASE 9387

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

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I N D E X

E X H I B I T S

MR. STOGNER: We'll call next Case Number 9387.

MR. ROYBAL: Case 9387. Application of Exxon Corporation for an unorthodox gas well location, downhole commingling, hydrocarbon storage authority, and relief from reporting requirements of Division General Order 1131, Eddy County, New Mexico.

MR. STOGNER: Call for appearances in this case.

MR. BRUCE: Mr. Examiner, James G. Bruce of the Hinkle Law Firm in Santa Fe, New Mexico, representing the applicant in this matter. I have three witnesses.

MR. STOGNER: Are there any other appearances?

Will the witnesses please stand and be sworn?

(Witnesses sworn.)

GORDON A. JENNER,

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

DIRECT EXAMINATION

BY MR. BRUCE:

Q Mr. Jenner, would you please state your full name and city of residence?

A Gordon Allen Jenner. I'm a resident of Midland, Texas.

Q And who are you employed by and in what capacity?

A I am employed by Exxon Corporation as a Senior Geologist.

Q And have you previously testified before the OCD as a geologist and had your credentials accepted as a matter of record?

A I have.

Q And are you familiar with the geological matters involved in Case Number 9387?

A Yes, I am.

MR. BRUCE: Mr. Examiner, are the witness' credentials acceptable?

MR. STOGNER: Mr. Jenner is so qualified.

Q Mr. Jenner, would you please state what Exxon Corporation seeks in this case?

A Exxon Corporation requests an exception to OCD Rule No. 303-A to permit downhole commingling of pro-

duction from the Happy Valley Morrow Pool with production from the Sheep Draw Northeast Strawn Pool in Exxon's Happy Valley Fed Com No. 1, located in Unit G of the northern half of Section 28, Township 22 South, Range 26 East, Eddy County, New Mexico. Both pools, the Strawn and the Morrow, are nonprorated.

In addition, Exxon requests approval to use a small Strawn reservoir for hydrocrbon storage pursuant to Section 70-6-1 of the New Mexico statutes and also an exception from the reporting requirements of OCD Rule 1131.

Please note that advertisement in this case is incorrect for the following reasons:

First, the advertisement referred to Happy Valley B Fed Com No. 1, which is located in Unit K in the southern half of Section 20 -- 28 of Township 22 South, Range 26 East.

As I indicated, the proper location is Unit G in the northern half of Section 28.

Also, the well location given in the advertisement, 1471 feet from the south line and 1908 feet from the west line of Section 28 is incorrect.

The correct location is 1780 feet from the north line and 1830 feet from the east line of the section.

Since Exxon has notified all offset oper-

ators with correct information, we request that the case be approved without the necessity of readvertising the case.

MR. STOGNER: We'll take about a three minute recess.

(Thereupon a recess was taken.)

MR. STOGNER: Mr. Jenner, the way I understand it, this is indeed your Happy Valley Federal Com Well No. 1 and not your Happy Valley B Federal Com No. 1, is that correct?

A That is correct.

MR. STOGNER: Okay, this we'll have to readvertise because of the location on it where the B Federal Well No. 1 is correct, except the wrong well was advertised.

A That is correct.

MR. STOGNER: So it will have to be readvertised, and the earliest we can get it on will be the 22nd of June.

Mr. Bruce, you still going to present testimony today?

MR. BRUCE: Yep. The application by Exxon did correctly describe the well and the unit and, as Mr. Jenner indicated, that was mailed to all offset

operators so they had correct notice of what was sought by Exxon. So I do not believe we need to renotify anyone.

MR. STOGNER: As far as renotification, then, I agree with you. When was this application sent in?

MR. BRUCE: It was filed on, I believe it was May 2nd.

MR. STOGNER: Was it called in or was it --

MR. BRUCE: I -- it was hand delivered. I hand delivered a copy of Exxon's letter to the OCD on -- it was a Monday. I believe it was May 2nd.

MR. STOGNER: Was it a letter dated May 3rd, 1988?

A It was dated May 2nd, 1988.

MR. BRUCE: It was hand delivered -- it was hand delivered May 3rd, 1988.

My letter to the OCD is dated May 3rd and it was hand delivered.

MR. STOGNER: On a Tuesday. Continue, Mr. Bruce.

Q Mr. Jenner, would you please refer to Exxon's Exhibit Number One and describe its contents?

A Exhibit Number One is a land plat which locates the Happy Valley Fed Com No. 1 Well in the northern

half of Section 28, a proration unit, Township 22 South, Range 26 East.

The unit is located approximately five miles southwest of the City of Carlsbad. Both the Strawn and the Morrow Pools in this unit are on 320-acre spacing and ownership of the Strawn and Morrow zones in this well is common.

The Happy Valley Fed Com No. 1 Well was originally permitted and drilled as a Morrow test and its unorthodox location was granted by Administrative Order NSL 20- -- or NSL-2010, dated March 22nd, 1985.

Also with regards to Section 70-6-1, the gas storage, we would like to note that the well is located in no known potash, and there are no injection wells offsetting the well.

Q Approximately how far is it from the potash area?

A It would be approximately about ten miles to the potash basin as recognized by the BLM.

Q Would you please refer to the cross section marked Exhibit Number Two and comment on its contents?

A If I may, I'll just stand up and can I direct you to Exhibit Two, which is taped up on the wall here.

Exhibit Two is a stratigraphic cross

section A-A' which runs from southwest to northeast and includes wells offsetting and the Happy Valley Fed Com No. 1.

The vertical scale here is 40 feet to an inch and the horizontal scale is irregular; that is, the wells are spaced equally and do not reflect the -- any type of horizontal scale on the cross section.

The cross section, I've said is one cross section. It's actually two. What I've done here is shown the Strawn formation from he top of the Strawn to the top of the Atoka. The datum here would be the top of the Atoka, and I've also shown the top of the Morrow formation down to and below the Lower Morrow Shale marker here.

The Atoka section has been left out so what you would essentially have is the Strawn, the Atoka left out, and then the Morrow.

The furthest well on the left to the southwest is operated by Exxon. It was drilled in late 1985. It's our EB State Com No. 1. The well was a Morrow test. It failed to prove productive; produced a little bit of water and some gas; set a bridge plug; came up and produced in some Strawn carbonates. The well is -- has not been a very good well and will probably only produce about 60-million cubic feet of gas.

The second well on here is the oldest well. It was drilled in the early seventies. It was dril-

led by C&K Petroleum. It's the West Airport Fed Com No. 1.

It DST'd an interval in the Strawn from 10,138 to 10,258, recovered a little bit of gas cut drilling fluid. It also DST'd in the Morrow, a section of Morrow sandstones and also recovered some gas cut drilling fluids. The well completed up in the Bone Spring formation and (unclear) 5.3-million a day.

The next well is the Happy Valley Fed Com No. B-1, which again is located in Section 28 to the south of Fed Com No. 1. It is also operated by Exxon.

This well encountered a sandstone in the Morrow formation beneath the Morrow Shale, and was perforated and is presently producing in the interval 11,516 to 11,550. And this is the well which we're here to discuss which we're here to discuss today, the Exxon Happy Valley Fed Com No. 1.

This well was drilled prior to the B-1. It was the first well we drilled in this area in here and it encountered a -- it was primarily an oil prospect but it encountered a clean section of Strawn carbonate, here colored blue, with good porosity, continued down and encountered the same sandstone that would later be encountered by the B-1. We offset, tried to offset this well with the B-1 both for the Strawn and the Morrow. It missed the Strawn objective but did get the Morrow objective.

We also tried to offset on the furthest well to the northeast, the Tomaine Well, located in the Section 27 of Township 22 South, Range 26 East. Again, the objectives here were the Strawn and the Morrow. We missed the Strawn again but did encounter this Morrow sand down below.

The porosity was largely gone in the Morrow. We did attempt a perforation down here and recovered largely water and a little bit of gas. We set a bridge plug and perforated some thinner Morrow sands in this interval here, and this well will probably be a fairly good well by (unclear) reserves.

The point of today's hearing is to perforate this -- well, when we completed this Strawn interval in here, we completed it prior to the Morrow. The Morrow has not been perforated yet. We completed this because we viewed it as a very potentially competitive pool. It was a new discovery, competitive pool, so we perforated the Upper Strawn first, the upper interval in the Strawn, and left this behind pipe and ran a bridge plug.

We would now like to go in, perforate the Morrow Sand down here, produce it up, store it during the winter season in the Strawn and produce at higher rates in the wintertime. The engineer will go through the production in the Strawn and the Morrow.

The Strawn currently is depleted. It's at line pressure. It turned out to be smaller than we originally estimated just based on the pressure drop, which the engineer will talk about.

As you can also see, it's not present in the two immediate offset wells and we have also run a seismic line over this area and which also indicates that the Strawn indeed is a limited size reservoir.

Q Mr. Jenner, in your opinion is the granting of this application in the interest of conservation, the prevention of waste, and the protection of correlative rights?

A It is.

Q And were Exhibits One and Two prepared by you or under your direction?

A Yes, they were.

MR. BRUCE: Mr. Examiner, I move the admission of Exhibits One and Two.

MR. STOGNER: Exhibits One and Two will be admitted into evidence.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Jenner, you stated in your testimony that you believe this Strawn interval in your Happy Valley

Federal Com Well No. 1 is a limited size.

Could you, or do you have enough evidence or enough seismic data to narrow it down to what size you actually think this limited --

A We could not see it on seismic, which would tend to be an indication that it is limited in size.

The second piece of evidence will be presented by the reservoir (sic), which is the pressure drop in the reservoir would tend to suggest a limited size reservoir.

And the third reason is the apparent lack, of continuity of the carbonate between the two immediate offset wells.

Q Has Exxon done any particular work inside the Happy Valley Federal Com No. 1, or proposes to do any work to maybe determine the actual volume that section actually holds?

A Yes, we have and the engineer will be explaining that in further detail shortly.

Q How would you describe this stringer that is in your Happy Valley in geological terms?

A In geological terms I would consider this, based on regional work that I have done in the area, to be a large, well, a thick, not large, a thick accumulation of carbonate that does not extend laterally a great

distance, horizontally a great distance.

It is probably a phyloid algal mound with leached porosity in it and, as I said again, the engineer will explain it. It's going to be limited. It is limited in size so it's essentially a -- just a large, vertical section of carbonate that does not extend out laterally in either direction very far.

Q And its porosity as you show it here on your log is 5 percent?

A We used a cutoff of 5 percent that's shaded in to show the porosity development there. It actually reaches up to as high as 14 or 15 percent porosity.

Q Okay. Now you show perforations on this particular Exhibit Number Two in the Strawn.

A Yes.

Q Are those the (unclear) that you plan to use or are you going to extend it out?

A Those are the perfs we plan to use.

Q Will this need any kind of a stimulation done to it, such as fracturing or any -- any further extensive stimulation?

A I do not anticipate any; not in our plans right now.

Q Okay. And you said the engineer would give us some volumetrics.

A Yes. He's got the calculated -- the -- based on what we estimate the oil in -- the gas in place to be, estimated the actual size of the reservoir.

Q Have you determined any kind of a fracture pressure or any kind of pressure or any kind of pressure that it would take to fracture this particular zone?

A No, we have not.

Q Will the engineer also be supplying us with some -- with some more detailed pressure data?

A Yes, he will be.

MR. STOGNER: Mr. Bruce, at least I'm fortunately going to have a little time before an order can be issued on this.

I would like to request, go ahead and request now a rough draft order.

I would also like to include his geological evaluation of this particular zone in that, if you would.

MR. BRUCE: Okay.

MR. STOGNER: I have no further questions of Mr. Jenner. Is there any other questions of this witness?

He may be excused for the time being.

LAWRENCE J. SOHANEY,

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

DIRECT EXAMINATION

BY MR. BRUCE:

A My name is Lawrence John Sohaney. I reside in Midland, Texas.

Q And what is your occupation and who is your employer?

A I work as a petroleum engineer for Exxon Corporation.

Q Have you previously testified before the OCD?

A No, I have not.

Q Would you please describe your educational and employment history?

A I graduated from Stanford University in 1976 with a Masters in mechanical engineering.

In 1976 I was hired by Exxon Corporation and went to work as a petroleum engineer in Houston, Texas.

From 1979 through 1984 I worked as a reservoir engineer primarily making studies and evaluations of fields in east Texas and the Gulf Coast area.

In 1984 I was transferred out to Midland, Texas, and for the following two years I continued my work as a reservoir engineer reviewing and evaluating fields in the Texas portion of the Permian Basin.

In 1986 my duties were switched and I assumed the responsibility for Exxon's operations in southeastern New Mexico.

Q And are you familiar with the engineering matters related to Case 9387?

A Yes, I am.

MR. BRUCE: Mr. Examiner, are the witness' credentials acceptable?

MR. STOGNER: Mr. Sohaney is so qualified.

Q Mr. Sohaney, would you please refer to Exhibit Number Three and describe its contents?

A Exhibit Number Three is entitled Monthly Production Tabulation. This is for the Happy Valley Fed Com No. 1 Well in the Sheep Strawn Northeast Pool.

What we've listed here is the monthly production since the well was put on production in August of 1987.

We have listed the monthly gas, condensate and water production, as well as the cumulative gas production at the end of each month.

The data for this tabulation was from the monthly statistical reports issued by the NMOCC, except for the month of August, which was not contained in that volume.

The production on this well began on August 11th, 1987, and during that month it produced 163,000, excuse me, 163,000 MCF of gas.

The well went on decline in November of 1987, and in February of 1988 it only produced 6639 MCF. It's on a very steep decline rate.

As a matter of fact, in January of 1988 the well actually ceased to produce when the reservoir pressure approximately equaled the sales line pressure. Later on in January the sales line pressure dropped and the well was able to resume a certain amount of production.

Q Would you please move on to Exhibit Number Four and discuss it?

A Exhibit Number Four is entitled P/z versus Cumulative Production on the Happy Valley Fed Com No. 1 in the Strawn reservoir.

What's shown on the Y axis is P/z in units of psia and on the X axis the cumulative gas production of the well.

The initial point shown on the Y axis was taken in July of 1985 when the well was initially completed. The initial measured pressure was 3693 psia.

The well was put on production approximately two years later and in December of 1987 the pressure was measured after a 5-day build-up and it was measured to be 1118 psia.

Drawing the line between the two points we're projecting original gas in place in the Strawn reservoir of approximately 890-million cubic feet of gas.

We've also shown on this plot a delta reserves with compression of 130-million standard cubic feet of gas. This represents the additional recovery that could be achieved from this reservoir if this well is put on production and it ceases to flow at 900 pounds.

The sales line is at approximately 900 pounds and when the reservoir pressure reaches approximately 900 pounds it will cease to produce.

If compression is installed on the well and the well could be produced down to 300 pounds reservoir abandonment pressure, then the additional 130-million cubic feet of gas could be produced; however, at this point in time it is not economically feasible to install compression on this well due to the current gas price market conditions.

Q If the application is not granted, would the -- in other words, what you're saying is the compression wouldn't be added for production from the Strawn zone itself.

A That's correct. If the -- if the application is not granted, the Strawn zone will probably be squeezed off. In such event, down the line it may or may not be possible to come back and recover those Strawn reserves that are left behind.

There's also the mechanical risk once the zone is squeezed off as to whether or not a good completion could be made again.

Q Would you please move on to Exhibit Number Five and discuss the proposed operations of the storage project?

A Exhibit Number Five is entitled Operating Schematic for the Happy Valley Fed Com No. 1 Well. The objective here is to show how we plan to operate this well if granted to the application.

First I'd like to direct your attention to the lefthand portion of the exhibit, which is entitled Recharging Operations.

We show there the wellbore with the Strawn reservoir, the shallower Strawn reservoir, and the deeper Morrow reservoir.

Recharging operations will take place whenever the well is shut in or curtailed. We expect that approximately 3.1-million a day of gas will flow out of the Morrow zone up into the Strawn reservoir and recharge the

small Strawn reservoir.

That is one, one extreme.

The other extreme would be maximum peaking operations shown on the righthand portion of the exhibit.

In this case the well would be produced wide open and we would produce approximately 3.1-million a day out of the Morrow together with approximately 10-million a day rate out of the Strawn for a combined total of 13-million cubic feet per day maximum peaking rate.

Q Would you please move on to Exhibit Six and discuss the proposed completion of the well.

A Exhibit Six is entitled Wellbore Sketch. Again this is of the Happy Valley Fed Com No. 1 Well.

The well was drilled to a TD of 11,846 foot and plugged back to 11,800 feet.

Currently the Strawn perfs from 10,294 to 10,338 feet are open and we propose no change for those perforations, as stated earlier.

What we will do to complete into the Morrow is first of all drop the Vann gun off the bottom of the tubing into the rathole, and then we will perforate the proposed Morrow interval with a through tubing -- with a through tubing gun. The two zones will then be open to one another. They will be able to cross flow between the two

and also to produce up the tubing to the surface.

I'd like to point out, too, that this well is cased with 5-inch 20.8 pound P-110 production casing, which has a calculated burst strength of 13,630 pounds.

There's also an intermediate string set to protect the Capitan Reef and also the shallow casing to protect shallow surface water.

Q Would you please move on to Exhibit Seven and discuss the production capabilities of the commingled well?

A Exhibit Seven is entitled Annual Production Capability plot. This is for the Happy Valley Fed Com No. 1. The intent here is to show how this well will probably produce with and without the proposed commingling and downhole storage.

By looking at the legend first of all, the thin, solid, black line represents production with commingling of the two zones.

The thin, dashed line represents production without the proposed commingling.

The solid, wide, black line represents the average yearly production with commingling, which we project to be about 2.8-million cubic feet per day, and the wide, dashed line represents the average yearly production without commingling of approximately 1.7-million cubic feet

per day.

And once again the Morrow capacity that we have calculated is about 3.1-million a day.

What we've plotted here on the Y axis is the estimated production rate in millions of cubic feet per day versus the month in a year.

We started in February and ended in January in this case and you'll see that it is a symmetrical plot about the mid-year point.

Let's look first of all at the production with commingling, which is the thin black line. Starting off in February we expect that the well might produce approximately 7-million a day average for the month. It will ramp down in the spring and reach a low point in the middle of the summer at approximately half a million a day rate.

Looking at the production without commingling, which is the thin dashed line, the well will produce at maximum capacity in February, which is estimated at 3.1-million cubic feet per day. Again this production will ramp down to a minimum in the summer months; however, as you can see by the average curves drawn across the plot, the wide, solid line and the wide, dashed line, you will sell considerably more gas on average with the commingling versus without the commingling.

Another point to be made by looking at

this plot is a higher percentage of the gas will be sold in the winter months and the price received for this gas is much higher than it is in the summer months.

Q Would you please move on to Exhibit Number Eight and discuss that exhibit?

A Exhibit Number Eight is entitled Morrow Equity Considerations. What we have at the top of this exhibit is an equation which represents the producing rate or the flow capacity of the well divided by the gas in place or the gas reserves of the well. It's simply the psuedo-steady state flow equation divided by the volumetric gas in place equation.

This whole equation can be simplified into terms of Kh over Phi-h times a constant, C1.

Kh again represents basically the millidarcy feet encountered in the well.

Phi-h, of course, is the porosity feet.

If we look under Item A on this exhibit, where we have listed data for the Happy Valley Fed Com B No. 1 Well, which is currently completed in the Morrow, that well has a calculated 92-1/2 millidarcy feet in the Morrow zone and it has approximately 1.94 porosity feet in the zone.

By comparison the Happy Valley Fed Com No. 1 has 53.2 millidarcy feet of flow capacity versus 1.91

porosity feet.

What this means basically is the two wells have about the same amount of gas in place; 1.94 porosity feet versus 1.91; however, the B-1 Well to the south, which is currently completed in the Morrow, has a much higher flow capacity currently than calculated for the No. 1 Well which we propose to complete into the Morrow, and in fact, if you take a ratio of the flow capacity divided by the gas in place between the two wells, you would come up with a factor of 1.72.

The bottom line as given by the prognosis there, is that basically the Happy Valley Fed Com No. 1 will more effectively capture its share of reserves and prevent drainage by the B-1 Well to the south if the No. 1 Well is allowed to produce at an average rate of approximately 1.7 times its expected noncommingled rate.

Q Thank you. Would you now discuss the production allocation formula on Exhibit Nine?

A Exhibit Number Nine is entitled Production Allocation Formula.

This is the formula that we propose for the Happy Valley Fed Com No. 1 after commingling.

First of all the gas allocation for the Happy Valley Morrow Pool, the calculated reserves are 3100 million standard cubic feet of gas and the calculated reser-

ves for the Sheep Draw Strawn Northeast Pool is 130-million standard cubic feet of gas. That 130-million standard cubic feet of gas was taken from Exhibit Number Four, which was the P/z plot we looked at earlier.

Those were the reserves that will eventually be gained by putting this well on compression.

This gives a total calculated reserves of 3230-million standard cubic feet of gas and we've allocated the gas between the two pools based on those reserve estimates.

As far as the condensate allocation is concerned, we propose allocating no condensate to the Happy Valley Morrow Pool.

The Happy Valley B-1 Well makes no condensate and the gas is dry.

On the other hand, the Sheep Draw Strawn Northeast Pool does make a little bit of condensate and we propose to allocate 100 percent of the condensate to that pool.

Q Would you please now discuss Exhibits Ten-A and Ten-B?

A Exhibits Ten-A and Ten-B are simply gas analyses of the two gases from the two separate pools.

Ten-A is from the Sheep Draw Strawn Northeast Pool from the Happy Valley Fed Com No. 1, and Ten-

B is a gas analysis on the Morrow gas from the Happy Valley Fed Com B No. 1 Well.

Basically both gas analyses are very similar. The specific gravity on the Strawn is approximately other hydrocarbons contained. Both analyses are very low in CO2.

Basically neither sample has any detectable H2S present. The gas from both zones is sold to the same purchaser. The purchase is based on BTU content and so there'll be no devaluation of gas value due to the commingling of these two zones.

Q Would you please now discuss the estimated size of the Strawn reservoir, and I refer you to Exhibit Eleven?

A Exhibit Eleven is entitled Size of Strawn Reservoir. This concerns the Happy Valley Fed Com No. 1 Well.

Shown at the top is a cross sectional view designed to depict the wellbore and the Strawn reservoir.

The average porosity of that Strawn reservoir is a little over ten percent with a height encountered, a net height encountered in the wellbore of 46 foot.

Using the original gas in place taken from the P/z plot, which is Exhibit Number Four, of 890-mil-

lion standard cubic feet, and equating it to the gas in place equation, one would calculate in the area of 22.3 acres of size for the Sheep Draw Strawn Northeast Pool.

Now assuming that the Happy Valley Fed Com No. 1 is in the center of that reservoir, and assuming that it is disc shaped with an area of 22.3 acres, the radius that one would calculate is 556 foot from the center of the wellbore.

Q In your opinion does this confirm the cross section, Exhibit Two, which showed a limited Strawn reservoir size?

A Yes, it does.

Q Will you please move on to exhibit Twelve and discuss its contents?

A Section 70-6-4 of the New Mexico Statutes sets forth the guidelines for hydrocarbon storage and this application meets those guidelines as are summarized on Exhibit Number Eleven.

First of all, the Strawn reservoir in this well is incapable of producing oil in paying quantities. This is a gas reservoir.

The Strawn reservoir was gas productive but is essentially depleted. Recovery of remaining gas reserves will not be diminished by the proposed storage operations. In fact, the proposed operations will actually in

crease the ultimate recovery.

There are no known commercial deposits of potash over the Strawn reservoir.

The proposed storage operations in the Strawn will not injure surface or underground water resources.

There are no other wells used for injection, storage, or withdrawal existing in the Strawn in the Strawn reservoir proposed for the storage operations.

And no appropriation of any property is proposed.

Q In your opinion is the Strawn reservoir suitable for storage of natural gas?

A In my opinion, it is.

Q Would you please give a project summary, and I refer you to Exhibit Thirteen?

A Exhibit Thirteen is entitled Project Summary.

It states very briefly and concisely the objective of the project and the reasons for the project.

The objective is to downhole commingle the Sheep Draw Strawn Northeast Pool with the Happy Valley Morrow Pool and to use the Strawn reservoir for hydrocarbon storage.

There are six main reasons for performing

this project.

First of all, the Sheep Draw Strawn Northeast Pool is essentially depleted. Commingling will eventually place the Strawn on compression with the Morrow and increase ultimate Strawn recovery by 130-million standard cubic feet of gas.

Secondly, the high peaking capacity will allow this well to better meet the swing demands by the purchaser and to make gas more readily available to the domestic, commercial and industrial consumers.

The project promotes the building of reserves in the summer for orderly withdrawal in periods of peak demand, which is the winter.

More gas will be sold during peak demand when prices are higher. This will result in a higher average sales price for the gas.

The fifth reqson is the Happy Valley Fed Com No. 1 Well would be better protected from drainage by the Happy Valley Fed Com B No. 1 Well, which is the offset Morrow well to the south.

And lastly, the added peaking capability will allow this well to produce at an average annual rate that is close to its Morrow capacity.

Q In your opinion will the granting of this application be in the interest of conservation, the preven-

tion of waste and the protection of correlative rights?

A Yes, I believe it meets all three objectives.

Q Were Exhibits Three through Thirteen prepared by you, under your direction, or compiled from company records?

A Yes, they were.

MR. BRUCE: Mr. Examiner, at this time I move the admission of Exhibits Three through Thirteen.

MR. STOGNER: Exhibits Three through Thirteen will be admitted into evidence at this time.

MR. BRUCE: Exhibits Fourteen and Fifteen are the notice and the certified return receipts mailed out to the offset operators and I would ask that they also be admitted.

MR. STOGNER: Exhibit Number Fourteen will be admitted into evidence.

CROSS EXAMINATION

BY MR. STOGNER:

Q Let's start with the notice first. Is all this Federal land that you propose to utilize this?

A Yes, it is.

Q And you are offset on all sides by Federal lands, is that correct?

A That is not quite correct. I believe the Happy Valley B Fed Com includes some State acreage.

Q That's the south half of 28, is that correct?

A That's correct.

Q And it looks like Section 32 is for purposes of today is also State acreage, is that correct?

A That is correct.

Q Now, to the best of your ability, as far as trying to find the extent of this reservoir, it's virtually impossible, isn't it? You know the volume of it but as far as its extent to the north, to the south, to the east or to the west, do you have any idea of its actual dimensions?

A We know the volume, as -- as we've stated. Looking at the offset wells, we know that to the south it does not extend to the B-1 No. 1 Well, and we also know that it does not extend to the east to the J. A. Tomaino Fed Com No. 1 Well.

Those are the two closest offsets.

Q Does your seismic data give you any kind of indication of how far north it may go?

MR. SOHANEY: The seismic data indicates that it's nonresolvable, which in turm would indi-

cate that it's a limited size.

Q So you don't know, either one of you doesn't know if it extends up to the ARCO or Amoco acreage to the north.

MR. SOHANEY: Where it -- how it lies within that proration unit or to the north, we do not know.

Q Have you been in verbal communication with ARCO or Amoco concerning this particular project? I know you've been in communication with them by letter because of your notification but have you talked to them verbally?

A Yes, we have. I believe Mr. Duncan has talked to them personally.

MR. STOGNER: Mr. Bruce, are you going to call Mr. Duncan to the stand?

MR. BRUCE: No, but it you want to hear what his conversation --

MR. STOGNER: Yeah, I'd like to hear. Let's swear him in. I'd like to get some issues like this resolved before we --

(Mr. Duncan sworn.)

WILLIAM T. DUNCAN,

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

DIRECT EXAMINATION

BY MR. STOGNER:

Q Would you please state your name and city of residence?

A My name is William T. Duncan, Jr. I reside in Midland, Texas.

Q And what is your occupation and who are you employed by?

A I'm a petroleum engineer, or a reservoir engineer employed by Exxon Corporation. I work in our Regulatory Affairs Group in the Southwestern Production Division.

Q And are you familiar with Exxon's application in Case Number 9387?

A Yes, I am.

Q And did you have conversations with Amoco regarding this case?

A Yes, I did.

Q Would you please describe those discussions?

A I discussed with Bruce Rowley (sic) of

Amoco in Houston on May 17th, 1988, the proposal. He called me after having received the mail notice and had questions about the proposal. We discussed it. He had no objections at that time; said that he would recommend that Exxon -- excuse me, that Amoco not oppose or appear at the -- at the hearing.

The -- two days later, excuse me, three days later, on May 20th. he called me. I was not in the office, I was at another hearing, but he talked to my supervisor and relayed to him, James Howell, that Amoco had no opposition to the downhole commingling application.

MR. STOGNER: What I'm leading up to, if Amoco or ARCO decided to drill a well at a standard location, they could do so at a 660 location from the side boundary and was there any kind of mention about that? Was that any kind of an agreement between Exxon and these two parties to the north, and -- or, would Exxon have any objection to them drilling a well at a standard location perhaps penetrating the Strawn formation?

A I doubt that we would have an objection to them drilling a well at a standard location because neither we nor Amoco even considered that the reservoir would extend that far to the north. The indications appear very unlikely that it could extend that significant a dis-

tance to the north.

As Mr. Jenner has previously noted, it's not encountered in any of the wells that offset this location either to the southeast or to the southwest, and as Mr. Sohaney has testified, the areal extent is very limited based upon the volume of the reservoir and the thickness of the reservoir as it was encountered in the subject well.

As a reservoir engineer I've also reviewed it and find it's very difficult to believe that it would extend very far to the north.

For my expert opinion I would not expect to see the reservoir encountered by a well drilled in Section 21.

MR. STOGNER: How about Section 22, while we're on the subject?

A Nor Section 22, especially by a standard location in Section 22.

MR. STOGNER: Okay.

A That would put it even farther away.

MR. STOGNER: Now, the acreage in 27 to the east, that is Exxon operated, is that correct?

A That's correct.

MR. STOGNER: Okay.

A The J. H. Tomaino Fed Com Well No. 1 is operated by Exxon.

MR. STOGNER: Okay. Those were the issues I wanted to clear up and he's answered them.

I have no further questions of Mr. Duncan.

Mr. Bruce, do you have any?

MR. BRUCE: No, I don't. Did you have any more questions of Mr. Sohaney?

A Excuse me, the return receipts have not been accepted as an exhibit. Should I verify those?

MR. BRUCE: Yeah.

MR. STOGNER: I thought we did but if we haven't, that's Exhibit Number Fourteen -- Fifteen?

A Fifteen, yes.

MR. STOGNER: Exhibit Fifteen will be admitted into evidence at this time.

Oh, yes, I do have some more questions for Mr. Sohaney.

LAWRENCE J. SOHANEY,

being recalled and remaining under oath, testified as follows, to-wit:

RECROSS EXAMINATION

BY MR. STOGNER:

Q Okay, in looking at your Exhibit Number Four, you propose at this time to produce from the Strawn formation until you hit line pressure, which is 900 pounds, is that correct.

A That is correct, and --

Q At which time you have a cumulative gas production out of there of about 700 MMCF.

A Right at approximately 700.

Q Okay. Thus leaving approximately 190 MMCF still in the Strawn reservoir?

A That is correct.

Q And if I understood your testimony correctly, if this is -- if this is approved and your (unclear) and you produce it the way you propose, that you will put a -- let me back up just a little bit, and you're going to produce the Morrow, when it gets down to an economic limit will there be a compressor put on it and do you propose to go down to a line pressure or a pressure of 300 psi?

A That's exactly what we're proposing, to utilize the compression to produce both zones down to the abandonment pressure of approximately 300 pounds rather than trying to get one zone currently down that far and then come

back later and reinstalling the compressor.

Q And that would be an additional 130 MMCF from the Strawn formation.

A That's correct.

Q And that's taken care of in your allocation formula of 4 percent being dedicated to the Strawn and 96 percent being allocated to the Morrow.

A That's correct.

Q With all of the condensate being dedicated to the Strawn, and based on your evidence there is no condensate production from the Morrow, is that correct?

A That is correct.

Q How about your water production? I do show some water production from your Strawn formation. Has there been any indication of water production either now or as you draw down in the Morrow formation?

A All these -- all these gas wells do produce water; however, it's fresh water. This is water condensation, where the water that is in the reservoir in a vapor state containing gas, upon bringing that gas to the surface and cooling it, you've having the water vapor fall out (not clearly understood) and so it is not production of formation water, it's really production of the water that is condensing out of the vapor stage.

Q Does that hold true for any water or

vapor that comes out of the Morrow?

A The same is true for the Morrow.

Q Is the Strawn formation water sensitive?

A The Strawn is not.

Q The Strawn is not, but the Morrow is, but as far as any kind of a back flow, that is not a problem as I read your testimony now.

A That's correct. Whether you produce the Morrow with or without the Strawn, of course, you've always got to -- there's always the potential for water condensing out of the gas, and whether or not you commingle these two zones, you do have that potential problem, and this is a potential problem on many gas wells that cannot be delivered.

As the gas is delivered up the wellbore and it cools, there is always potential for gas -- excuse me, for water to condense out of the vapor stage into the liquid stage, and of course it will contain no salt; it will be fresh water.

Q But with your configuration this additional condensate of water from the Strawn formation, as I see it, or according to the (unclear), there's not a particular danger to the Morrow other than what is -- other than what would normally be if you just produced straight out of the Morrow without going through the --

A That is correct.

Q And you see no situation where that the Morrow producing and condensate forming and going into the Strawn formation it will not be -- there will not be any harm done to the Strawn formation?

A There will be no harm done to the Strawn.

Q Are you proposing any kind of a stimulation to either the Strawn or the Morrow?

A No, no stimulation to the Strawn is necessary.

The Strawn was capable of producing at least 10-million cubic feet of gas per day. It was not stimulated on original completion.

The Morrow would simply be perforated approximately 3000 pounds in a balance and we think that the natural completion will be quite adequate.

Q Now in your Exhibit Number Eleven, that is your size of the Strawn reservoir, you showed an h, which is the height, being 46 feet. Does that correspond, and I'll refer back to Exhibit Number Two, that is the cross section, of the blue colored on the right of that particular log, this well?

A It corresponds to the shaded porosity on that log.

Q The shaded gray portion --

A Yes.

Q -- to the right of it?

A To the right of it, that's correct.

Q And that corresponds essentially with your perforations, does it not?

A That is correct. There is, if I recall correctly, two feet of pay that we have counted which is not perforated. Let me call off the depth. It's at approximately 10,372 foot.

There is also what we have counted 2 foot of net pay (inaudible).

Q And that is included in your 46-foot figure.

A That is correct.

Q Out of curiosity, what I -- if I took a compass and drew a 22.3 acre circle around your wellbore, how far would it extend?

I know this is idealistic conditions with the 46 feet, but --

A That would --

Q That would be a radius of 556 --

A -- be 556 foot. It would not cross over the lease boundaries.

Q So it's according to your calculations and stuff, it's well confined in the north half.

A We believe that to be the case.

Q Let's take a look at the reporting requirements that we're talking about eliminating. As far as the reporting, you're essentially asking to go ahead and report the production on the C-115 and showing the allocation between the Strawn and the Morrow with your 96 percent and 40 (sic) percent split, is that correct?

A That is correct. What we are asking for exemption from is the reporting requirements as to how much has been injected into the Strawn reservoir and how much has been withdrawn from it because there's no practical method to keep track of what has been put into the Strawn and then removed from the Strawn.

Q Technically it's a gas storage; in reality you got a storage tank down in your well essentially, as part of your case.

A That's correct.

Q So as our rules and regulations and the statutes refer to a gas storage and to sort of make sure that we fall within the law, we need to cover it, is this correct, as you see it, in asking for these exceptions?

A That is correct.

Q At the present time, today, what -- what pressure are you producing the Strawn from? How far away are we from this 900 pound (unclear)?

A Well, let's see. Let's refer back to Ex-

hibit --

Q Four?

A -- Number Four -- no, Exhibit Number Three.

Q Three.

A As of the end of February we had a cumulative gas production of 672 and a projected point at which this well will probably cease to flow is right at 700.

Today, as we speak, we are probably up to approximately 685 to 690,000 cumulative gas production, so we are very close to the point at which this well would probably cease to produce altogether.

The well, the latest report on the well from the field is that it is producing at approximately 170 MCF per day but that it's essentially riding the line pressure. There's no choke.

Q Once you start this work in pulling the tubing out and completing into the Morrow, do you propose to have a single completion in the Morrow before you actually start your commingling operations or do you propose to go right into your commingling?

A We propose to go right into it.

Q Seeing that there's going to be about a month lag time due to the misadvertisement, is this still the case?

A Yes.

Q I mean assuming if I could have gotten the order out today.

A There are -- there are reasons for not trying to separately test the Morrow.

If we were to rerun the string and complete in the Morrow first, and separately test the Morrow, and then to come back and commingle the two zones, we would have to kill the well with brine, and we really don't want to do that because there is a risk of losing the Morrow completion by killing it with brine.

Q If you hit this 900 pound line pressure before an order is issued, is it Exxon's intention to go ahead and shut the well down or will you put a compressor on the Strawn formation?

A The well will be left shut in because the lease is still in the primary term.

Q The only completion that needs to be done to be done to the Morrow is just perforating, is that correct?

A That's correct.

Q Let me ask about the frac pressure in your Strawn formation.

Do you know what that might be?

A The fracture pressure?

Q Yes.

A Specifically, for the Strawn I don't know the exact number; however, generally used numbers use a gradient of approximately .65 times the depth. So the depth of the Strawn --

Q I believe you see the question I'm leading up to, is the Morrow going to be perforated, is there any danger of fracing the Strawn formation?

A The fracture pressure of the Strawn would be approximately 6700 psi. What we have done is to look at what would be the maximum pressure if the two ones were commingled and left shutin indefinitely, what could that Strawn pressure build up to, and --

Q You anticipated my question.

A -- and the number I have calculated is 3757 psia, which is approximately 50 pounds above the original encountered pressure in the Strawn. Now that would assume 4400 pounds original pressure in the Morrow and that it was shut in indefinitiely. I think there's some question that the Morrow is even at 4400 currently because we've had the offset well producing. Chances are the Morrow pressure is more on the order of 4000 to 3800 pounds, and so I think the worst case scenario would be 3757 psia and quite likely lower.

Q What was the virgin pressure in your Hap-

py Valley Federal Com B No. 1 in the Morrow, do you remember?

A The approximate virgin pressure was 4400 pounds. I don't recall the exact number that we measured.

Q Has that well been shut in since its completion? In other words, what's the pressure of the reservoir now from that particular well, the Com B No. 1 Well?

A The B No. 1 was put on production the same date as the No. 1 Well and it has been producing ever since and continues to produce.

The capacity of that well has fallen from about 5.3-million a day to approximately 4.8-million a day. We have not actually measured the pressure in the Morrow on that well but based on the producing rates I think we could use as an estimate the approximate change in capacity, which would say that the pressure is approximately, approximately 3980 pounds.

Q And of course there would be some pressure drop like in your worst case scenario if you had to shut the Morrow down in just as soon as you perforated.

What kind of a pressure drop would we see going into the Strawn?

A Well, if the Strawn is currently approximately 1100 pounds and the Morrow is at 4000, we'd be about 2100 pounds differential.

This is, incidentally, important in perforating the Morrow with a natural completion, there is a threshold pressure of under balance which you want to achieve to make a good natural completion and that threshold pressure is listed as somewhere between approximately 2700 pounds under balanced to about 3300 pounds under balanced, and so this is typically why the Morrow is completed with a Vann gun or with a through-tubing gun completely drawn down.

Q What do you mean by a Vann gun?

A Vann gun is simply tubing conveyed perforating gun that is attached at the end of the tubing. It is lowered into the wellbore with the tubing. The tubing is latched into the packer and when everything is set a bar is dropped down through the tubing which sets off the charges, and in that manner you can perforate the wellbore totally under-balanced with no fluids in the wellbore.

Q Is this Vann gun in place in the tubing at the present?

A The used Vann gun from the Strawn reservoir is currently on the end of the tubing and it will be dropped off into the rathole in the well.

Q And then you will come in with a wireline --

A With a wireline, yes.

Q -- and perforate.

Q If I refer to your Exhibit Number Six, you show quite a bit of cement behind your production string and do you know what the top of cement is for your lower zone?

A We do not know where the top of cement is on the lower zone.

Q Do you know how many sacks were run in that first stage?

A I don't, I don't recall the figures. Well, the number -- I don't -- I don't know the exact number of sacks; however, they attempted two circulations to the DV tool and circulated twice the amount of cement that's theoretically required and did not get returns through the DV tool.

Q So there is definitely cement behind the Morrow and the Strawn. There is no break between the Morrow and the Strawn as far as cement.

A That is -- that is correct, and in fact, we -- it was no change -- the well was drilled in 1980 -- 85, in July of '85. It was completed and shut in. The well was put on production in August of 1987 and in that two year period of shut-in time we saw no decline in the shut-in relative pressure.

So we feel that at least the top of cement is above the Strawn and that there's no leakage that

took place during those two years that the well was shut in.

Q (Unclear) exhibits, there won't be an increase in the cumulative reserves being produced but there won't be a decline, is that correct, from the Morrow or the Strawn?

A Well, there will be an increase because by allowing the commingling now we can be assured that the Strawn will eventually be put on compression, so we will at least get those additional reserves, 130-million standard cubic feet.

If the commingling is denied there is a good chance that we may never come back to recover that 130-million standard cubic feet of gas out of the Strawn.

Q Do you know what your perforation program for the Morrow will be at the present time?

A Yes, we do.

Q Is that somewhere in the exhibits or am I missing it?

MR. JENNER: Total perfed interval is located down there, the (not clearly understood) the proposed Morrow perfs 11,628 to 11,666.

MR. STOGNER: 11,666, and that's two shots per foot?

MR. JENNER: I believe that is. Is that two shots?

A It's either two or four.

Q Two or four.

MR. JENNER: I think it's four, probably more likely four.

Q There will not be any breaks between that --

A There will be a break, yes, sir.

Q There will be a break there? Can you give me an estimate of where that --

MR. JENNER: Sure can. That's an approximate depth of 11,650 feet. It's about a 2 or 3 foot shot spread in there.

MR. STOGNER: Gentlemen, I have no further questions.

Are there any other questions of any of these witnesses?

If not, they may all be excused.

Mr. Bruce, do you have anything further in this case?

MR. BRUCE: Nothing further, Mr. Examiner.

MR. STOGNER: Gentlemen, my apologies for the -- for the advertisement problem. This case will have to be continued and readvertised for the June

22nd hearing; however, I do not foresee any reason to have any witnesses come back at that time.

If there's nothing else in this matter today, we will move on.

(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. 9387, heard by me on 25 May 1988.

Michael E. Stogner, Examiner
Oil Conservation Division

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

22 June 1988

EXAMINER HEARING

IN THE MATTER OF:

Application of Exxon Corporation for an unorthodox gas well location, downhole commingling, hydrocarbon storage authority, and relief from the reporting requirements of Division General Rule 1131, Eddy County, New Mexico.	CASE 9387

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Robert G. Stovall
Attorney at Law
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico

For the Applicant:

MR. STOGNER: We'll call next Case Number 9387, which is the application of Exxon Corporation for an unorthodox gas well location, downhole commingling, hydrocarbon storage authority, and relief from the reporting requirements of Division General Rule 1131, Eddy County, New Mexico.

This case was previously heard at the Examiner's Hearing held on May 25th, 1988, but had to be readvertised due to an error in the advertisement.

Are there any appearances in this case at this time?

There being none, Case Number 9387 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. 9387, heard by me on 22 June 1988.

Michael E. Stogner, Examiner
Oil Conservation Division

8/12/88