STATE OF NEW MEXICO
ENERGY AND MINERALS DEPT.
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
25 April 1984

EXAMINER HEARING

IN THE MATTER OF:

Application of Amoco Production Company for salt water disposal Lea County, New Mexico. CASE 8167

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 8167.

MR. PEARCE: That case is on the application of Amoco Production Company for salt water disposal, Lea County, New Mexico.

MS. MAGRUDER: Mr. Examiner, my name is Kathleen Magruder. I'm an attorney representing Amoco. I'm here in association todoay with Mr. Carr of this city and we will present one witness.

MR. PEARCE: Are there other appearances in this matter?

(Witness sworn.)

MS. MAGRUDER: May it please the Examiner, my name is Kathleen Magruder. I am an in-house attorney representing Amoco Production Company.

This is the application of Amoco to dispose of salt water produced from the Bone Springs and the Wolfcamp formations from the Airstrip Field area into its State "FU" No. 3 Well.

That well is located 1700 feet from the north line and 660 feet from the west line of Section 25, Township 18 South, Range 34 East, Lea County, New Mexico.

Amoco proposes to inject into

both the Upper and Lower Bone Springs formations in this well.

Amoco Exhibit One, which you have before you, was the application for administrative approval for this project, which was filed in March by our District Office.

Mr. Scheffler, our witness today, will expand upon the material submitted therein. He will also tell you why this well is especially suited to salt water disposal.

We are requesting today that the same approval as requested in that administrative application be granted, with one exception. We would ask that any order issued granting approval for this project set a maximum injection pressure of approximately 1800 psi. This is in keeping with what we understand to be the Division's policy of calculating maximum pressure at approximately .2 psi per foot to the top of the perforations through which injection will occur.

With that I will call Amoco's only witness today, Stephen P. Scheffler, who has been sworn.

STEPHEN P. SCHEFFLER,

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

DIRECT EXAMINATION

BY MS. MAGRUDER:

Q Will you state your name for the record, please?

A Stephen Scheffler.

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

A Amoco Production Company.

Q And what is your position with Amoco, Mr. Scheffler?

A I'm a Senior Staff Petroleum Engineer. I work in the Regulatory Affairs Department.

Q In your employment with Amoco, Mr. Scheffler, have you had occasion to familiarize yourself with the application that's being heard today?

A Yes, I have.

Q And in particular are you familiar with the Airstrip Field in Lea County, New Mexico?

A Yes, I am.

Q Have you previously testified before this Division?

A Yes.

Q And are your credentials as a petroleum

engineer a matter of public record?

A Yes, they are.

MS. MAGRUDER: Mr. Examiner, do you have any questions concerning Mr. Scheffler's qualifications?

MR. STOGNER: No, I do not, and since he has been qualified before, he is so qualified at this time.

MS. MAGRUDER: Thank you, sir.

Q Mr. Scheffler, you're going to sponsor into evidence today a number of exhibits. Were these either prepared by you or under your direction and supervision?

A Yes, they were.

Q Exhibit One, which we have already mentioned, is before the Examiner and is the administrative application of Amoco for this salt water disposal permit.

Do you have anything further you'ld like to say with regards to that exhibit?

A Only that we're offering this exhibit as a matter of record.

It has already been offered as Miss Magruder indicated as an administrative application for approval of this application by our District Office. Rather than burden the record with the same information that's in there, we're going to try to just expand on information that will make it more clear to the Examiner as to why we're making this application.

Q Fine. If you would, then, please turn to what you've marked as Amoco Exhibit Two and identify it for the record and describe it.

A Okay. The Exhibit Two that I've shown here is an area map of the Airstrip Bone Field -- Airstrip Bone Springs Field area. On this map I've identified Amoco acreage which is outlined in yellow.

I've shown on that acreage the Amoco operated wells. There are currently twelve Amoco operated wells in the field area. Ten of those are Upper Bone Springs producers. One of those wells, the light green colored well, is a Lower Bone Springs producer, whichis currently shut in. That is the State "FU" No. 3, which is the subject of this application. It is identified by the red arrow. The Lower Bone Springs is shut in as a result of the depletion of that particular interval in that well.

There is also one Wolfcamp completion, which is in the State "FU" No. 1. That well is currently downhole commingled with the Upper Bone Springs Field -- or the Upper Bone Springs horizon that is also perforated in that wellbore.

I've noted again by the various colors, as you can see by the legend at the bottom of this exhibit, in the lower righthand corner, that the dark blue are the -- rather the light blue colored dots identifies the Upper Bone Springs producers. The light green colored dot identifies the Lower Bone Spring producers or the last well that pro-

duced from the Bone Springs, and the dark green dot identifies the Airstrip Wolfcamp producers.

Q And Amoco operates ten Upper Bone Springs wells in this area?

A That is correct.

Q Do you have anything further you would like to say with regards to this exhibit?

A No.

Q Fine. If you would, then, turn to what you've marked as Amoco Exhibit Three and describe it for the record, please.

A Exhibit Three is an Airstrip Field well test data sheet for Amoco operated wells.

On this sheet I've shown the lease names that are -- the lease names of the leases on which Amoco has wells that it operates. The appropriate or associate well numbers are also shown. The current completion interval is indicated by the heading "completion". I've also noted the lastest well test data for each of the subject wells and the date of that test and the current status of the well.

Under "latest well test" column I've noted the test in terms of barrels of oil per day, barrels of water per day and MCFD.

As you can see, the range of water production that occurs from each of these different wells in these various horizons is quite extensive with the highest water producer currently being the State "FU" No. 6, which

is completed in the Upper Bone Springs horizon. That well, as of April of 1984, was tested at 50 barrels of oil per day, 310 barrels of water per day, and 14 MCFD on pump.

I've noted at the bottom of that column that the total water production from this Airstrip Field area for Amoco operated wells during the months of March and April was some 444 barrels of water per day.

I will note that for the State "FU" No. 3 and State "FU" No. 4, that those wells, as I mentioned earlier, are shut in. They were shut in as of November of '80, so the test information there is not early test data, it is actual production data, the last production data that was reported for those individual wells prior to them being shut in. The appropriate date at which the production was acquired is indicated under the column "date".

I would like to point out also that this water is currently being trucked some 25 miles away from the Bone Springs, or rather the Airstrip Field area, and is being disposed into a commercial well, disposal well.

Q If you have nothing further with regards to that exhibit, why don't you turn to what you've marked as Amoco Exhibit Five and describe the data regarding the proposed injection well?

Excuse me, I believe it's Exhibit Four.

A This is an exhibit in which I've identified pertinent data for the well for which we are requesting the application for approval to inject into the Upper and

Lower Bone Springs intervals.

I've noted here under the heading of "pertinent data" the location of the well, elevation, total depth, and plugged back TD.

I'd like to point out under "casing data" that this well has cement circulated to the surface behind the surface casing, the 13-3/8ths inch casing which is set at a depth of 320 feet.

Cement is also circulated to surface behind the 9-5/8ths inch casing which is set at 4000 feet.

Behind the long string, the production string, which is the 7-inch casing string, the top of the cement is identified as being at 6258 feet by temperature survey.

I might note that the total Bone Springs formation top is noted in this particular well to be at a measured depth of 7,666 feet, so there is a significant cement above the top of the Bone Springs and some 3000 feet of cement above the top of the projected injection interval, the uppermost perforated interval, of 9206.

On this pertinent data sheet I've also noted the current producing interval to be the Lower Bone Spring -- well, the last producing interval to be the Lower Bone Springs, which was perforated over the interval 10,207 feet to 10,237 feet with the completion in that interval of -- that took place in March of 1980.

The current status of the well is, as I

mentioned before, a shut in status. It was shut in in November of '80 due to depletion of the horizon in that particular wellbore.

Under "comments" I've noted a summary of the well's history, which I can briefly review.

The well was originally perforated in the Wolfcamp in February of 1980 over the interval 10,574 feet to 766 feet. That interval was found to be nonproductive.

A cast iron bridge plug was set at 10,350 feet over the perforated interval and capped with 35 feet of cement.

In February of 1980 a subsequent completion was made in the Lower Bone Springs. This interval was perforated at 10,207 to 37 feet. That interval tested originally on pump at 363 barrels of oil per day and 74 barrels of load water per day with an associated 305 MCFD of gas. That interval was then isolated and a test of the Upper Bone Springs was made in the same month. It was found that that interval, which was perforated at 9205 to 70 feet, was nonproductive. This was defined after the well was swab tested for a period of approximately 10 hours. It was actually a little bit longr than that, that period being the period at which actual formation water was recovered. The recovery of formation water was 150 barrels of water. There was an additional 50 barrels of formation water which I have not noted here, which brought the total to some 200 barrels of formation water.

There was no show of oil or gas as a result of that swab testing and the zone was squeezed with some 250 sacks of cement.

I've also attached to this exhibit a production curve for the Lower Bone Springs interval. As you can see, the initial rate that I indicated on the previous page fell rapidly and the last production test which I indicated on Exhibit Number Three is noted here and is, as I mentioned, some .4 -- well, in this case as indicated here, it's about 2-1/2 to 3 barrels of oil per day.

This interval is, as far as we are concerned, a depleted interval in the Lower Bone Springs.

Also attached is a current wellbore schematic of the State "FU" NO. 3, which identifies the data that I have mentioned on the first page of this exhibit. It graphically depicts the casing setting depths, the cement tops, the current tubing configuration, and the perforated intervals, and the Lower Bone Springs, or rather the Wolfcamp interval, which is isolated below a bridge plug at 10,350 feet.

Q So to summarize, this well has produced only from the Lower Bone Springs and then only for a very short period of time.

A That is correct.

Q The Upper Bone Springs and the Wolfcamp were never productive in this well.

A That is correct.

Q Fine.

A If I might mention just in passing, that the Lower Bone Springs cumulative oil production is noted on the second exhibit as 1821 barrels of oil.

Q Fine. If you have nothing furthe regarding Exhibit Four, please turn to Exhibit Five and discuss its important points.

A This is an injection well data sheet for the proposed injection well. I've shown here the tubular data information that again is just a review of the same information that we just mentioned.

I'd like to point out here that with regard to the cement behind the surface casing string, some 10 sacks were circulated out from the annular portion between the surface casing and the surface hole.

Some 75 sacks were circulated out behind the 9-5/8ths inch casing and the 12-1/4 inch intermediate hole, and some, well, the top of the cement behind the long string was identified, as I mentioned earlier, to be at 6285 feet.

The proposed injection interval is also noted on this exhibit. I've shown it to be 9,206 feet to 9,285 feet for the Upper Bone Springs and for the Lower Bone Springs we are proposing to inject into the same interval that was previously a productive interval, that being the 10,207 to 37 foot Lower Bone Springs interval.

These will be perforated intervals.

At the bottom of this exhibit I've noted that the proposed tubing that will be used in the wellbore will be 2-7/8ths inch lined with plastic tubing to be set in a Baker Lok-set plastic coated packer to be set at 9100 feet.

Looking at the data that is listed under "other data", I would just point out that the intention, the original intention for drilling this well was not as an injection well but as an attempt to make two primary -- well, to make a completion in the primary completion targets, those being the Wolfcamp and Upper Bone Springs, and as it turned out, our secondary target, the Lower Bone Springs, was in fact the producing horizon.

I would also note that there is underlying oil and gas production, as I have indicated, that being the Wolfcamp, which is approximately located 10,600 feet.

In this particular Airstrip Field area there is no productive, currently productive, oil and gas zone. The nearest --

Q Overlying oil and gas zone?

A Yes, I'm sorry, no overlying oil and gas zone that's currently producing in this particular Airstrip Field area. The nearest overlying oil and gas zone is the E-K Queen producing horizon, which is located some one mile, approximately one mile to the north/northeast of this Airstrip Field area.

Q What is the next page of this exhibit?

A The attachment here that we have to this exhibit is, again, a wellbore schematic, which details the -- graphically, the specific information for the proposed injection well.

Again it shows the tubing configuration relative to the location of the proposed injection intervals and also again the tops of the cement behind the -- the casing strings.

Q Fine. Why don't you turn, then, to what's been marked as Amoco's Exhibit Six and explain it to the Examiner?

A This exhibit identifies all wells that lie within a 2-mile radius from the proposed injection wellsite. That wellsite is identified by the green arrow and by a green dot, Amoco State "FU" No. 3.

The interval, or the next radial circle that's indicated there is a one-mile distance from the proposed injection well.

The smallest circle is a half mile distance from the proposed injection well.

The purpose for the innermost circle, that is the half mile circle, is to comply with the requirements the Commission has set up to identify an area of review around the proposed injection location that would allow for identification of well status in that area of review.

Amoco has expanded the area of review to include those wells that have red boxes aroud them. This is an approximate 3/4 mile area away from the proposed injection well.

Q And will you be referring to those wells in a later exhibit?

A Yes. The next exhibit we will detail, as requested by the Examiner, specific information on those wells.

Q Fine. Why don't you tell us what all these little colors mean?

A Okay. Located at the bottom of the exhibit are -- is the legend which identifies the various horizons that are color coded appropriately. I would just point out that again the Upper Bone Springs is the light blue colored dot and the Lower Bone Springs would be the green, light green colored dot.

I would like to note that the Wolfcamp is also the same color as was color coded horizon, or has the same color code as we had indicated earlier for the Wolfcamp on Exhibit Number Two, that is the dark green color.

I've noted here that there are three plugged and abandoned wells that are immediately due west of the State "FU" No. 3 location. Those wells are located in Section 26 and the southeast portion of Seciton 23. The wells are the Bass Enterprises Airstrip State No. 2, the Bob Johnson Gulf State No. 1, and HNG's Wiser 26 State No. 1.

All three wells are currently plugged and abandoned.

Both the Airstrip well and the Wiser well have penetrated the proposed injection interval. The Bob Johnson Gulf State No. 1 was a shallow well to a total depth of approximately 4200 feet and it, of course, did not penetrate the zone of interest.

Q If you have nothing further regarding this exhibit, why don't you turn to your next exhibit, which has been marked Amoco Exhibit Seven and discuss it briefly?

A Okay. Exhibit Seven is the pertinent data for wells that lie within what Amoco has defined as the area of review.

I've noted here the first three wells are the plugged and abandoned wells I just mentioned. I have attached to those wells the appropriate wellbore sketch that depicts the, graphically, the configuration the well is currently in. Where appropriate, I have also attached the production curve that identifies the cumulative production and production history for the particular horizon, that being either the Bone Springs, the Upper Bone Springs, Lower Bone Springs, or Wolfcamp horizon that a well may hae produced from.

This is with regard to the -- to the plugged and abandoned wells as well as the other wells that lie within the area of review.

I would point out in summary that all of the wells that lie within the area of review have had cement

circulated to surface behind the surface casing and also all wells have had cement circulated to surface behind the intermediate string, with the exception of one well, that being the State "FU" No. 5, which is operated by Amoco, and if the Examiner would care to turn to page five of this set of data, he will note that that particular well -- I'm sorry, page fifteen. You will note that the pertinent data for that particular well indicates the top of the cement behind the intermediate string was at some 1,470 feet. I would point out that there is adequate protection behind the entire length of casing set in the -- set for this well because cement was circulated to surface behind the long string, as can be noted under the casing data for this particular well.

Q Do you want to discuss page by page this exhibit?

A I would prefer, unless the Examiner would like to go through each one of these things, to briefly state that each one of these wells has a summary of the well history and identifies the perforated intervals that were tested and in some cases completed. As I mentioned earlier, those that were completed have the appropriate production information attached in the form of a well production plot.

It's -- that basically will explain if there's any need to go into detail in review of this case by the Examiner. I hope it will take care of any questions you have regarding the well completion.

Q Fine. If you don't have anything else with regards to this exhibit, why don't you turn to what you've marked as Amoco Exhibit Eight and discuss it.

A This exhibit was prepared in an attempt to show graphically why we feel that the proposed well that we're requesting be utilized for disposal is appropriate for that use.

I would point out that the Amoco "FU" No. 3 is -- is located in Unit F, yes, Unit F of this Section 25, excuse me.

Q I believe it's Unit E.

A Unit E, I'm sorry. I'm sorry. Unit E of Section 25. That will be, of course, the well that we're proposing for injection, for utilization as an injection well.

The area that I have described on this exhibit can be seen to be colored in red in the lower right-hand corner of the exhibit. That encompasses the area of interest that we'll be discussing at this time.

The State "FU" No. 3, as you can see, has several markers that I've identifie for it. These markers, as you will see, are carried throughout the well logs that are noted for particular wells that I've put on this exhibit.

The purpose for our putting these well logs on this exhibit was primarily as -- to be used as type logs that identify characteristic carbonate development in

the Bone Springs Field area, that being in this case the Upper Bone Springs carbonate.

I would like to point out that these individual markers have specific purpose for being there.

Starting at the marker and looking at the H. G. Wisner State 26 No. 1, which is a plugged and abandoned well, the green marker identifies the top of the First Bone Springs Sand, which is te classical marker used to identify the Upper Bone Springs Sand area.

The yellow marker identifies the top of what we're calling First Bone Springs carbonate.

I've also shown a pinkish marker here that identifies in this case, as best as can be correlated, what we would consider to be the top of the proposed injection interval, that is, the interval that would be in this carbonate body identified as having a top where this green marker -- or this pink marker is.

The base of the Upper Bone Springs carbonate is identified by the lower orange marker in each one of these log cross sections, or each one of these logs, log segments.

I would like to point out that I've noted here on the -- these are all porosity logs, but I've noted on the compensated neutron and formation density log profiles a pink colored area which identifies the presence of the dolomite pay. This dolomite carbonate is -- is required for the production of reservoir fluids.

Typically the Airstrip Field area comprises -- is comprised of limestone, dolomite and basinal material, which is a silty type material. It is the limestone and basement or rather basin --

Q Dolomite?

A No, just can't think -- it's the limestone and the basinal, that's the word I'm looking for, basinal material that usually results in the formation of permeability barriers within the area between the wells.

I would point out that this is what is considered to be a debris flow type of environment; that is, this sediment was laid down as a result of activity where we actually had what we could call, I guess, the movement of debris off the top of the shelf down into the basin of the area where we have the deeper basement material, that being the basin.

What I would like to point out also is that the correlative intervals that I've shown here, particularly the top of the Upper Bone Springs sand, the First Bone Springs Sand, if you look at the flourescent orange marker that I've noted for the "FU" No. 3, "FU" No. 6 and "FU" No. 5, you'll see that that top is a structurally dipping, up dipping marker. In other words, looking at the structural cross section I prepared, the stick cross section at the bottom of the exhibit, you can see that the "FU" No. 3 lies in an up structural location relative to the location of the "FU" No. 6 and "FU" No. 5.

This is an important point to be made because what we see in the State "FU" No. 3 in the proposed injection interval is as a result of testing that I mentioned earlier, a water producing interval, and that water producing interval, if you attempt to correlate it to the remaining intervals in the field, that is, the same apparent carbonate body, you find that those, that same correlative, as best it can be determined body, is producing oil.

The point to be made here is that you see water production being realized from an up structure well and oil production being realized in a down structure location in the remaining wells.

The point to be made here is that that is not an indication of communication between the "FU" No. 3 and the "FU" No. 6, 5 or 2.

We would suggest, we feel strongly that this would indicate that this is an isolated reservoir that we are proposing to inject into because of its producing characteristics which are unlike the oil producing characteristics one finds in the oil producing dolomite pay section that we see in the remainder of the Bone Springs, Upper Bone Springs oil producing wells.

The exception to that, of course, is the H. G. Wiser State No. 26 Well, which was also tested to be wet. It's located just offset to the "FU" No. 3.

Q Would you characterize the Upper Bone Springs in this particular area as lenticular?

A Yes, I would. That describes exactly the way that the -- the pay is developed in the area. Again that ties back to the fact that this is a debris flow type environment or was laid down by a debris flow type. It is a lobe type of deposition whereby you have a very limited, not very limited but limited and noncontinuous carbonate development, which is very hard to actually define as being connected even though you might be able to correlate those common pay zones from one well to the next.

I'd like to point out, too, that I've shown some dots which I have well names next to them in the surrounding 40-acre sections. I would just say that all of these wells are currently Upper Bone Springs producers, and as noted on the previous exhibit, Exhibit Number Two, for the Amoco wells they are all producing oil with the exception of the Amoco State "FU" No. 4, which is currently shut in in the Upper Bone Springs and we're evaluating it for some workover activity in that interval.

Q Well, to review this exhibit, then, in -- in real life, in nature would you expect to find a well up dip from a well down dip that is producing oil? Would you expect that up dip wellk to produce oil or water if the wells were in some sort of communication or at least the producing horizon was continuous across the interval?

A You wouldn't expect to find an up dip well producing water if it was in communication with the down dip wells that are producing oil.

Q Is it your opinion, Mr. Scheffler, that the Upper Bone Springs as it exists in the "FU" No. 3, the proposed injection well, is discontinuous or at least is not in communication with the Upper Bone Springs that produces from the wells in this area?

A Based on the production tests that we have to date, that is the tests that indicated that that zone is only water productive, the indication is that it is water productive. That same zone appears to be oil productive in the surrounding wells.

Q So then you would not expect injection into this Upper Bone Springs horizon in the "FU" No. 3 Well to affect offset Upper Bone Springs completions?

A No, I would not, because there is obviously some barrier that occurs between the location of this well and the locations of surrounding wells in this -- between the interval we're wanting to inject into in the "FU" No. 3 and the same apparent interval that is being produced in the surrounding wells. That barrier is either a non-dolomitized limestone or, as I mentioned earlier, possibly the basin material, the silty basin material that is acting as a barrier to any communication between this well and the surrounding wells.

Q Do you have anything further you'd like to say with regards to this Exhibit Eight?

A No.

Q Fine. Why don't you turn to what you've

marked as Amoco's Exhibit Nine?

Would you discuss this exhibit for the Examiner, please?

A This exhibit identifies the same type of information that was shown on the previous exhibit for the Lower Bone Springs carbonate.

As you can see, on this exhibit I've identified the carbonate section that is considered to be possibly productive as a result of having some dolomite present. That dolomite that would be present is identified with the pink color on the porosity log profile, particularly or specifically in this State "FU" No. 3, which did produce from the Lower Bone Springs as well as in the Amoco State "FU" No. 2, which is currently shut in in the Lower Bone Springs.

I would note that there is no apparent dolomite development in the remaining wells for which I've supplied logs here. I would also note that the logs that you see without any dolomite development colored in are typical logs that would also be seen for the surrounding wells that are identified with a black dot in the area.

The point to be made here is that the "FU" No. 3 Well is an isolated pod again in the Lower Bone Springs interval, which we feel will, as a result of injecting into, will not have any detrimental effect on -- cannot have any detrimental effect on surrounding wells because there are no surrounding wells that have dolomite pay pre-

sent.

So we feel confident that by injecting into the Lower Bone Springs horizon in this particular well we will not be in any way adversely affecting potential production in the area of this horizon.

I would note that the primary zone of interest in terms of injectivity would be the Upper Bone Springs. We would request that the Lower Bone Springs carbonate be also included to supply whatever additional storage capacity would be available in that Lower Bone Springs carbonate zone.

Q Well, to summarize your testimony regarding this exhibit, is it your opinion that the Lower Bone Springs as it exists in the "FU" No. 3 is not continuous into the other producing wells in this particular vicinity?

A I would say that the only other producing well that is in this area, the "FU" No. 2, which has not really been produced as yet but only tested, it is not continuous to that well.

There is no other available producing well to which it could be continuous. There's a lack of dolomite presence in surrounding wells.

Q Fine. Do you have anything further with regard to Exhibit Nine?

A No.

Q If you would, then, turn to what you have marked as Amoco Exhibit Ten and explain this exhibit,

please.

Q Exhibit Ten is an exhibit that I prepared to identify an example of increased reserve recovery that we would anticipate with a particular proposed salt -- with our proposed salt water disposal well for a particular well in the Bone Springs area, the Airstrip Field area, that is, that being the Amoco State "FU" No. 6.

What I've noted for this particular well is that the percentage of Amoco operated Airstrip Field water production that this well contributes is about seven percent of the total.

The percentage of Amoco operated Airstrip Field oil production as of April of '84 is about five percent.

The economic limit with continued trucking the produced water from this well will be about 18 barrels of oil per day and if we are able to facilitate the use of a disposal well, the "FU" No. 3, a reduction in monthly well operating expense of some 9,420 barrels -- Dollars per month would be realized.

The resulting lower economic limit with the proposed salt water disposal well would be about five barrels of oil per day.

Assuming a decline that has been seen to be typical for the UpperBone Springs Field of about 32 percent, this equates to as much as some 14,830 barrels of oil that might be recovered that would not otherwise be re-

covered at the higher economic limit.

I would note that this reserve recovery is the maximum that might be recovered. The intent of this exhibit is to show that there will be some additional reserve recovery that would not otherwise be realized if we did not have the disposal well.

Q But this 15,000 barrels or almost 15,000 barrels of oil that you calculated on this exhibit is only with regard to the No. 6 Well, is that correct?

A That is correct. The other wells that are making water in the area will also see benefit from the recovery of additional reserves as a result of reducing their economic limit in a likewise manner.

I would note that on this exhibit I've shown the method by which the 14,000 barrels of oil recovery is indicated, 14,830 barrels of oil recovery is indicated. As I mentioned there's a 32 percent 3-year decline and this was calculated using decline curve analysis.

Q And is this a standard analysis that's used to determine recoverable reserves?

A Yes, it is.

Q Mr. Scheffler, in your opinion will the granting of this application promote conservation, prevent waste and protect correlative rights of all parties affected?

A Yes, it will.

MS. MAGRUDER: At this time I'll

offer Amoco Exhibits One through Ten and tender the witness for any questions the Examiner might have.

MR. STOGNER: Exhibits One through Ten will be admitted into evidence.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Scheffler, will you please refer to Exhibit Number One and I'd like to ask a question. I'm sorry the pages aren't marked but the result of water analyses, which is behind the schematics of all the wells in one-half mile.

A Okay.

Q Martin Water Laboratories, Incorporated?

A Yes, uh-huh.

Q Have you got that there?

A Yes, sir.

Q Okay. This particular sheet that you've handed me is a little different from the one that was received by us for administrative approval in that Columns number 2 and 3 have some numbers in them.

Could you please explain that to me?

A Okay. Mr. Examiner, I haven't seen that data; different application. This is the only one that's been supplied to me by the District.

Q Okay, let me give this back to you. This is the one that was handed me this morning.

A Okay, I'm sorry. This was some work that I had done. You -- this is my own work. So I'll tell you what I'll do is I'll trade with you. Let me enter -- I can either continue to have this submitted or we can just erase that information. I can explain what that is, if you'ld like to know.

Q No, why don't you -- we'll just ignore that because I have the original copy that was --

A Okay, that's fine.

Q -- submitted and I'll make that a part of Exhibit Number One.

Let me have that back there.

A Okay.

Q Because I have some more questions concerning this.

Where will the produced waters that will be disposed, where will that water be coming from?

A They'll be coming primarily from -- well, all of them will be coming from the Airstrip Field area from the Wolfcamp producing horizon, the Upper Bone Springs and whatever Lower Bone Springs producing horizons might be anticipated or expected in the future.

Right now there are none, of course.

Q And you had water analyses run on that Wolfcamp water?

A Yes, sir, we did have water analyses run and that data was submitted in a -- as a matter of record in

the application that was made and approved for downhole commingling of the Wolfcamp with the Upper Bone Springs in the State "FU" No. 1.

Q And that information is included in Exhibit One?

A I do not believe that the Wolfcamp water analysis is in here. No, it is not.

Q Could you please submit subsequent to this hearing?

A We certainly can.

Q Let's now refer back to Exhibit Number Seven and I have three wells in question I'd like to go over with you.

A Okay.

Q One being the -- the first one being on page three, the Bass Enterprises Airstrip State No. 2 that was plugged and abandoned. The total depth was 10,538 feet, is that right?

A Yes.

Q Okay, and the 8-3/4 -- I'm sorry, the 5-1/2 inch casing had cement behind it up to 7925.

A Yes, sir.

Q Is this well within a half mile of the proposed injection well?

A The Bass Enterprises well lies just outside the half mile radial line or radial circle, the circle shown on Exhibit Number Six. It looks like it's just a bit

further away than half a mile.

Q All righty. Let's now refer to the well on page 24, the Gulf Oil Company Lea that looks like "YH", Yankee Hotel.

A Yeah.

Q No. 1. Does that well lie within a half mile of your proposed injection well or is that also outside the half mile?

A The "YH" No. 1 is outside the half mile circle.

Q Okay. Now the third one, the Gulf Oil Corporation No. 3 on page 26 and 27.

A Okay.

Q I show that one to lie on the half mile circle, and the --

A Yes.

Q -- 5-1/2 inch casing has cement back up to 7150, is that right?

A Yes, sir.

Q Do you foresee any problems with water encroaching into that area?

A Oh, no, I do not. I do not. First of all, I think that, you know, there's adequate cement. Well, let me point out that the top of the Upper Bone Springs perfs in this particular well are at 9334 to 9410.

I would expect that -- that because of the distance of the well, number one, and the fact that

there is a significant amount of cement above that interval, assuming that it was correlative to the injection interval, correlative not necessarily implying that there is communication, as I've said, we feel that there is not, this is an oil producing well. We have water producing in our well.

I would say there's no way that we could see any water, adverse water effects, on this particular well.

Q Thank you, Mr. Scheffler.

MR. STOGNER: I have no further questions.

MR. PEARCE: Excuse me, Mr. Examiner, one quick one.

CROSS EXAMINATION

BY MR. PEARCE:

Q Mr. Scheffler, I notice on the page immediately following Form C-108 that was submitted with the administrative application three's a description and it shows 800 barrels of water maximum injection volumes.

A Yes.

Q And 500 psi. Now I understand the 500 psi has been raised to 1800, as the maximum and the average injection volumes. do you also expect those to increase?

A No, sir. Based upon the District's analysis of the proposed volumes of water that will be available out there, I would say that the actual daily injection

rate will not require an increase.

We would ask that that pressure limit be raised only as a matter of allowing for sufficient operational ranges consistent with the Commission's rule.

Q Thank you, sir.

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

MS. MAGRUDER: I have none.

MR. STOGNER: If not, he may be excused.

Ms. Magruder, to you have anything further in this case?

MS. MAGRUDER: I have nothing else, no, sir.

MR. STOGNER: Does anybody else have anything further in Case Number 8167?

If not, this case will be taken under advisement.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division 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. 8167 heard by me on April 25 1984

Oil Conservation Division