STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
8 June 1983

EXAMINER HEARING

IN THE MATTER OF:

Application of Amoco Production Company for salt water disposal and an unorthodox location, Union County, New Mexico.

CASE 7869

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division:

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For the Applicant:

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Amoco Production Company
Houston, TExas

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E X H I B I T S

MR. STOGNER: We'll call next Case Number 7869.

MR. PEARCE: That case is on the application of Amoco Production Company for salt water disposal and an unorthodox location in Union County, New Mexico.

MR. MOTE: Mr. Examiner, I'm Clyde Mote, attorney, who, in association with Bill Carr, represent Amoco Production Company, and we'll have one witness.

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

MR. HECKEL: I'd like to -- I'd like to make a brief statement.

MR. PEARCE: Okay. Would you prefer to make that now or at the close of the testimony in this case?

MR. HECKEL: I think at the close will be satisfactory.

MR. PEARCE: Okay, thank you.

(Witness sworn.)

MR. MOTE: Mr. Examiner, Rule 104-B-III of the Regs of this Division provide that if a wildcat well in Union County "may reasonably be presumed to be productive of gas" then a well should be located on 160-acre unit, consisting of a quarter quarter section,

which well shall not be located closer than 660 feet to any outer boundary, or closer than 330 feet from any inner boundary.

Now, the well which is the subject of this application is 500 feet from the northern boundary of the section; however, we do not believe that this would require, this application to be considered an unorthodox location for two reasons: First of all, we don't believe the proposed well will be reasonably presumed to be productiv of gas; therefor, statewide rules would only require a 40-acre location on which the proposed well would be a standard location. Number two, the Bravo Dome CO_2 Unit has been unitized and it is our opinion that an interior well such as this, further than 660 feet from the outer boundary and further than 330 feet from anyl interior line would be at a standard location.

Now, if the Division agrees with us in this interpretation wholly or in part, and determines that an unorthodox well location application is unnecessary, they we'd move to dismiss that portion of our application dealilng with an unorthodox location; however, should the OCD disagree with us in this regard, then we request that this case be readvertised for the June 23rd, 1983, hearing, because the advertised location is incorrect as the east/west description is correctly stated as being 765.7 feet from the west line as compared to the advertised location of 565 feet from the west line of Section 26,

Township 19 North, Range 34 East.

In any event, we wish to proceed with the merits of our application at this time.

MR. STOGNER: Mr. Mote, the non-standard location portion of this case will be dismissed, since it has been the practice in the past byl the New Mexico Oil Conservation Division to dedicate 40-acre spacing to a disposal well, and since this application meets those guidelines for a standard location for a well dedicated 40 acres, the nonstandard location portion of the application will be dismissed; however, in the unlikely event that this case happens to be productive of natueral gas or CO_2, we would expect Amoco then to apply for a nonstandard location for a 160.

MR. MOTE: Okay, good.

LARRY W. SHEPPARD,

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

DIRECT EXAMINATION

BY MR. MOTE:

Q Mr. Sheppard, would you please state your name, by whom employed, in what capacity and location?

A My name is Larry W. Sheppard. I'm employed by Amoco Production Company as a Staff Petroleum Engineer. I work in our Houston West Region, Proration Section.

Q Have you previously testified before the Division and are your credentials as an expert in the field of petroleum engineering a matter of public record?

A They are.

Q Are you familiar with the subject matter of this application?

A Yes, sir, I am.

MR. MOTE: Is there any question concerning the witness' qualifications?

MR. STOGNER: He is qualified.

Q You'll be asked to testify concerning certain exhibits. Were these exhibits either prepared by you or under your supervision and direction?

A Yes, sir, they were.

Q All right, I'll ask you to first turn to what has been marked as Amoco's Exhibit Number One, and please identify this exhibit for the record.

A Exhibit Number One is a map which shows the entirety of the unit encompassed by the Bravo Dome Carbon Dioxide Gas Unit.

Q What are the various colored arrows shown on this map for?

A As shown on the legend in the upper lefthand corner of the map, the red arrow depicts our proposed disposal well; the blue arrow depicts the locations from which we obtain fresh water samples in accords with the Commission Form C-108, to provide as evidence in this case

case; the green arrow depicts the well from which we obtained a sample of Glorieta water, which will be entered as evidence in this case; and the orange arrow depicts the well from which we obtained a sample of Tubb water, which also will be entered into evidence in this case.

Q All right, would you please locate for the Examiner the approximate location of the AmeriGas Property, please?

A Amerigas property is located to the west of our proposed disposal site and, in fact, is located west of the well in which we have produced water from the Glorieta, that being in Township 19 North, Range 32 East. It is approximately 20 to 25 miles to the west of our proposed disposal site.

Q The AmeriGas property is 20 to 25 miles west, is that correct?

A To the best of my knowledge, that is correct; somewhere in the range.

Q And the Glorieta salt water well is somewhere in between those two locations, is that correct?

A That is correct.

Q All right, if you will, please, turn to what has been marked Amoco's Exhibit Number Two and identify this for the record.

A Exhibit Number Two is a map of the portion of the Bravo Dome Carbon Dioxide Unit in the immediate vicinity of the proposed disposal well.

Q All right, and why do you have a 1/2 mile radius shown on this exhibit?

A This exhibit was prepared in order to fulfill the requirements as set forth in Commission Form C-108, which states that we must show all leases within two miles of the disposal well. It also states that we are to draw a 1/2 mile radius around the proposed disposal well. The area circumcised by that radius is an area of review and that is an area in which any well that has penetrated the proposed disposal horizon will be reviewed.

Q Are there any wells that have penetrated that formation located within the 1/2 mile area?

A No, sir, the nearest well is located in Section 23, and as the Examiner can see, that falls just outside the boundary of the 1/2 mile radius.

Q Just to the north of the proposed location, the northeast of the proposed location, you show a well 1934 251-K. Are you going to discuss this well later on in your testimony?

A Yes, sir. Seeing as how there are no wells in the section where we propose the disposal well, we're going to use 1934 251-K as a type log in order to show the approximate depths at which we expect to encounter the various formations.

Q All right, go to your Exhibit Number Three and identify this exhibit for the record.

A Exhibit Number Three is a copy of the Commission Form C-102, which is the acreage dedication and well location plat. This shows the staked location of the proposed well, that being 500 feet from the north line, 765.7 feet from the west line, Section 26, Township 19 North, Range 34 East. That is in Union County, New Mexico.

Q This constitutes a change from the west line of the position of the well as advertised. Why was this change made?

A The first location that was staked was too far to the west to suit the purposes of Amoco. The well is to be located on our compression facility site and the first location staked was too far removed from that site in order to easily facilitate the disposal of water from that plant.

Q And will this proposed facility site be the subject of a later exhibit in your testimony?

A It will.

Q Turn to your Exhibit Number Four. Would you please identify this for the record?

A Exhibut Number Four is a copy of the Commission Form C-108. This exhibit, with attachments, has already been submitted to the Division; however, we are entering it as a separate exhibit and in order to show that we are complying with the various requirements of this.

Q All right, would you discuss any items

of particular significance on this completed application for the Examiner?

A If the Examiner would turn to the attachment portions of this exhibit, the first attachment is an injection well data sheet in which I have shown both in tabular and schematic form the planned configuration of the injection well, if it is authorized.

As the Examiner can see, both strings of casing, the surface and the long string, will be cemented to surface. The injection will be through plastiac-coated tubing beneath a packer. Inert fluid will be on the back side and the well will be monitored in compliance with all the UIC rules of the Commission as set forth in Rule 701.

Q All right, is there anything else you'd like to discuss with the Examiner?

A On the next page I would like to briefly discuss the information that's required by other sections of the C-108.

First of all, as required by Section 7, is statements concerning the proposed operations. Initially, when this well begins disposing, we anticipate it disposing only between 100 and 150 barrels a day. That's because we'll only have a small portion of the wells on line when we initiate the project; however, once the full scale project is underway, we anticipate average daily injection of around 500 barrels a day. The maximum anticipate injection should never exceed 900 barrels a day. The

system is entirely closed. The average pressure of the injection well we estimate to be approximately 100 psi at the average daily rate; however, we are asking the Commission to grant us a maximum limit of 330 psi. This is in accords with the Commission's criteria that has been historically used of .2 psi per foot of depth, and it has also been justified in previous hearings regarding disposal wells in this area.

The source of the injection water will be from the Tubb formation.

Next I would like to discuss the geology of the proposed disposal horizon and the fresh water sands within the area.

The Glorieta in this area is a fine to coarse grained sandstone, which are composed of clean, semi-round quartz, which are well cemented by calcareous material. The gross thickness of the horizon is approximately 155 feet and the net pay is approximately 60 feet. We anticipate that we'll encounter the top of the Glorieta at 1605 feet and that the mid-point of our perforations will be approximately 1650 feet.

Fresh water sands in the area, the deepest of which is the Morrison Exeter sand, which is of Jurassic age, it has been bound based on areal hydrological and geological studies to have a base of approximately 550 feet, and as we will show on a later exhibit, we believe in this particular area that the base of that sand is approxi-

mately 530 feet.

Next, as required by Section 9 of the C-108, if indeed the Glorieta requires stimulation prior to injection, we anticipate that it would only require a small volume acid job that would be in the range of 1000 gallons and we would utilize 7-1/2 percent hydrochloric acid, and of course, the log for this well will be submitted to the Commission once the well is drilled.

On the next page, as required by the C-108, Section 11, we must obtain water samples from all fresh water wells that are within a mile radius of the proposed disposal well. We have done that. There are two wells on the Amoco property, that being the facility plant site, which are immediately adjacent to the proposed disposal well, and there are two other wells located on the Bolts property (sic). The first well in the northeast quarter of Section 25, and at a depth of approximately 125 feet, and there is a well in the southeast quareter of Section 25 at a depth of approximately 150 feet.

On the last page of this exhibit we have a summary of the water analyses for the Glorieta and the Tubb. The wells from which we obtained these water samples are highlighted on Exhibit Number One, as shown by the arrows.

First of all, the Glorieta water sample shows total dissolved solids of approximately 29,000 parts per million and the Tubb formation shows total dissolved

solids of approximately 45,000 parts per million.

Q Mr Sheppard, is it your testimony that this facility, if permitted by the Division, will be constructed, operated, and monitored in compliance with UIC rules and regulations?

A Yes, sir, it will.

Q Have you examined all available geological and engineering data and find no evidence of open faults or any other hydrological connection between the proposed disposal horizon and any underground source of drinking water?

A Yes, sir, I have, and there is no evidence of such.

Q Has notice by certified mail been given to the surface owners?

A Yes, sir, it has.

Q Do you have evidence of this recipt in your possession if the Examiner wishes to see it?

A I do have.

Q All right, turn to what's been marked as Amoco's Exhibit Number Five and identify tha for the record.

A Exhibit Number Five is a copy of the water analyses from the four fresh water wells within the mile radius of the proposed injection well.

Q Would you please explain what's

shown by this exhibit?

A The exhibit shows a detailed water analysis from the water from each of the four wells. Also, to the righthand portion of the exhibit I show the approximate depth of each well and the location of each well.

The, all four wells show to have good quality water, which is fit for human consumption.

Q All right, and how far from the Glorieta, where the injection is to be had, if this application is granted, how far on a vertical scale is the fresh water sands from this water analysis in feet?

A In excess of 1000 feet vertical separation.

Q All right, go to your Exhibit Number Six and identify this for the record, please.

A Exhibit Number Six a well log from the Bravo Dome Carbon Dioxide Unit Well 1934 231K.

Q All right, and would you please explain what you've shown on this exhibit?

A Marked on the exhibit are the tops of all the major formations which have been identified in the Bravo Dome area. Of particular importance, I'll work from the top to the lower section of the log, you can see that I have the top of the Triassic marked at approximately 530 feet. The top of the Triassic would be the bottom of the Jurassic, which contains the Morrison Exeter sand, which we have already made reference to as being the deepest sand

which has potential for bearing fresh water.

The next top that I would like to mention would be the Glorieta. We have shown it at 1605 feet, and as you can see, the interval between 1620 and 1680 feet has sufficient porosity to facilitate the injection that we are proposing in this well.

Lastly, I'd like to mention the Tubb formation, which we have shown at approximately 2150 feet. The Tubb is the horizon which is productive of CO2. It is also the horizon from which the produced water would originate that would disposed into the Glorieta.

MR. MOTE: With regard to the next exhibit, we only have one copy. We'd like to put it on the wall to discuss it.

Q Mr. Sheppard, you only have one copy of this, but if the Division needs more than one copy we'll be glad to furnish it, will we not?

A Yes, that is correct.

Q All right. If you would, please -- this is -- please identify what is shown by this exhibit.

A This exhibit is an overall plot plan for the first Amoco combination of dehydration and compression facility plant that will be located in the Bravo Dome. The plant will be utilized for the purpose of dehydrating the gas to the point that it can be placed into a transmission line. It will compress it up to line pressure and at which

time it will be placed in a transportation line to be transported to the tertiary oil recovery projects that will utilize it, the CO2.

Q All right, point out the proposed disposal well as it would lay on this subject site.

A The proposed disposal well is just outside the western portion of the main body of the facility plant itself. It is going to be approximately 300 feet outside the fence encompassing the facility site.

Q All right, point out the two fresh water wells which you've either drilled or will drill on the facility site.

A The first fresh water well is within the facility site itself, located approximately in the center of the facility site. The other fresh water well is located on the very far eastern portion of the land on which the facility will be located.

Q And are those two of the wells on which you've shown fresh water samples?

A Yes, sir, those were included in our exhibits shown separately.

Q All right, if you would, just discuss briefly this facility and what you expect it to do.

A On this exhibit the facilities that are currently under construction are shown by the darkened lines. All of the dashed lines are future facilities that

will be installed as we require them. Initially, the only dehydration compression will be for the gas that Amerada is going to take, which we estimate to be approximately 85-million a day. The gas will enter from the north into the facility. It will go to an initial separation phase where most of the produced water will be separated from the gas. The gas will then be brought through three stages of compression. On the compression, all of the prime movers for the compression will be electrically driven. We will have, as I mentioned, three stage compression, 6000 horse-power per compressor, and all of the coolant for those compressors, jacket water coolant, will be in a closed system and that coolant water will be cooled by an air to liquid system.

As we come in, the only other water that will be derived from the plant will be on the second stage of our compression we will have a glycol dehydration unit, which will separate the remainder of water from the gas in order to ready it for transmission.

Q Would you say that primarily and almost exclusively, the only water which will be injected into this proposed salt water disposal well is produced water?

A Yes, sir, it will be produced water, either knocked out on the initial separation phase or the glycol dehydration phase on our second stage of compression, and that will make up virtually 100 percent of the water that will be disposed into the proposed injection well, if

so granted.

Q Can you testify, then, that in your opinion as an engineer, that there will actually be no effluent water injected into this well?

A By and large, I guess, if you take the strict definition of effluent water, no, it will virtually all be produced water.

Q All right, now, are you going to test the water coolant from the compressor periodically?

A Yes, sir, we will. As I mentioned, the only water that will be utilized in the compression facility itself, or the operation of those facilities, is jacket water coolant for the compressors, and that will be tested on a regular basis.

Q And where you going to get the fresh water for this coolant?

A That fresh water is really of a small quantity, but the amount that we do need will be obtained from the fresh water wells that we have on our plant site.

Q Have you obtained a permit from the Water Control Commission?

A No, sir, we have not.

Q Is that because in your opinion you don't believe it's effluent?

A Yes, sir, we believe that the Oil Conservation Division, both in their rules and regulations and according to the rules and regulations of the Water

Quality Control Commission has jurisdiction over this matter.

Q And your request is to obtain an order permitting disposal of all water discharged from the facility shown on this exhibit?

A Yes, sir, that is correct.

MR. MOTE: We offer Exhibits One through Seven into evidence.

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

MR. MOTE: We have no further questions for this witness.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Sheppard, I have a few questions. I'll start with your Exhibit Number Seven there, so you can go sit down over there.

The coolant water that will be coming out of the jacket, what will -- will there be any possible contaminants in that water, and if so, what would they be?

A The only thing that will be contained in that water, it will be fresh water, it will be high

quality because it's going to be used in a jacketing system in the compressor, and so the only, I guess what you could classify contaminant in that water, will be a corrosion inhibitor to inhibit corrosion of the jacket coolant system of the compressor.

Q Do you know what type of corrosion inhibitor that you will be using?

A No, sir, I've not been able to determine that yet. I do not think the decision has been made yet. As soon as I am able to get that decision, I would be more than happy to -- to submit that in separate correspondence to you all.

I can state, though, that as a company policy that we do not use chemicals in our operations in our collant waters, which are potentially hazardous contaminants. We would not be using a chromate type additive to the water.

Q I would appreciate it if you would submit that information when it becomes available.

That's all the questions I have concerning Exhibit Seven. At this time is there any other questions concerning this exhibit before we take it down? If not, I'll have some other questions for Mr. Sheppard.

Mr. Sheppard, to the best of your knowledge, has any CO2 been encountered in the Glorieta within, say, six miles of the proposed salt water disposal well?

A No, sir, if you would make reference to your Exhibit Number One, I've shown on Exhibit Number One a well located in Section 4, Township 19 North, Range 32 East. That well is currently designated as Bravo Dome Carbon Dioxide Unit 1932 041-D, and it is shown by the green arrow on the map. That well was tested in the Glorieta when it was originally drilled. I don't know the specific date, but I believe it was prior to 1974, because in 1974 our company made a study of Glorieta potential within the Bravo Dome Unit, and based on the results of the testing in this well, we determined that there was little or no potential for Glorieta production east of that well or north of the well. The well tested 100 percent water in the Glorieta, and that is -- analysis of that water was presented on our Exhibit Number -- in our Exhibit Number Four.

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

MR. MOTE: None.

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

Mr. Mote, do you have any statement at this time?

MR. MOTE: No, sir.

MR. STOGNER: Mr. Heckel?

MR: HECKEL: AmeriGas leases approximately 75,000 acres in an area that's to the south and west of the Bravo Dome Unit, 65,000 acres of those which are actually outside the limits of the Bravo Dome. 10,000 are within the limits of the Bravo Dome but are not included in the (inaudible).

We had two CO2 plants operating from those wells in the Tubb formation for approximately 20 years.

In 1982 we commissioned H. J. Gruy to do a reserves estimate at the three potential formations in that area, the Tubb, the Glorieta, and the Santa Rosa. In Gruy's study they have determined there was a potential for considerable production of CO2 from the Glorieta zone. The formation changes there and it's my understanding that it's substantially different from the formation in the location of the injection well.

AmeriGas has no objection to the proposal that Amoco and the unit has to make injection at the wellsite that they're proposing, but we would at least like to go on record saying that if injection rates are increased dramatically over the 900 barrels of water a day, or if there are injection wells considered closer to the AmeriGas acreage, that we would like to be a party to a discussion and would like to have the Commission fully explore the potential dangers to the Glorieta zone in the area of our leases.

MR. STOGNER: Thank you, Mr. Heckel. Is there anything further to come before Case Number 7869?

It has come to my attention that the advertisement has already gone out to June 23rd, so this -- therefor, this case will remain open until the June 23rd hearing.

MR. PEARCE: It is our intention when that case is recalled on our docket to take the portion of the case that is still in existence under advisement at that time and to dismiss the nonstandard location portion of this case. I do not suspect that any appearanceis necessary at that time.

MR. MOTE: Okay. Thank you.

MR. PEARCE: One thing further, if I might, Mr. Mote. I noticed that on Amoco's Exhibit Number Three, the copy of Form C-102, that form was filed prior to the determination of the acreage dedication as a 160-acre dedicated unit. I'd request that Amoco file an amended C-102 on this well.

MR. MOTE: All right.

(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 of Hearing 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. 7869, heard by me on June 8 19 83.

Michael E. Stogner, Examiner
Oil Conservation Division