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

11 July 1984

EXAMINER HEARING

IN THE MATTER OF

Application of Arco Oil and Gas Company for amendment of Division Order No. R-7395, San Juan County, New Mexico. CASE 8255

BEFORE: Richard L. Stamets, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division:

For the Applicant: William F. Carr
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MR. STAMETS: We'll call next Case 8255, which is on the application of ARCO Oil and Gas Company for amendment of Division Order R-7395, San Juan County, New Mexico.

MR. CARR: May it please the Examiner, my name is William F. Carr with the law firm Campbell and Black of Santa Fe, appearing on behalf of ARCO Oil and Gas Company.

I have one witness who needs to be sworn.

MR. STAMETS: Any other appearances in this case?

Will the witness stand and be sworn, please?

(Witness sworn.)

MR. CARR: Mr. Stamets, as you may be aware, waterflooding began in the Horseshoe Gallup Field in 1960.

A little over, well, about a year ago ARCO appeared before you in Case 7931. The hearing was heard August 3rd, 1983, and at that time ARCO sought amendment of Order R-2210, that order originally having been entered by the Commission to approve water injection for pressure maintenance in the Horseshoe Gallup Field.

We sought an amendment to permit ARCO to inject polymer into certain wells on its "C" Lease.

Verbal approval was received from the Division to go forward with the injection of the polymers in October of 1983.

In November of '83 polymer was in fact injected and this is a qualified tertiary oil recovery project under the Crude Oil Windfall Profits Tax Act of 1980.

Injection of polymer took approximately four days.

Order R-7395 was entered by the Division on December 8, 1983, and that order contained Order Paragraph Five, which required annual tracer surveys on all the injection wells.

Today ARCO appears before you asking that that order be amended.

PEGGY WAISANEN,

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

DIRECT EXAMINATION

BY MR. CARR:

Q Would you state your full name and place of residence?

A My name is Peggy Waisanen. I live in Aurora, Colorado.

Q By whom are you employed?

A I work for ARCO Oil and Gas Company.

Q And in what capacity?

A I'm a petroleum engineer.

Q Were you the engineering witness in the hearing in August of 1983 in Case 7931?

A Yes, I was.

Q Were your qualifications as a petroleum engineer accepted and made a matter of record at that time?

A Yes.

Q Are you familiar with the application filed by ARCO Oil and Gas at that time and also the application in this case?

A Yes.

Q Are you familiar with the subject area and in particular production from the "C" lease?

A Yes, I am.

MR. CARR: Are the witness' qualifications acceptable?

MR. STAMETS: They are.

Q Would you briefly state what ARCO seeks with this application?

A ARCO is seeking revision of the Order R-7395 to delete requirement number five, which is requiring radioactive tracer surveys to be conducted on each of the

polymer injection wells.

Q Would you refer to what has been marked for identification as ARCO Exhibit Number One, identify this and review it for Mr. Stamets?

A Exhibit Number One is a map of the wells at Horseshoe Gallup.

The triangles highlight those wells into which we injected polymer November, 1983, and as you can see, all those wells are located on the "C" lease.

Q Will you now refer to ARCO Exhibit Number Two and review this for Mr. Stamets?

A Exhibit Number Two is "C" lease production. The heavy black curve is daily production plotted on a weekly basis, starting in January of 1983.

The dashed line is the established decline.

In July of 1983 we drilled Well No. 300 and the production jumped. The dashed line that's drawn there is parallel to the initial decline. As you can see, Well No. 300 did not change the initial decline.

In November of 1983 we injected polymer for a short period, as shown by the two lines, the two vertical lines on the plot.

Before that time and since that time strictly water has been injected into the "C" lease injection well.

Q Now, as I understand it, the two parallel

lines -- the uppermost of the two parallel lines merely reflects the established decline rate.

A That's correct.

Q Have you experienced any kind of an increase in production from these wells since the injection of polymer?

A There has been an increase, starting approximately in March. It is still questionable as to how much of this increase is due to the polymer and how much to other operations going on in the field.

Q The top line does not show your interpretation of the current decline for the "C" lease.

A No, it would not be current.

Q If ARCO needs to inject additional polymer into any of these wells it would have to come back to the Division for additional approvals, would it not?

A That is correct.

Q Would you now refer to what has been marked as ARCO Exhibit Number Three and review this for Mr. Stamets?

A Exhibit Number Three shows radioactive tracer surveys that were run on the Injection Well No. 219, which is one of the wells that we injected polymer into, and it is typical of the polymer injection wells.

The first page is the survey that was run just last week. The second page shows the survey that was run in August of 1983. That was run before the polymer was

injected.

The third page of the tracer surveys shows the survey that was run in December of '83, which was run after the polymer was injected.

As you can see, there's very little difference from page to page as to whether water is leaving the wellbore. There's no new information given on the survey that was taken last week.

Q Do these surveys show any adverse effect from the polymer injection?

A There is no adverse effect shown.

Q How much does it cost to run a -- one of these individual tests?

A It costs approximately $3000 per well.

Q And what was the original project cost for the polymer injection program?

A The total cost initially was $150,000.

Q How many years will you be running these tests on each of the subject wells?

A Probably about four years.

Q So what would that do to the cost of the polymer injection program?

A That would greatly increase the cost that we would have to pay for this. We would be spending, probably, $15,000 a year on injection surveys alone, so that could increase the cost by as much as 60 percent.

Q If the application to delete this re-

quirement is denied, will it result in the waste of hydrocarbons?

A Yes, it will. It will mean that this area reaches its economic limit earlier than it might if we are not forced to run these surveys, and reserves will be left in the ground that we could otherwise recover.

Q So there would be physical waste as well as economic waste.

A That is correct.

Q What would this do for possible plans for additional polymer injection in the remainder of the Horseshoe Gallup Unit?

A If we are forced to run annual tracer surveys, we will probably not expand this project to the rest of the field.

Q Could correlative rights be affected by the interest owners in the Horseshoe Gallup Unit if the application is denied?

A Yes.

Q And how would that occur?

A If we lose the production, then the interest owners and the royalty owners will lose.

Q Were Exhibits One through Three prepared by you or under your direction?

A Yes.

Q Can you testify as to their accuracy?

A Yes.

MR. CARR: At this time, Mr. Stamets, we would offer ARCO Exhibits One through Three into evidence.

MR. STAMETS: These exhibits will be admitted.

MR. CARR: That concludes our direct examination of this witness.

CROSS EXAMINATION

BY MR. STAMETS:

Q Ms. Waisanen, refresh my memory. I was not the examiner at the original hearing on this, but it seems that I remember the injections taking place down casing in these wells rather than through tubing under a packer.

A That is the case in four of them. Four of the wells are dual injectors where we're injecting down the annulus as well as down tubing.

Q Okay, and which well does not inject -- or which well does utilize tubing and a packer?

A All of them utilize tubing. There are four also that we're injecting down the annulus, and they would be 219, 221, 232, and 244.

Q Which one then does not?

A All of those also have injection down the tubing as well as 128, 134, 242, and 253.

Q 128, 134 --

A 242 and 253.

Q 253, so in the case of the 128, 134, 242 and 253 you do have a casing/tubing annulus that can be monitored for --

A No, it's not that the annulus can be monitored. It's -- there is no injection down the annulus in those cases.

Q Why can't the annulus be monitored?

A You mean with a tracer survey? I guess I don't understand what you're getting at.

Q A bradenhead test so that the annulus can periodically be checked for pressure or a water flow which would indicate the failure of the tubing/packer.

A Yes.

Q So the last four wells can be checked.

A Yes.

Q All right. Now, under the Safe Drinking Water Act and the privacy application of the New Mexico Oil Conservation Division, approved by the Environmental Protection Agency, we're required to demonstrate the mechanical integrity of injection wells, or operators are required to demonstrate that at least once every five years, and that has two sides to it. One, that the tubing and packer are all right, no internal leaks.

The other side of that is that there is that there is no fluid movement adjacent to the wellbore.

We have been running periodic bradenhead

tests, which we feel have a tendency to show that; however in the case of wells that are injecting down casing, where there's no annulus for us to check, that's somewhat difficult, and one of the ways of checking this is by running tracer surveys or perhaps a temperature survey.

If -- can such a survey be run on these wells?

A No. We attempted to run a survey to check the injection on one of the wells that was injecting down the annulus and what has to be done in a case like that, at least in these wells with small wellbores, is that the survey, or the radioactive substance injected at the surface and the testing tool is going down the tubing.

By the time the radioactive slug gets to the perforationd it's so dispersed that there is no reading. The injection rates are relatively low and the volume is so great, the volume of water from the surface to the perforations, that the slug is too dispersed to give anything meaningful.

Q Is it possible to shut those wells in, both sides, tubing and casing, and run a temperature survey after stabilization is achieved and read anomalous temperatures opposite the casing?

A We did do temperature surveys for all the -- the tubing injection was those that we ran surveys on, and essentially got no results. The temperature, bottom hole temperature in these wells is 87 degrees, so the temp-

erature variance is so slight that we weren't able to identify anything.

Q That leaves us with a question. How do we demonstrate that there is no fluid movement behind the casing on those wells that are injecting through casing?

Is there an answer to that question?

A I don't know it.

MR. STAMETS: Let's go off the record a minute.

(Thereupon a discussion was had off the record.)

MR. STAMETS: Are there any other questions of this witness? She may be excused.

Anything further in this case?

MR. CARR: Nothing further, Mr. Stamets.

MR. STAMETS: 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. 8255, heard by me on 7-11, 1984.

Richard L. Stamets, Examiner
Oil Conservation Division