

STATE OF NEW MEXICO  
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT  
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY )  
THE OIL CONSERVATION DIVISION FOR THE )  
PURPOSE OF CONSIDERING: ) CASE NO. 13,022  
)  
APPLICATION OF POGO PRODUCING COMPANY )  
FOR APPROVAL OF A PILOT PRESSURE )  
MAINTENANCE PROJECT AND TO QUALIFY THE )  
PROJECT FOR THE RECOVERED OIL TAX RATE )  
PURSUANT TO THE ENHANCED OIL RECOVERY )  
ACT, EDDY COUNTY, NEW MEXICO )

**ORIGINAL**

REPORTER'S TRANSCRIPT OF PROCEEDINGS

EXAMINER HEARING

BEFORE: DAVID R. CATANACH, Hearing Examiner

April 10th, 2003

Santa Fe, New Mexico

**RECEIVED**

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Oil Conservation Division

This matter came on for hearing before the New Mexico Oil Conservation Division, DAVID R. CATANACH, Hearing Examiner, on Thursday, April 10th, 2003, at the New Mexico Energy, Minerals and Natural Resources Department, 1220 South Saint Francis Drive, Room 102, Santa Fe, New Mexico, Steven T. Brenner, Certified Court Reporter No. 7 for the State of New Mexico.

\* \* \*

STEVEN T. BRENNER, CCR  
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## I N D E X

April 10th, 2003  
Examiner Hearing  
CASE NO. 13,022

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## A P P E A R A N C E S

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## FOR THE APPLICANT:

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\* \* \*

1                   WHEREUPON, the following proceedings were had at  
2   9:16 a.m.:

3  
4  
5  
6                   EXAMINER CATANACH: At this time we'll call the  
7   hearing back to order and call Case 13,022, the Application  
8   of Pogo Producing Company for approval of a pilot pressure  
9   maintenance project and to qualify the project for the  
10   recovered oil tax rate pursuant to the Enhanced Oil  
11   Recovery Act, Eddy County, New Mexico.

12                  Call for appearances in this case.

13                  MR. BRUCE: Mr. Examiner, Jim Bruce of Santa Fe,  
14   representing the Applicant.

15                  I have three witnesses.

16                  EXAMINER CATANACH: Call for additional  
17   appearances.

18                  Okay --

19                  MR. BRUCE: Mr. Examiner, I would reflect that  
20   Mr. Carr has entered an appearance on behalf of Yates  
21   Petroleum Corporation. He's not here today. Mr. Boneau  
22   from Yates is here.

23                  EXAMINER CATANACH: Okay, will the witnesses  
24   please stand to be sworn in?

25                  (Thereupon, the witnesses were sworn.)

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SCOTT McDANIEL,

the witness herein, after having been first duly sworn upon his oath, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BRUCE:

Q. Will you please state your name and city of residence for the record?

A. My name is Scott McDaniel, and I live in Midland, Texas.

Q. Who do you work for and in what capacity?

A. I work for Pogo Producing Company, and I'm a district landman for them.

Q. Have you previously testified before the Division?

A. Yes, I have.

Q. And were your credentials as an expert petroleum landman accepted as a matter of record?

A. Yes, they were.

Q. Does your area of responsibility at Pogo include southeast New Mexico?

A. Yes, it does.

Q. And are you familiar with the land matters involved in this Application?

A. I am.

MR. BRUCE: Mr. Examiner, I'd tender Mr. McDaniel

1 as an expert petroleum landman.

2 EXAMINER CATANACH: He is so qualified.

3 Q. (By Mr. Bruce) Mr. McDaniel, could you identify  
4 Exhibit 1 and briefly describe what Pogo seeks in this  
5 case?

6 A. Yes, Pogo seeks an order approving a pilot  
7 pressure maintenance project in the Delaware formation for  
8 its State Lease LH 1523.

9 Q. And what is Exhibit 1?

10 A. Exhibit 1 is a land plat that I have prepared in  
11 connection with this case. It covers a portion of Township  
12 22 South, Range 31 East, there in Eddy County, with certain  
13 leases highlighted on the plat there. The project area  
14 that we're interested in covers the southeast quarter of  
15 Section 2 and is all within lease LH 1523.

16 Shown in blue on this plat are lands and wells  
17 that are operated by Yates Petroleum Corporation, shown in  
18 orange are lands and wells that are operated by Penroc Oil  
19 Corporation, and shown in yellow are lands and wells that  
20 are operated by Pogo Producing Company.

21 On this plat also what I'm going to call the  
22 color purple is an outline reflecting the area comprising  
23 our pressure maintenance project.

24 Q. And the green circle is the proposed injection  
25 well?

1 A. Yes, that's correct.

2 Q. What is the well name, and where is it located?

3 A. The well name is the State 2 Well Number 5, and  
4 it is located 1300 feet from the south and east lines of  
5 Section 2.

6 Q. And that's an unorthodox location. Was that  
7 previously approved by the Division?

8 A. Yes, it was. The location was approved by Order  
9 NSL-4774-SD.

10 Q. What is the current status of that well?

11 A. That well is not a productive well. It's  
12 awaiting further work.

13 Q. It was drilled last year, was it not?

14 A. Yes, it was. In fact it was spud, I believe, on  
15 September the 18th of 2002.

16 Q. Okay. It was originally drilled with the  
17 prospect of being a producing well; is that correct?

18 A. Yes, it was.

19 Q. And the geologist and engineer will further  
20 discuss this well?

21 A. Yes, they will.

22 Q. How many producing wells are in the project area?

23 A. I believe there's four producing wells there in  
24 the project area. They're referred to as the State 2 Well  
25 Numbers 1 through 4.

1 Q. And those are marked and identified on Exhibit 1?

2 A. Yes, they are.

3 Q. And are they all existing Brushy Canyon  
4 producers?

5 A. Yes, they are existing Brushy Canyon Delaware  
6 producers.

7 Q. What pool are these wells in?

8 A. These wells are located within the Lost Tank-  
9 Delaware Pool.

10 Q. And is that developed on statewide rules?

11 A. Yes, it is.

12 Q. Who was notified of this Application?

13 A. The State, since it is the surface owner, Penroc  
14 Oil Corporation and Yates Petroleum Corporation were also  
15 notified, and they're the only operators within a half mile  
16 of our injection well, our proposed injection well.

17 Q. Has Pogo been in contact with the other two  
18 operators?

19 A. Yes, we have been.

20 Q. And what about Penroc? Did they have any  
21 comments?

22 A. Yes, Penroc had contacted us after receiving  
23 their notice, and they asked to see a copy of our well  
24 logs, which we had provided them a copy of, of those logs,  
25 for their review. And they have not indicated any



1 objection to our Application.

2 Q. And what about Yates?

3 A. We have been in contact with Yates, and I believe  
4 we have rectified any concerns that they may have had in  
5 connection with our project.

6 Q. And will Pogo's engineer further discuss the  
7 matters that were discussed with Yates?

8 A. Yes, they will.

9 Q. And is Exhibit 2 simply my affidavit of notice?

10 A. Yes, it is.

11 Q. And were Exhibits 1 and 2 prepared by you or  
12 compiled from company business records?

13 A. Yes.

14 Q. And in your opinion, is the granting of this  
15 Application in the interests of conservation and the  
16 prevention of waste?

17 A. Yes.

18 MR. BRUCE: Mr. Examiner, I'd move the admission  
19 of Pogo Exhibits 1 and 2.

20 EXAMINER CATANACH: Exhibits 1 and 2 will be  
21 admitted.

22 Mr. Bruce, when you were in the office the other  
23 day I showed you a letter from Penroc. Is that the same  
24 letter that references this case, or do you recall? We had  
25 received a letter from Penroc --

1 MR. BRUCE: I didn't see that, Mr. Examiner.

2 EXAMINER CATANACH: -- I can't recall. I'm going  
3 to go up and see if I can track that down. But I thought  
4 it might have been in relation to this case.

5 MR. BRUCE: I do not recall, and I haven't  
6 received anything from Penroc.

7 EXAMINATION

8 BY EXAMINER CATANACH:

9 Q. Okay. Now, Mr. McDaniel, this is one State  
10 lease, it's all owned by your company; is that correct?

11 A. Yes, that's correct, Pogo owns 100 percent of the  
12 working interest in this lease.

13 Q. Okay. And have you talked to the Commissioner of  
14 Public Lands about your proposal at all or --

15 A. I have not personally, no.

16 EXAMINER CATANACH: You might want to -- Mr.  
17 Bruce, you may want to talk to the Commissioner about that,  
18 see if they have any additional requirements or  
19 stipulations.

20 MR. BRUCE: I'll call Mr. Albers after the  
21 hearing, Mr. Examiner.

22 EXAMINER CATANACH: Okay. I think that's all I  
23 have.

24 But I'm going to run up and get that -- see if I  
25 can find that letter and see if it is, in fact, in relation

1 to this case. I should be back in a couple minutes.

2 (Off the record)

3 MR. BRUCE: Mr. Examiner, while you were absent  
4 Mr. Boneau had received a copy of the letter, and so he  
5 gave us a copy.

6 EXAMINER CATANACH: Okay, that was addressed to  
7 you. And it does indicate that this is a letter from  
8 Penroc to Pogo, and it looks like they were requesting more  
9 information, and it doesn't look like they're objecting to  
10 the Application, so...

11 MR. BRUCE: Yeah. And Mr. Examiner, we did give  
12 him the logs, and he expressed concerns about the maximum  
13 injection rate of 6000 barrels a day, and our engineer will  
14 address that further. That was an issue that Yates  
15 Petroleum was concerned with, and we will mention that in  
16 our engineering testimony.

17 EXAMINER CATANACH: Okay, I'm going to  
18 incorporate this letter into the record in this case.

19 And let's see if I had anything else. I believe  
20 that's all I have of this witness, he --

21 MR. BRUCE: Good, because I've already dismissed  
22 him.

23 (Laughter)

24 EXAMINER CATANACH: Good job. Okay, you may  
25 proceed.

1                                    WILLIAM E. HARDIE,  
2       the witness herein, after having been first duly sworn upon  
3       his oath, was examined and testified as follows:

4                                    DIRECT EXAMINATION

5       BY MR. BRUCE:

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

8                A.     My name is William Hardie, I live in Midland,  
9       Texas.

10              Q.     Who do you work for?

11              A.     I work for Pogo Producing Company as a district  
12       geologist.

13              Q.     Have you previously testified before the  
14       Division?

15              A.     Yes, I have.

16              Q.     And were your credentials as an expert accepted  
17       as a matter of record?

18              A.     They were.

19              Q.     And are you familiar with the geology involved in  
20       this Application?

21              A.     Yes, I am.

22                      MR. BRUCE:   Mr. Examiner, I'd tender Mr. Hardie  
23       as an expert petroleum geologist.

24                      EXAMINER CATANACH:   Mr. Hardie is so qualified.

25              Q.     (By Mr. Bruce)   Mr. Hardie, could you identify

1 Pogo Exhibit 3 and describe the injection zone we're  
2 discussing here today?

3 A. Exhibit 3 is -- I'll call it a type log, but it's  
4 the actual -- the well that we're proposing to convert to  
5 an injector. And on the left-hand side I'm showing the  
6 entire Delaware section.

7 At the top of the left-hand side you see the base  
8 of the salt at a measured depth of 4083, and then shortly  
9 underneath that you see the Delaware lime, which is the  
10 beginning of the Delaware section. So you're looking at  
11 the Bell Canyon interval; that's a major formation top.  
12 Below that at 5273 is the Cherry Canyon formation, another  
13 major formation top. And then further down at 6539  
14 measured depth is the top of the Brushy Canyon. And then  
15 near the bottom of the well is the Bone Spring at a  
16 measured depth of 8290.

17 In between those major tops you also see some  
18 internal subdivisions that Pogo uses to break these  
19 formations up even further.

20 On the right-hand side you see a blow-up of the  
21 pertinent part of this log. And again, it starts at the  
22 top of this blow-up. Part of the log on the right has the  
23 top of the Brushy Canyon formation near the top of that,  
24 and then below that some subdivisions that Pogo uses to  
25 further subdivide the Brushy Canyon. So we're looking at

1 the upper part of the Brushy Canyon formation.

2 Our two proposed injection intervals are -- the  
3 first one, the uppermost, is at the lower part of the  
4 Brushy "G3" interval, and then the lower injection zone is  
5 near the top of the Brushy "F" interval.

6 I would mention that the Brushy "F" sand that we  
7 propose to inject into is the main pay in this field, and  
8 it's present throughout the field. Virtually every well  
9 drilled in the field is completed in this sand. So it's  
10 almost a blanket sand.

11 The "G3" zone above that is much less -- or is  
12 less continuous and is only sporadically found with  
13 sufficient porosity to be productive. But in the pilot  
14 injection area, it does happen to be well developed in the  
15 injection well itself and most of the surrounding first  
16 ring of wells. So we felt like it was also a good  
17 candidate for injection and sweeping of hydrocarbons into  
18 producing wells.

19 Q. Please move on to your Exhibit 4 and discuss the  
20 structure in the area of the injection well.

21 A. Exhibit 4 -- And I'll refer back to the Exhibit 3  
22 type log -- Exhibit 4 is a structure map on the Brushy "F",  
23 and on your type log you can see which marker that is.  
24 It's on the right-hand side towards the bottom of that  
25 blown-up log interval, you can see the Brushy "F" marker.

1           The Brushy "F" is very near the top of the main  
2 pay in this field, and it's approximately 150 feet below  
3 the "G3" interval that we propose to inject into, so it's a  
4 good representation of structure for both of the injection  
5 intervals.

6           Looking at Exhibit 4, the structural contour  
7 interval is 20 feet. We're essentially looking at regional  
8 southeast dip. There are no prominent structural features.  
9 There are a few very subtle noses and lows, but the real  
10 point to make with this exhibit is that structure does not  
11 play a dominant role in trapping the hydrocarbons in this  
12 reservoir.

13           I will mention that the sand itself does get wet  
14 and become water-productive below an elevation of about  
15 minus 3500 feet subsea, which would be off on the right-  
16 hand side of this map. And everything above that elevation  
17 is considered to be productive.

18           Q.    Okay, what is Exhibit 5?

19           A.    Exhibit 5 is again a map on the Brushy "F" sand.  
20 In this case we're looking at a net porosity map on the  
21 Brushy "F" sand, and I've used -- in order to construct  
22 this map, I've used a 14-percent density porosity cutoff on  
23 that sand.

24           On the map you can see that the contour interval  
25 is approximately five feet, and this is the main pay for

1 this field. And as you see, it varies in thickness from  
2 perhaps 10 feet in the thinner parts of the field to  
3 upwards of 40 or 50 feet in the thicker parts of the field.

4 This is probably an appropriate map to discuss  
5 our interpretation of how this sand was deposited.

6 If you look at the right-hand side of this map  
7 you'll see a blue feeder channel. That is a main channel  
8 system, a very thick channel system that we believe is the  
9 source for the sands that are productive in this field.

10 We believe that as these sands were being  
11 deposited, this feeder channel would occasionally receive  
12 such a great amount of influx of sand that it would  
13 overflow and create these spillover lobes that you see  
14 represented by the isopach map, and these spillover lobes  
15 are what constitute the reservoir in this field.

16 These lobes vary in net porosity, as I mentioned,  
17 from 10 to perhaps 40 feet in thickness. But it's  
18 important to note that even the thin parts of the sand are  
19 productive. And as I mentioned before, virtually every  
20 well in the field is productive from this sand interval.

21 Also shown on Exhibit 5 and also on the previous  
22 Exhibit Number 4 is the outline with a purple box of the  
23 proposed pilot injection project.

24 Q. Why don't you move on to -- Well, you've got two  
25 cross-sections, marked Exhibit 6A and 6B. Could you



1 identify those for the Examiner and tell him about these a  
2 little bit?

3 A. The two cross-sections that I've included as  
4 Exhibit 6, the orientation of those cross-sections is also  
5 shown on the maps, both Exhibit 4 and 5.

6 The first one I'll discuss is Exhibit 6A, which  
7 is cross-section A-A'. It's the southernmost of the two  
8 cross-sections shown. These extend east-west across the  
9 pilot project area. And I've constructed these mainly just  
10 to show the regional and localized correlations that I've  
11 used in interpreting the maps that I've presented thus far.

12 On the cross-section you can see we're looking at  
13 the upper part of the Brushy Canyon formation, and I've  
14 shown some of the various internal picks that Pogo uses in  
15 order to subdivide these zones.

16 I'll point out that the two primary zones of  
17 interest are highlighted in yellow. The "G3" sand is one  
18 of them that we propose to inject into. And below that,  
19 near the bottom of the cross-section, again highlighted in  
20 yellow, is the Brushy "F" sand.

21 This simply shows the lateral relationships  
22 between the proposed injection well that's in the middle of  
23 the cross-section and some of the surrounding wells that  
24 will receive the benefit of the injection.

25 I would also point out, if you look closely --

1 These are porosity logs on this cross-section, and you can  
2 see that within the "F" sand virtually all these wells have  
3 sufficient porosity over 14 percent, so that not only is  
4 the sand continuous but the porosity itself is also  
5 continuous from well to well.

6 On the other hand, looking up at the "G3" sand  
7 above that, you see the proposed injection well has good  
8 porosity in it, over 14 percent, and the two adjacent wells  
9 also have good porosity. But once you move to the next --  
10 the wells on either end of this cross-section, the  
11 porosities are fairly low. So it's unlikely that we will  
12 effectively sweep hydrocarbons beyond the first ring of  
13 wells around our proposed injector.

14 The second half of the Exhibit is labeled 6B, and  
15 it's the northernmost of these two cross-sections. Again,  
16 it's shown on Exhibits 4 and 5, where this cross-section  
17 lies.

18 Again, I've placed the proposed injector well at  
19 the middle of this cross-section, and again I'm showing  
20 just the lateral relationships between the proposed  
21 interval and the adjacent wells, with the two proposed  
22 injection intervals highlighted in yellow. This is very  
23 similar to Exhibit 6A.

24 Q. Before we got off of this exhibit, maybe this  
25 would be a good time to mention the proposed injection

1 well, the Number 5 well. That was drilled last year, was  
2 it not?

3 A. That was drilled last year, originally intended  
4 as a -- to be a producer. We were concerned about  
5 reservoir depletion so we did run a drill-stem test across  
6 the Brushy "F" sand, and that test showed the "F" sand to  
7 be severely depleted, so much so that we concluded that  
8 this well would be better utilized as an injection well so  
9 that we could attempt to maintain pressure in this  
10 localized area, and perhaps even provide some kind of sweep  
11 of hydrocarbons to the adjacent producers.

12 Q. The well was never completed as a producer, was  
13 it?

14 A. It has not been completed as a producer. The  
15 goal was to try to get it approved as an injector, and  
16 that's why we're here today.

17 Q. Are the proposed injection zones continuous  
18 across the project area?

19 A. Yes, they are.

20 Q. Is there a freshwater-bearing zone in this area?

21 A. I believe the shallow Santa Rosa formation does  
22 bear freshwater. My recollection is that there are no  
23 freshwater wells within a mile of this project area, but I  
24 think that perhaps within two miles there may be a  
25 freshwater well. The Santa Rosa is very shallow,

1 approximately 500 to 600 feet deep.

2 Q. Are there any faults in this area which would  
3 connect the freshwater zone with the injection zone?

4 A. There are none.

5 Q. Were Exhibits 3 through 6B prepared by you or  
6 under your supervision?

7 A. They were.

8 Q. And in your opinion is the granting of this  
9 Application in the interests of conservation and the  
10 prevention of waste?

11 A. Yes, it is.

12 MR. BRUCE: Mr. Examiner, I'd move the admission  
13 of Exhibits 3 through 6B.

14 EXAMINER CATANACH: Exhibits 3 through 6B will be  
15 admitted.

16 EXAMINATION

17 BY EXAMINER CATANACH:

18 Q. Mr. Hardie, where is your proposed project in  
19 relation to WIPP? Is that anywhere near here?

20 A. Yeah, as a matter of fact on both Exhibits 4 and  
21 5 you can see the upper right-hand corner of the WIPP site.  
22 If you look in Section 15 at the bottom left-hand of each  
23 of these exhibits, you'll see a red line. That's the upper  
24 right-hand corner of the WIPP site.

25 It's worth pointing out too that the extent of

1 this field as we move from the northeast to the southwest,  
2 we haven't really exploited the extent of the field. We've  
3 run into a potash buffer and the WIPP site, which has  
4 prevented us from continuing development. So the way the  
5 wells are distributed does not necessarily indicate the  
6 extent of the entire reservoir.

7 Q. Now, as I recall, don't you guys have another  
8 similar project down to the south of this?

9 A. There is a similar project approximately eight  
10 miles south of this.

11 Q. It's that far away, okay.

12 A. Yes. I would mention that this project is  
13 different from that previous project in that that project  
14 involved converting a former producer into an injector, and  
15 that former producer had been fracture-stimulated. And we  
16 feel like if we can possibly avoid fracture-stimulating  
17 this well and inject into the zone without it having been  
18 fracture-stimulated, we might have a more effective sweep  
19 and better containment of the injection interval.

20 Q. Do you guys have sufficient porosity and  
21 permeability that it will take water, do you think?

22 A. We think it will take water. We haven't actually  
23 tested to see if it will up to this point, and our  
24 assumption will be that it will not take water at the rate  
25 of a well that had been fracture-stimulated, but

1     nonetheless that if it takes water at, you know, perhaps  
2     hundreds of barrels per day, that that would still provide  
3     an effective means of maintaining pressure and perhaps  
4     sweeping hydrocarbons towards producing wells.

5           Q.     Now, you're confident -- As far as the geology  
6     goes, there's no potential communication between your  
7     injection zone and any of the zones that WIPP is completed  
8     in?

9           A.     I'm confident that we will not be affecting any  
10    of the zones of the WIPP site.

11          Q.     Okay.

12          A.     They're quite a distance vertically from where  
13    this activity occurs and even quite a distance horizontally  
14    from the WIPP site. We're approximately a mile and a half  
15    away from the WIPP site, the edge of the WIPP site.

16          Q.     Okay. Now, the Lost Tank-Delaware Pool, that  
17    encompasses the entire Delaware formation; is that correct?

18          A.     Yes, it does.

19          Q.     Now, in this pool, though, are you testifying  
20    that the only productive interval is the Brushy Canyon?

21          A.     I'm not testifying to that, I'm -- The Brushy "F"  
22    interval is productive in virtually every well within this  
23    pool, but there are other, more lens-type sands that can be  
24    productive here and there within the field, and within this  
25    pilot area the main producing intervals would be those two

1 that we propose to inject into the Brushy "F" and the  
2 Brushy "G3".

3 Q. Okay, but as far as the --

4 A. Elsewhere in the field, you do see pays that  
5 occur in the lower part of the Brushy formation. They're  
6 not good pays, but they are commonly completed. And you  
7 may also see pays in the lower part of the Cherry Canyon  
8 formation, all of them within the Delaware group. But  
9 those types of pays are much more sporadically found;  
10 they're not everywhere in the field.

11 Q. As far as your project area, though, you've only  
12 got these -- basically these two producing sands; is that  
13 correct?

14 A. That is correct. There are some other sands that  
15 don't look like they would be productive, that can be  
16 productive elsewhere in the field. They don't look like  
17 they would be here.

18 Q. Now, as far as this being a pilot project, are  
19 there any plans to expand it any way?

20 A. I think, you know, if this pilot is successful in  
21 sweeping hydrocarbons and maintaining reservoir pressure, I  
22 think the real benefit would probably be to Yates  
23 Petroleum, because they have most of the offsetting  
24 acreage, and they may consider themselves perhaps drilling  
25 unorthodox wells to provide injection support for their

1 producers.

2 If it is successful, most of Pogo's acreage is  
3 south of here, and we might consider expanding the flood  
4 concept to that acreage down to the south.

5 Q. Okay, it looks like you guys do have some acreage  
6 to the east and to the southeast of this.

7 A. That is correct.

8 Q. Is that more or less the same type of situation  
9 in that acreage?

10 A. It is, and this flood could, if successful, be  
11 expanded to that adjacent acreage. There are no current  
12 plans to try to unitize the entire field. That is a  
13 possibility, but right now we're not really -- that's not  
14 in our plan.

15 Q. Is it going to be your intent to try and regulate  
16 the flow of water into each of these zone, or are you just  
17 going to let it go where it will?

18 A. Currently don't think that we will attempt to  
19 regulate the flow of water in one zone or the other. We  
20 will attempt to inject into both zones simultaneously. My  
21 suspicion is that most of the water will go into that  
22 Brushy "F" zone, mainly because it is so continuous and  
23 developed throughout the field. And it's also  
24 significantly depleted, and that will act as a pressure  
25 sink that should allow us to inject abundant quantities of



1 water.

2 Q. Okay. Now the Brushy "F", that's the main  
3 producing zone in these wellbores?

4 A. That is correct.

5 EXAMINER CATANACH: I think that's all I have of  
6 this witness, Mr. Bruce.

7 THOMAS E. GENTRY,

8 the witness herein, after having been first duly sworn upon  
9 his oath, was examined and testified as follows:

10 DIRECT EXAMINATION

11 BY MR. BRUCE:

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

14 A. Thomas Gentry, Midland, Texas.

15 Q. And what is your occupation?

16 A. I'm a consulting petroleum engineer.

17 Q. And have you been retained by Pogo with respect  
18 to this matter?

19 A. Yes, sir.

20 Q. Have you previously testified before the  
21 Division?

22 A. I have not.

23 Q. Would you please summarize your educational and  
24 employment background?

25 A. I have a bachelor's of science in petroleum

1 engineering from New Mexico Institute of Mining and  
2 Technology, 1970. I'm a licensed professional engineer in  
3 the State of Texas, Certificate Number 83457, and I have 32  
4 years of total industry experience, six years as an  
5 independent consultant and 26 years with medium to large  
6 independent oil and gas companies.

7 Q. Does your area of responsibility with respect to  
8 your employment by Pogo include this area of southeast New  
9 Mexico?

10 A. Yes.

11 Q. And are you familiar with the engineering matters  
12 related to this Application?

13 A. I am.

14 MR. BRUCE: Mr. Examiner, I'd tender Mr. Gentry  
15 as an expert petroleum engineer.

16 EXAMINER CATANACH: Mr. Gentry is so qualified.

17 Q. (By Mr. Bruce) Just briefly, Mr. Gentry,  
18 referring back to Exhibit 1, again what are the initial --  
19 or what is the injection and the producing wells for the  
20 project?

21 A. The injection well is proposed to be the State 2  
22 Number 5, located in the center of that southeast quarter  
23 section, Section 2, and then the four producing wells,  
24 State 2 Numbers 1 through 4, located on the exterior limits  
25 there or extent of the lease.

1 Q. Let's discuss the proposed injection operations.  
2 Could you identify Exhibit 7 for the Examiner?

3 A. Yes, that is the Form C-108 application for  
4 injection and the associated attachments.

5 Q. Okay. Why don't we run through that a little  
6 bit, starting with page 3? What does that show?

7 A. That's a wellbore schematic for the injection  
8 well after completion, and it gives the pertinent  
9 information about the casing program and the cementing  
10 program and schematically shows the injection interval.

11 Q. Has this well been properly cased and cemented so  
12 that no injected water can escape to -- out of the Delaware  
13 formation?

14 A. Yes.

15 Q. Now, Mr. Hardie mentioned that a DST was run on  
16 this well. What did it show?

17 A. Well, it showed that there had been significant  
18 depletion, as he had stated. Bottomhole pressure was  
19 measured approximately 950 pounds per square inch.

20 Q. Okay. And so the decision was made not to  
21 complete it as a producing well?

22 A. That's correct.

23 Q. Now, referring to pages 4 through 8, how many  
24 wells are there in the area of review?

25 A. There's a total of 14 wells in that area, not

1 including the proposed injector.

2 Q. Okay. Those are 14 wells that penetrate the  
3 Delaware; is that correct?

4 A. That's correct.

5 Q. Okay. And do pages 5 through 8 contain data on  
6 those 14 wells?

7 A. Yes, they do.

8 Q. Are any of these wells plugged and abandoned?

9 A. Yes, there is one, that SCL Federal Well Number  
10 1. That well is located in the southwest quarter of the  
11 southwest quarter of Section 1.

12 Q. Okay. Was that well drilled to the depth that  
13 Pogo plans on injecting into?

14 A. No, it was not, it just was drilled and just  
15 penetrated the very uppermost part of the Delaware section.

16 Q. Okay, the Bell Canyon?

17 A. Correct.

18 Q. Of the wells in the area of review, have they all  
19 been properly completed or plugged, and will they prevent  
20 the movement of fluids to other zones?

21 A. Yes, they have.

22 Q. Could you discuss a typical -- Most of these  
23 wells are fairly new, are they not?

24 A. They are. They've all been drilled since the  
25 early 1990s. They all have surface casing exceeding 800

1 feet down below the Santa Rosa water sands. They have an  
2 additional intermediate water string that's in excess of  
3 4100 feet into the basal anhydrite section of the -- below  
4 the salt. And both of those strings are cemented to the  
5 surface. And then the typical Pogo well has the production  
6 string either cemented to surface or tied back very high  
7 inside the intermediate.

8 Q. Okay. In your opinion, they've been properly  
9 drilled and completed?

10 A. Yes.

11 Q. Now let's move on to page 9 of the exhibit. What  
12 do you -- Well, let's start at the top. What does Pogo  
13 request insofar as maximum injection rates?

14 A. The maximum injection rate that we are requesting  
15 at this hearing is 1200 barrels per day.

16 Q. Okay. Now the Application states 6000 barrels a  
17 day. Could you discuss why that has been reduced?

18 A. Yes, a higher than expected rate was originally  
19 requested, realizing that the maximum authorized pressure  
20 would be the limiting factor. Engineering personnel at  
21 Yates Petroleum were uncomfortable with that higher volume,  
22 and Pogo agreed to lower the requested rate to the 1200  
23 barrels per day.

24 Q. Okay. And so you would ask that the Application  
25 be amended to reflect 1200 barrels a day, rather than 6000

1 barrels a day?

2 A. Yes.

3 Q. What do you anticipate as an average injection  
4 rate?

5 A. We anticipate that the average would be around  
6 1000 barrels a day, maybe -- you know, between 800 and 1000  
7 barrels a day.

8 Q. What will be the injection pressures?

9 A. Approximately 1000 pounds on average and not to  
10 exceed the maximum.

11 Q. Which is .2 p.s.i. per foot?

12 A. Correct.

13 Q. Okay. Is there a proposed stimulation program  
14 for the injection well?

15 A. Yes, we plan to acidize both the zones  
16 independently with a total of 4000 gallons of 7.5-percent  
17 hydrochloric acid, and that would be distributed between  
18 the two zones.

19 Q. Mr. Hardie mentioned this briefly, but are there  
20 any sources of fresh water in this area? About two miles  
21 of this area there is a freshwater well from the Santa Rosa  
22 that we've obtained an analysis, and that was attached to  
23 the Application.

24 Q. That's the last page, page 13 of the C-108?

25 A. That's correct.

1           Q.   Okay.  What is the source of your injection  
2   water?

3           A.   This will be water that's currently being  
4   produced from other Pogo-operated Delaware wells and leases  
5   there in the area.  And then if necessary we may make  
6   agreements to inject offset operators' production -- or  
7   produced waters, you know, from the same zones, the same  
8   Delaware zones.

9           Q.   Okay, because it's Delaware-produced water, there  
10   won't be any compatibility problems, will there?

11          A.   No.

12          Q.   Let's move on to your next exhibit, Mr. Gentry.  
13   What does Exhibit 8 show?

14          A.   Exhibit 8 is a schematic depiction of the  
15   wellbore configuration of all of the wells within a half-  
16   mile radius.  And it shows the proposed injection interval  
17   in the State 2 Number 5 as well as the information on where  
18   the other wells are completed.  Of course, the outside  
19   operated wells, that data comes from public record, and  
20   then all of the individual zones are -- and therefore some  
21   of those may not depict the actual perforations, but just  
22   an overall perforating from top to bottom that's been  
23   reported.

24                At the bottom there's some tabular information  
25   about the current production rate in barrels per day and

1 MCF per day of each of the wells, and then the cumulative  
2 production is also given.

3 Q. What -- In this area, if you can give offhandedly  
4 some average producing rates for these wells, what are  
5 they?

6 A. Well, currently these wells are -- the wells on  
7 our lease are averaging about 15 barrels of oil per day, 29  
8 barrels of water and 30 MCF per day, and that's just  
9 slightly below, plus or minus, a couple of barrels with the  
10 average for the entire half-mile radius area.

11 Q. What's the average GOR for the wells in this  
12 area?

13 A. About 1800 currently.

14 Q. Are these wells stripper wells?

15 A. They are not.

16 Q. What is Exhibit 9?

17 A. Exhibit 9 is a kind of a tabular representation  
18 of the wells as they appear -- as they're configured on the  
19 lease itself, which shows the injector in the center, and  
20 then -- attributable to each well, and then with a lease  
21 summary towards the bottom. That gives the estimated  
22 ultimate primary oil and gas for the "F" and "G3" zones in  
23 each of the wells, as well as the ultimate secondary oil  
24 and gas that's been estimated to be recovered at each  
25 location.



1           And then in the summary below for the entire  
2     State 2 Lease, it gives the summary of all those numbers  
3     and indicates that we are expecting to recover about 95,000  
4     barrels of oil and about 56 million cubic feet of gas in  
5     incremental production.

6           Q.     What did you use to estimate the incremental  
7     production, or how did you --

8           A.     I arrived at that, assuming a one-to-one  
9     secondary-to-primary ratio, and that's strictly for the "F"  
10    and "G3" zones in each of the wells.

11          Q.     Okay. What does Exhibit 10 reflect, Mr. Gentry?

12          A.     Exhibit 10 is a composite production graph for  
13    this lease, and the lowermost curves on the -- or the  
14    lowermost forecasted curves beyond the actual -- The actual  
15    is up through January of 2003, but I have two forecasted  
16    curves.

17                 The lowermost curve is about -- slightly under  
18    11-percent decline rate, and that reflects the current  
19    status of the production on the lease.

20                 And then the upper curve is a production curve at  
21    approximately 6-percent decline rate. If the proposed  
22    injection recovers the additional oil, 95,000 barrels  
23    expected, that 6-percent decline rate would allow us to  
24    recover that amount of incremental barrels through the life  
25    of this lease.

1 Q. So looking at this data, you don't anticipate an  
2 increase in producing rates, but what you do anticipate is  
3 a flattening of the decline rates of the gas-oil ratio?

4 A. That is correct.

5 Q. Will the pressure maintenance project result in  
6 an increase in the amount of crude oil ultimately recovered  
7 from this reservoir?

8 A. Yes.

9 Q. What is Exhibit 11?

10 A. Exhibit 11 is a tabulation showing the future  
11 cost or the remaining cost to be expended on this project  
12 to complete the well and install the necessary surface  
13 facilities, and those costs would total about \$200,000.

14 And then below that is the estimated value of the  
15 incremental production of 95,000 barrels of oil and 56  
16 million cubic feet of gas. And at those assumed pricing  
17 numbers there on the table, the incremental value would be  
18 \$2,375,000.

19 Q. So you anticipate recovering -- receiving extra  
20 revenues which would exceed the costs of the project?

21 A. Yes.

22 Q. And the project area requested is, again, just  
23 the southeast quarter of Section 2?

24 A. That's correct.

25 Q. Now, as far as the project allowable, would you

1 simply request the depth bracket allowable times the number  
2 of producing wells, or the depth bracket allowable times  
3 four, for the project?

4 A. Yes.

5 Q. That would be plenty of -- That would cover  
6 plenty of the production that you anticipate?

7 A. Yes, it would.

8 Q. Is it prudent to apply enhanced recovery  
9 techniques to maximize ultimate recovery of oil from the  
10 pool?

11 A. Yes, it is. As previously discussed, we feel  
12 like that the reservoir pressure decline would be  
13 stabilized, and as a result the producing GOR will stop  
14 increasing, the reservoir solution gas drive energy would  
15 be conserved, and this should yield a higher recovery  
16 factor for the wells in the affected area and yield a  
17 higher gross ultimate reserve.

18 Again, we're not expecting a classic waterflood  
19 response here, but rather a longer sustained productive  
20 life through the conservation of reservoir energy.

21 Q. Is the pressure maintenance project economically  
22 and technically feasible at this time?

23 A. Yes.

24 Q. Were Exhibits 7 through 11 prepared by you or  
25 under your supervision?

1 A. Yes, they were.

2 Q. And in your opinion is the granting of this  
3 Application in the interests of conservation and the  
4 prevention of waste?

5 A. Yes.

6 MR. BRUCE: Mr. Examiner, I'd move the admission  
7 of Exhibits 7 through 11.

8 EXAMINER CATANACH: Exhibits 7 through 11 are  
9 admitted.

10 Mr. Bruce, with regards to the maximum rate of  
11 1200 barrels a day, are you guys requesting that that be  
12 incorporated into the order?

13 MR. BRUCE: Yes, sir.

14 EXAMINER CATANACH: Okay.

15 EXAMINATION

16 BY EXAMINER CATANACH:

17 Q. Mr. Gentry, is it your opinion that this is not a  
18 waterflood, as opposed to a pressure maintenance?

19 A. Well, it probably is going to be a combination of  
20 both. There could actually be some banking of oil, but  
21 with the higher gas saturation in this reservoir the  
22 building of a waterflood bank will be somewhat limited.

23 Q. How old are these wells, the producing wells,  
24 generally?

25 A. Just over 10 years. Most of them were drilled in

1 the early 1990s.

2 Q. Okay. I notice that the State 2 Number 3, that  
3 has yet to be perforated in one of the zones.

4 A. That's correct. I believe in Exhibit 8 it shows  
5 that we have a set of perforations proposed, and after --  
6 if this project is approved, our plan is to complete that  
7 interval, go ahead and perforate and fracture-treat that  
8 interval in the State 2 Number 3. But as of right now it's  
9 not open. It did have shows through that zone, but  
10 originally weren't considered to be of sufficient quality.

11 That is the zone that was referred to earlier by  
12 the geologist as being somewhat sporadically distributed in  
13 the area, and it was not as well developed at the Number 3  
14 location. But it still would be a part of this project to  
15 complete that zone as a take point.

16 Q. Did you attribute any secondary reserves to that  
17 interval in that well?

18 A. I did not.

19 Q. Okay. I notice these wells -- when they run the  
20 production casing on these wells they use two or maybe even  
21 three DV tools.

22 A. Correct.

23 Q. Do you have knowledge as to why that is done in  
24 these wells?

25 A. Well, these Delaware sands sometimes won't

1 support the additional hydrostatic of a full column of  
2 cement, and so the DV tools are run to remove that  
3 hydrostatic pressure, and then lessen your chances of  
4 losing circulation during the cement job.

5 Q. You've examined the well records for the area-of-  
6 review wells, Mr. Gentry; is that correct?

7 A. Yes, sir.

8 Q. Are you confident that those wells have adequate  
9 production casing and cement quality so as to preclude any  
10 migration?

11 A. Yes, sir, I am. Specifically on the Pogo wells,  
12 all of the multi-stage cement jobs recovered cement to the  
13 surface in between stages indicating that the cement had  
14 exceeded the DV tool height, and those types of details are  
15 not available in the public record for the offset  
16 operator's wells, as far as whether or not cement was  
17 recovered during the multi-stage cementing jobs.

18 But there's no reason, you know, to think that  
19 that wouldn't -- You know, that would have been the goal of  
20 all the wells in the area.

21 Q. Okay. And you're just going to be injecting  
22 basically produced water from these wells in this area?

23 A. Yes. We have a disposal system in there  
24 gathering from all of the Pogo leases down to the south,  
25 into the Livingston Ridge field, and then back to the west

1 and northwest in the -- another part of Lost Tank, plus the  
2 production, you know, from this lease right here. And we  
3 have immediately available within that system about 1500  
4 barrels a day of water. But the whole system handles about  
5 4500 barrels a day.

6 Q. Okay. Now, on your Exhibit Number 10, I think --  
7 according to your testimony -- This is for all four wells,  
8 the producing wells on the lease, right?

9 A. Correct.

10 Q. And the current decline rate is, I believe you  
11 said, 11 percent?

12 A. It shows over in the right-hand column there, in  
13 that top square where it shows the oil, you know, where it  
14 says "Oil - barrels of oil per day", and down there where  
15 it says " $D_e$  equals 10.74" is the current decline rate,  
16 approximately 11 percent per year.

17 Q. Okay, and that's represented graphically by the  
18 light-blue-colored line?

19 A. Actually, yes.

20 Q. Okay, so that was projected -- if you were not to  
21 institute any kind of operations out there, that would be  
22 the predicted decline for these wells?

23 A. Yes, sir.

24 Q. Okay, and the green line above that represents  
25 the decline that you're projecting as a result of

1 injection?

2 A. Yes, that represents the decline rate that would  
3 be needed to recover that additional 95,000 barrels of oil,  
4 the incremental oil from the waterflood, or from the  
5 pressure maintenance project.

6 Q. So when you look at this thing a year from now,  
7 if your production falls along that upper green line,  
8 you're going to believe that the project is working as it  
9 should?

10 A. Yes, sir.

11 Q. How long do you anticipate before you see some  
12 kind of result of this injection?

13 A. I think it would be somewhere in the range of six  
14 months to a year and a half. And that's not necessarily  
15 depicted on that curve. I just -- I started that decline  
16 rate from, you know, actually current production. So it's  
17 somewhat of a -- You know, it doesn't exactly depict what  
18 we expect the performance to be, because that would  
19 indicate that the lessening of decline would start  
20 immediately, and that probably won't start for maybe six  
21 months to a year and a half, as I said.

22 Q. But graphically, do you believe that we will be  
23 able to tell at what point in time that you started --

24 A. Yes, sir--

25 Q. -- some result?



1 A. -- I do.

2 EXAMINER CATANACH: I believe that's all I have,  
3 Mr. Bruce. Anything else?

4 MR. BRUCE: I have nothing further in this  
5 matter, Mr. Examiner.

6 MR. BROOKS: Just one question.

7 EXAMINATION

8 BY MR. BROOKS:

9 Q. Would you say that the implementation of this  
10 proposed pressure maintenance program at this time in this  
11 area would be premature, either from an economic or a  
12 technical standpoint?

13 A. No, sir.

14 MR. BROOKS: Thank you.

15 EXAMINER CATANACH: Okay, there being nothing  
16 further in this case, Case 13,022 will be taken under  
17 advisement.

18 (Thereupon, these proceedings were concluded at  
19 10:00 a.m.)

20 \* \* \*

21 I hereby certify that the foregoing is  
22 a complete record of the proceedings in  
23 the Examiner hearing of Case No. 13022,  
24 heard by me on 4-10-1983  
25 David H. Catanch Examiner  
Oil Conservation Division


## CERTIFICATE OF REPORTER

STATE OF NEW MEXICO    )  
                                  ) ss.  
COUNTY OF SANTA FE    )

I, Steven T. Brenner, Certified Court Reporter and Notary Public, HEREBY CERTIFY that the foregoing transcript of proceedings before the Oil Conservation Division was reported by me; that I transcribed my notes; and that the foregoing is a true and accurate record of the proceedings.

I FURTHER CERTIFY that I am not a relative or employee of any of the parties or attorneys involved in this matter and that I have no personal interest in the final disposition of this matter.

WITNESS MY HAND AND SEAL April 12th, 2003.



STEVEN T. BRENNER  
CCR No. 7

My commission expires: October 16th, 2006