

1 STATE OF NEW MEXICO
2 ENERGY, MINERALS, AND NATURAL RESOURCES DEPARTMENT
3 OIL CONSERVATION DIVISION
4 IN THE MATTER OF THE HEARING CALLED
BY THE OIL CONSERVATION DIVISION FOR
THE PURPOSE OF CONSIDERING:

ORIGINAL

CASE 15307
(cont'd from
9/17/15)

5 APPLICATION OF OASIS WATER SOLUTIONS,
6 LLC, FOR APPROVAL OF A SALT WATER
DISPOSAL WELL, LEA COUNTY, NEW MEXICO.

8 REPORTER'S TRANSCRIPT OF PROCEEDINGS

9 EXAMINER HEARING

10 October 1, 2015

11 Santa Fe, New Mexico

12
13
14 BEFORE: PHILLIP GOETZE, CHIEF EXAMINER
WILLIAM V. JONES, EXAMINER
15 GABRIEL WADE, LEGAL EXAMINER
16

This matter came on for hearing before the
17 New Mexico Oil Conservation Division, Phillip Goetze,
Chief Examiner, William V. Jones, Examiner, and Gabriel
18 Wade, Legal Examiner, on October 1, 2015, at the New
Mexico Energy, Minerals, and Natural Resources
19 Department, Wendell Chino Building, 1220 South St.
Francis Drive, Porter Hall, Room 102, Santa Fe, New
20 Mexico.

21 REPORTED BY: ELLEN H. ALLANIC
22 NEW MEXICO CCR 100
CALIFORNIA CSR 8670
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A P P E A R A N C E S

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Also Present: Protester Charles Rand Briggs

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1 (Time noted 3:05 p.m.)

2 EXAMINER JONES: We are back on the record,
3 and I am going to turn this case over to Mr. Goetze. He
4 is going to be the Examiner on this case.

5 EXAMINER GOETZE: We will pick up where we
6 left off. Case No. 15307, Application of Oasis Water
7 Solutions, LLC, for approval of a salt water disposal
8 well, Lea County, New Mexico.

9 Call for appearances.

10 MR. PADILLA: Mr. Examiner, Ernest L.
11 Padilla for Oasis Salt Water Solutions, the applicant in
12 this case. I have one witness to be sworn.

13 EXAMINER GOETZE: Very good.

14 MR. BRIGGS: Mr. Examiner, Randy Briggs, one
15 of the protestors in this case. And I have another
16 matter today to bring before you. And I ask to go
17 first.

18 EXAMINER GOETZE: What does this involve?

19 MR. BRIGGS: It's a continuation of my
20 protest, but there's new information that has come to
21 light and may result in another exhibit if you so see
22 fit.

23 I am here without my counsel. And I will be
24 brief.

25 EXAMINER GOETZE: Would you like to make a

1 statement pro se?

2 EXAMINER WADE: Let's go ahead and take care
3 of our appearances first. I was going to actually see
4 if there are any procedure matters in the next step, so
5 we can discuss this.

6 MS. MOSS: Katherine Moss for the New Mexico
7 State Land Office. And I have a rebuttal witness, most
8 likely, Mr. Holm.

9 EXAMINER GOETZE: Very good. Let's go back
10 to the procedural.

11 EXAMINER WADE: Did you discuss this with
12 either of the attorneys, the applicant and state land
13 office attorney?

14 MR. BRIGGS: I have given the state land
15 office a copy. We have tried for days and days to
16 contact someone at the state land office through
17 Mr. Danoff, my attorney -- so that no one was
18 blind-sided in this case -- and could not get a call
19 back.

20 And I apologize to Mr. Goetze. I probably
21 should have called him directly, but I didn't know.

22 MS. MOSS: If I may. I think when you said
23 "state land office," you meant them.

24 MR. BRIGGS: Well, I gave you a copy. And
25 this was just an hour ago.

1 MS. MOSS: Yes. But you've been trying to
2 call the OCD.

3 EXAMINER WADE: Did you inform the applicant
4 and Mr. Padilla?

5 MR. BRIGGS: No, sir.

6 EXAMINER WADE: Mr. Padilla, have you had
7 any opportunity to review --

8 MR. PADILLA: No. Dr. Briggs talked to me
9 earlier and asked me if he could make a statement ahead
10 of time so he could leave. And I don't have an
11 objection. But I do have an objection to introduction
12 of additional evidence in this case.

13 MR. BRIGGS: This information is now
14 contained in his well file.

15 EXAMINER WADE: Is this information
16 something that is public information?

17 MR. BRIGGS: Yes, sir.

18 EXAMINER WADE: Is it an OCD document?

19 MR. BRIGGS: Yes, sir.

20 EXAMINER WADE: It is?

21 MR. BRIGGS: Yes.

22 EXAMINER WADE: We could talk administrative
23 notice of an OCD document. So if there is no objection
24 to the statement --

25 EXAMINER GOETZE: Certainly may.

1 EXAMINER WADE: Ms. Moss?

2 MS. MOSS: No objection.

3 EXAMINER WADE: So depending on what the
4 Hearing Examiner would like to do -- it sounds like you
5 have a time constraint and that is why you need to go
6 first?

7 MR. BRIGGS: Last time I went first and this
8 could be lengthy in the second part. But it's your
9 show.

10 EXAMINER GOETZE: Let's proceed with letting
11 him make his statement -- would that be out of
12 procedure?

13 EXAMINER JONES: Usually the applicant goes
14 first.

15 EXAMINER WADE: The way this is set up
16 currently we have the applicant coming back with more
17 specific information. So is your information that you
18 are going to present today based on the original
19 presentation done by the applicant, is it some kind of
20 rebuttal to the original presentation or do you have
21 something to say about what's going to be presented
22 today?

23 MR. BRIGGS: No. It has nothing to do with
24 the hydrology report today. It is new information that
25 has come to light vis-a-vis what's already on your

1 record and what I presented at the last meeting.

2 EXAMINER WADE: When you said it may be
3 lengthy, are you saying that you --

4 MR. BRIGGS: No. It will be very brief.

5 EXAMINER WADE: Oh, yours will be brief?

6 MR. BRIGGS: Yes, sir.

7 EXAMINER WADE: I think that that would
8 probably be appropriate to go ahead and let him go if
9 there's no objections.

10 EXAMINER GOETZE: Counsel?

11 MR. PADILLA: I don't have an objection.

12 MS. MOSS: No objection.

13 EXAMINER GOETZE: Then we will let you go
14 ahead and present your information and then we'll move
15 on to applicant's case.

16 MR. BRIGGS: Thank you, sir.

17 EXAMINER GOETZE: So please come up,
18 identify yourself, and be sworn in by the court
19 reporter.

20 MR. BRIGGS: I apologize. I may not have
21 enough copies for everyone.

22 EXAMINER GOETZE: The most important is the
23 court reporter.

24 EXAMINER WADE: Let's wait before you give
25 it to her because you're going to have to mark it and we

1 are going to have to make sure that there are no
2 objections beyond what was already stated.

3 CHARLES RAND BRIGGS

4 having been first duly sworn, made a statement as
5 follows:

6 MR. BRIGGS: It recently has come to my
7 attention -- I want to backtrack to our last meeting.
8 My concern was that -- and it is on the record that
9 Cooper Enterprises plugged this well from top to bottom
10 and remediated the surface.

11 That's on the record from the last meeting.
12 Their expert testified that they intended to do that.
13 And I believe Mr. Padilla agreed with that, et cetera.

14 And it's on the record that the Examiner
15 stated that that would be one of the requirements to
16 going forward before a new well was approved.

17 On July 10th, Mr. Eddie Seay applied to plug
18 this well to a depth of 1,100 feet as opposed to more
19 than 4,000 feet. The very next day, Mr. McKee Brown,
20 the district supervisor in Hobbs, approved this
21 application to plug this well to a depth of 1,100 feet.
22 And that's not the deal.

23 And I am surprised that this wasn't brought
24 forward in the last meeting, this intention, et cetera,
25 but I feel blind-sided by this and this needs to be part

1 of the record. This wasn't the agreement we made a
2 month ago.

3 EXAMINER GOETZE: Very well.

4 MR. BRIGGS: And there's nothing in the well
5 logs of their previous stuff that says they can't come
6 and go and this well casing is as deep as they please.
7 There is nothing in there of down hole stuff that says
8 they can't plug this well.

9 EXAMINER WADE: For the record, you are
10 referring to a C-103 that is dated, as received in the
11 Hobbs OCD District, on October 10th, 2015.

12 MR. BRIGGS: Yes, sir.

13 EXAMINER WADE: And my copy that you handed
14 to me has a second page to it. Does everyone else have
15 a second page?

16 MR. BRIGGS: Everyone but me.

17 EXAMINER WADE: Okay. And not knowing
18 personally -- I know where the C-103 came from. The
19 second page, was that found in the well file as well?

20 MR. BRIGGS: I think so, yes.

21 EXAMINER WADE: And you would like to enter
22 this as an exhibit?

23 MR. BRIGGS: If my memory is correct, this
24 would be Exhibit 9.

25 EXAMINER WADE: Do you remember what we

1 called your exhibits in the prior hearing?

2 MR. BRIGGS: No, sir, I don't.

3 EXAMINER WADE: You will have to mark it
4 "Protester Exhibit." And I don't know the number. It
5 might be number 9. And then that's what you can give to
6 the court reporter.

7 And we can see if there is any objections to
8 this being entered into the record.

9 EXAMINER JONES: First of all, this is a
10 notice of intention. This is not the subsequent notice
11 of plugging.

12 MR. BRIGGS: Yes, sir. You are correct.

13 MR. PADILLA: I'm going to object to this
14 exhibit because it has nothing to do with this case. I
15 think the testimony was that this well should be
16 plugged. It was a well that Dr. Briggs brought up.

17 And his objection to the proposed well in
18 this case was that this well that he is bringing up here
19 should be plugged and abandoned.

20 We agree that it should be plugged and
21 abandoned. But my recollection is that we didn't agree
22 to plug it from top to bottom or -- ordinarily wells are
23 plugged in accordance with what the Division says the
24 plugs ought to be.

25 And, again, Mr. Jones has stated this is

1 just a notice of intention. It's not -- it has nothing
2 to do with the proposed application, so I object on the
3 basis of relevancy.

4 MR. BRIGGS: With all due respect, sir, I am
5 going to order a copy of the transcript from the last
6 time because there was testimony that this well was
7 going to be plugged from top to bottom before an
8 approval is issued for anything else. And I think we
9 need to go back and read the record.

10 EXAMINER WADE: For my sake to clarify, this
11 well is part of the area review for the well that's the
12 subject of this application?

13 MR. BRIGGS: Yes, sir.

14 EXAMINER WADE: So I do see it's relevant.
15 It's an OCD administrative record, so I think we would
16 overrule your objection and enter it into the record.

17 (Protester's Exhibit 2 was offered and
18 admitted.)

19 APPLICANT'S CASE-IN-CHIEF (cont'd)

20 EXAMINER GOETZE: Let's proceed now with
21 applicant's case. And proceed with your witness, with
22 the testimony you wish to give with your witness.

23 MR. PADILLA: Mr. Examiner, we'll call
24 Mr. Dennis Powers at this time.

25 EXAMINER GOETZE: Go ahead and present your

1 name and have the reporter swear you in.

2 DENNIS W. POWERS

3 having been first duly sworn, was examined and testified
4 as follows:

5 DIRECT EXAMINATION

6 BY MR. PADILLA:

7 Q. Dr. Powers, will you please state your full name
8 for the record?

9 A. Dennis Wayne Powers, commonly known as Dennis W.
10 Powers.

11 Q. Dr. Powers, you're a Ph.D; is that right?

12 A. That is correct.

13 Q. Have you previously testified before the Oil
14 Conservation Commission and had your credentials
15 accepted as a matter of record?

16 A. No.

17 Q. Refer to Exhibit No. 4, which is your resume, and
18 let me ask you some questions relative to that
19 Exhibit 4.

20 Please tell the Examiner when and where you
21 obtained your degrees in -- let me ask this. Are you a
22 geologist?

23 A. Yes.

24 Q. And when and where did you get your education for
25 being a geologist?

1 A. I received a bachelor of science degree from Iowa
2 State University in 1967 and a Ph.D. from Princeton
3 University in 1980.

4 Q. Can you briefly tell us what your work experience
5 as a geologist has been since you graduated from
6 Princeton University?

7 A. I would actually like to begin just prior to that
8 if that's permissible. In 1975, my main professional
9 experience began when I was employed by Sandia National
10 Laboratories as a member of technical staff to work on
11 the Waste Isolation Pilot Plant Project as a geologist.

12 I worked at Sandia National Laboratories for
13 seven and a half years. And then I proceeded to the
14 University of Texas, El Paso, for five years as an
15 assistant professor of geology.

16 And in 1988, I left the university and became a
17 full-time consultant, self-employed. I've remained so
18 since then. I also serve as an adjunct professor in the
19 department of geology and geological engineering at the
20 University of Mississippi in Oxford, Mississippi.

21 My principal activities in the early days of WIPP
22 were responsibility for site characterization in the
23 Delaware Basin. That involved a wide range of
24 activities, from drilling projects to surface mapping to
25 geophysics to hydrology. I later supervised the same

1 group doing that work.

2 When I left Sandia National Laboratories, I also
3 began consulting part-time for various people, mainly on
4 Waste Isolation Pilot Plant.

5 Over the years I have done a lot of work related
6 to the waste isolation pilot plant and activities
7 particularly in the Delaware Basin and the northern
8 Delaware Basin.

9 More recently those activities have extended to a
10 lot more work with oil and gas companies and service
11 companies with three primary objectives in mind; one is
12 for characterization of sites for potential brine
13 caverns, mining operations -- this is in West Texas and
14 southeastern New Mexico -- for evaluating locations,
15 drill holes for potential for salt water disposal and
16 also a lot of work on alternate sources of water,
17 because, as you all know, water is kind of scarce out in
18 the Southwest and companies are beginning to look very
19 hard at sources that are not regular commercial or
20 drinking municipal sources and the like.

21 Q. Dr. Powers, is it fair to say that most of your
22 work has been in southeast New Mexico and West Texas?

23 A. Yes. That's the bulk of it.

24 Q. The Permian Basin?

25 A. That is the bulk of it, yes.

1 Q. Tell us, for example, what you did with regard to
2 fluid studies for the WIPP project.

3 A. One of the -- the principal objective of the
4 fluid studies and hydrology-related studies at the WIPP
5 are simply to ascertain as best one can the potential
6 pathways for failure scenarios. So it involved
7 extensive geology relating to processes and extensive
8 characterization of, particularly, the superficial, near
9 surface rocks from Salado on up.

10 We also were concerned about the potential for
11 fluid migration downward. And so there was work to
12 monitor Upper Delaware Mountain Group, which is part of
13 the Guadalupian Series. And there are a variety of
14 other tendrils related to that.

15 Q. When you talk about fluids, does that include the
16 salt water, brine water?

17 A. Yes, it certainly did. Because one of the early
18 discoveries, unfortunate discoveries was that the
19 initial site at WIPP was pressurized brine and H₂S in
20 the Castile, underlying that site, which resulted in
21 relocation in 1976 -- which is the current site.

22 And also these are -- as many of the rocks in the
23 Delaware Basin and surroundings are -- very complex with
24 enormous lateral changes. And most of the fluids
25 involved range from full brines to relatively fresh

1 water, at least for those formations, not something that
2 you would want to imbibe, but relatively fresh water, on
3 the order of, say, 10,000 milligrams per liter or that
4 sort of TDS's.

5 Q. Dr. Powers, are you licensed in any state?

6 A. I am licensed in two states. I'm licensed in the
7 state of Texas as a professional geoscientist, License
8 No. 0167. I am also licensed in the state of Illinois
9 by examination, but I've placed that on inactive status.

10 Q. When you say "geoscientist," what does that
11 include?

12 A. Well, in the state of Texas, they use a broader
13 term, and so it can encompass quite a wide variety of
14 sub professions, if you like.

15 So a person who specializes in sedimentology, a
16 person who specializes in oil exploration, a person who
17 specializes in hydrology or whatever can also be
18 licensed as a geoscientist.

19 Q. Is it fair to say that you qualify in all these
20 areas?

21 A. Yes.

22 Q. What papers have you written?

23 A. There's a variety of them --

24 EXAMINER GOETZE: May I indulge for a
25 moment. I don't think we need to impress the Examiners

1 with his qualifications. He is very well-known in the
2 area as well as in the industry.

3 What are you going to qualify him as?

4 MR. PADILLA: As a geologist and
5 geohydrologist.

6 EXAMINER WADE: If there are no objections
7 from --

8 EXAMINER GOETZE: Do you have --

9 MS. MOSS: I have questions, I guess, as to
10 the second.

11 EXAMINER GOETZE: Very well. Then proceed
12 with the presentation.

13 EXAMINER WADE: It was a geologist and
14 geohydrologist?

15 MR. PADILLA: Yes, sir.

16 Q. (By Mr. Padilla:) Tell us about your experience
17 and your authorship of papers in geohydrology.

18 A. Again, the principal concern for most of these
19 that are actually published has been the evaluation of
20 how the geology in particular interacts with the
21 hydrology of these units.

22 And even though it is practical from a strictly
23 experimental practice or process to try to just
24 understand what the parameters are by well testing and
25 so on, oil geologists, oil and gas geologists, petroleum

1 geologists and people in the hydrologic field recognize
2 that geology certainly has a major influence.

3 And, in this case, what we did was to reorient
4 the hydrology, geohydrology, hydrogeology -- however you
5 want to term it -- from a strictly stochastic point of
6 view, to having a lot of empirical data that could be
7 related to the well data, and, therefore, we could
8 enhance the predictability of the hydrologic parameters
9 between wells.

10 MR. PADILLA: Mr. Examiner, to make sure, we
11 tender Dr. Powers as qualified in geology and
12 geohydrology.

13 EXAMINER WADE: Can I ask one
14 question before --

15 EXAMINER GOETZE: Go ahead.

16 EXAMINER WADE: Have you been qualified in
17 the other administrative proceedings or in any court
18 proceedings as an expert in geology or geohydrology?

19 THE WITNESS: I have testified before the
20 New Mexico Environment Department in the RCRA hearings
21 for the Waste Isolation Pilot Plant.

22 I have also given depositions as a -- I was
23 never -- it was never said exactly what the expertise
24 should be.

25 EXAMINER WADE: So not necessarily qualified

1 as an expert --

2 THE WITNESS: I testified. I don't recall
3 in the RCRA hearings whether anybody said, You are
4 hereby accepted as such-and-such and such-and-such.

5 EXAMINER WADE: Did you give opinion
6 testimony or did you give factual testimony?

7 THE WITNESS: I gave both.

8 EXAMINER WADE: Okay.

9 MS. MOSS: Would it be appropriate for me
10 to ask a few questions now before you make this
11 decision?

12 EXAMINER GOETZE: If you have an objection,
13 please state the reasons. And if you have questions,
14 now is the time.

15 MS. MOSS: I have objections based on the
16 resume that was given to us, mostly which reflects
17 expertise in areas that may be above the zone here.
18 Although you just mentioned working for oil and gas
19 companies, your resume reflects working for service
20 companies. And I have some questions there. I have
21 questions about your experience in determining the
22 properties of containment zones.

23 I would say I have seven questions all
24 together that I plan to ask.

25 EXAMINER GOETZE: Proceed.

VOIR DIRE EXAMINATION

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BY MS. MOSS:

Q. So it's an incredibly impressive resume. I have some questions and you may well be able to clear them up.

A. Proceed.

Q. I see from your experience that you are an expert in salt formations, but do you have experience concerning the properties of containment zones?

A. Well, I would say WIPP is one of the ultimate containment zones. But I am not sure that's what you are driving at.

Q. Have you testified about the impact of salt water disposal on oil and gas protectable waters?

A. No.

Q. And so if the containment zones that I was asking about concern the impact of salt water disposal on oil and gas protectable waters, what would your answer be?

A. I have not testified.

Q. Have you published any papers or articles on the impact of salt water disposal on oil and gas and protectable waters?

A. No.

Q. What work have you done on salt water disposal?

A. Proprietary work for a number of clients, ranging

1 from West Texas, loosely defined as out to, let's say,
2 Midland/Odessa, as well as in southeastern New Mexico,
3 some of which have come before the OCD, and I assume
4 have been admitted, although I have never testified.

5 Q. What work did you do for them that would not have
6 made your testimony important enough to come before the
7 board, the Commissioners?

8 A. I can't speak in every case because I don't know
9 whether the documents that I have written for particular
10 companies, organizations, are proprietary to them, and,
11 in most cases, I'm not -- I move on to the next project,
12 and unless they call me because there is an objection
13 and a hearing I don't do anything more for them.

14 But I do -- I do have to make remarks about
15 containment. I have to -- for example, in the state of
16 Texas, they have some specific requirements that they
17 put on a salt water disposal well. And so those would
18 be included in a report that I would give to a company.
19 What the company does with that, I don't always get
20 involved in.

21 Q. And what about New Mexico?

22 A. New Mexico, I am not as explicit because there
23 have not been as many explicit requirements, but I have
24 made reports to companies.

25 In hearings that have come -- I know there are

1 hearings on some of those that have come before the OCD
2 here. I have not been present for those. And in one
3 case in particular, the question was partly on
4 communication with the Capitan Reef.

5 Q. This answers a couple of questions.

6 A. Sure.

7 Q. Have the studies you've done for service
8 companies concerned penetration through the salts of the
9 Permian Basin?

10 A. Yes. Almost every one of them goes through a
11 zone including salt.

12 Q. Through salt into another zone?

13 A. Yes.

14 Q. And you told me that those reports were provided
15 for oil and gas companies?

16 A. Oil and gas or service companies.

17 Q. In what proportion?

18 EXAMINER GOETZE: Let's draw a line here.
19 This is not getting anywhere. And I will have to state
20 at this point that Dr. Powers has had evidence entered
21 into several cases here, which has been presented and
22 accepted as evidence. And it includes the study with
23 the reef and Rustler and Salado.

24 I'm really having a hard time with this line
25 of questioning. I think this representative here has

1 been provided with a good set of skills which does
2 qualify him. And I really do believe that at this point
3 let us look at the evidence presented, and then let us
4 make the determination.

5 But his background and experience is
6 exemplary and has exceeded many others who have been
7 qualified as such.

8 So unless you have something really, really
9 substantial saying that he's not qualified to
10 specialties that have been presented, let's proceed on
11 with the case.

12 MS. MOSS: With all due respect, if I could
13 ask one additional question.

14 EXAMINER GOETZE: Very well.

15 MS. MOSS: I am creating a record. I
16 recognize his expertise, and I believe I am being
17 appropriate in the way I ask him. Just one other
18 question.

19 Q. (By Ms. Moss) Can you please explain your
20 experience in ground water modeling?

21 A. Ground water modeling, I think what you are
22 looking for is whether I actually crank the codes and
23 crank the computer codes, and I do not.

24 What I do, however, is -- and the record shows
25 that clearly -- I am involved from the beginning to end

1 in providing geological data and providing the
2 background by which we characterize the quality of that
3 modeling and how we recognize whether it's good or not.

4 And I have -- I think the record can show that I
5 have sat the wells on numerous places where we make the
6 decisions about how to complete them, how to prepare
7 them for the testing and so on that goes into the
8 hydrologic modeling. I am familiar with the concepts,
9 but it is not something that I do.

10 Q. Thank you.

11 MS. MOSS: Thank you very much.

12 EXAMINER GOETZE: And you have no objections
13 or you have clarification?

14 MS. MOSS: I would like to reserve a right
15 to object until after I hear --

16 EXAMINER GOETZE: No, no. We move on from
17 here, so it is now or never.

18 MS. MOSS: No objections.

19 EXAMINER GOETZE: Very good. You are so
20 qualified as an expert in geohydrology and geosciences.

21 Please proceed with your testimony.

22 (Interruption.)

23 EXAMINER GOETZE: Back on the record,
24 please.

25 BY MR. PADILLA (cont'd):

1 Q. Dr. Powers, let's jump into Exhibit 1 and have
2 you identify that and tell us what it is.

3 A. I believe you are referring to Exhibit 5.

4 Q. I'm sorry. Exhibit No. 5.

5 A. Exhibit 5, which is also presented up here in a
6 large format so that we might more easily communicate
7 about certain features that you -- that you may wish to
8 talk about and you may wish to ask about, is a cross
9 section employing geophysical logs that begin on the
10 left or southwest end with one of the geophysical logs
11 that was represented in Dr. Bill Hiss's research map
12 number 4, and it ends on the right-hand or northeast
13 side in a well that is beyond the proposed salt water
14 disposal site for the Oasis well.

15 Q. Dr. Powers, can you tell us what the line of
16 cross section is in terms of on the large exhibit?

17 A. The line of cross section here begins with the
18 well number 3025-20607. And that is a log that is
19 included in the very small scale cross section that
20 Dr. Hiss included in his report, in resource map number
21 4. It proceeds across to the south -- or to the east
22 and then to the north to get across to the area proposed
23 for the site, and then ends over here.

24 Q. In a cross section which is a proposed well?

25 A. It would be adjacent to the 06411 -- sorry --

1 06141 well. And it is represented here just
2 diagrammatically by depth.

3 Q. What was the purpose in preparing this exhibit?

4 A. The reason I did this exhibit is because there
5 are questions about the relationships between the
6 proposed disposal interval in the Lower San Andres at
7 the site, a proposed site, and the Capitan, Capitan
8 Aquifer System that is present over here at the
9 southwest end of that log cross section.

10 Q. How do you depict the Capitan structure there on
11 the left side of this exhibit?

12 A. On this particular log, I attempted to replicate
13 Dr. Hiss's selections and his interpretations for this
14 particular zone. And he designated an upper portion
15 here as Capitan, which, normally, we would call Capitan
16 Reef rocks, or equivalents, characterized by the natural
17 gamma on the left-hand side as very low, and the density
18 log on the right-hand side -- I'm sorry -- this is an
19 acoustic log -- as being rather high in acoustic
20 velocity.

21 And then there are other representations here of
22 what he called Capitan Aquifer, Artesia Group,
23 Undifferentiated, and at the base a Delaware Mountain
24 Group, and a small increment here that he termed the San
25 Andres Limestone.

1 Q. In terms of what you describe as the Capitan
2 Reef, how far did you extend that?

3 A. Well, the interpretation here seems very clear in
4 Dr. Hiss's cross section. This well is not in his cross
5 section and neither is this well in his cross section.
6 It's post-date his work.

7 I was rather aggressive, I think, in extending
8 the Capitan as far as I thought it possibly could be
9 extended. It could be argued against, but I attempted
10 to extend the reef rocks up here as far as I thought
11 they might exist.

12 And so that extends out here to this well, which
13 is on the order of six-plus miles from the proposed
14 site.

15 Q. One of the questions that Mr. Goetze proposed at
16 the last hearing, at the first hearing, was separation
17 between the San Andres, the Upper San Andres and the
18 Lower San Andres. Does this cross section illustrate
19 the geological change in those two sections?

20 A. It does reflect some of those changes. If we
21 look over on the northeast side, which is closest to our
22 site, we see a section that is identified in many of the
23 OCD well files for these particular wells at the top of
24 Glorieta and top of San Andres. Some of them don't
25 identify top of San Andres. They may identify Penrose

1 and they may identify Queen and all those things that we
2 know are common out there. But not every well log or
3 every well file is created equal, and so there is some
4 variation in there. So we see about 1,300 feet of what
5 is attributed to the total San Andres.

6 And one of the concerns I had was how do we --
7 was how is the Lower San Andres identified out here in
8 this area, what are the criteria by which the Lower
9 San Andres is separated and differentiated from the
10 Upper San Andres.

11 And I am sad to say that so far in my research I
12 have not found a well file or log in which someone has
13 exactly identified in a well log those two units. I'm
14 sure it must exist. I just haven't searched far enough
15 yet.

16 And as you note -- or as I would note, out here
17 in this whole area in here, intercepts of the San Andres
18 really don't exist. So that is why this log cross
19 section goes out here.

20 What I did do was to go back to some of the --
21 being often a researcher as well as an applied person, I
22 went back to a lot of literature -- and you all know
23 there is a huge amount of literature -- and a lot of
24 papers -- a lot of the research and a lot of the
25 industry well picks in discussions would depict the

1 San Andres as equivalent to -- it's Guadalupian in age,
2 so it would be equivalent to the whole Capitan Aquifer
3 System.

4 And then there are a few others, Karins others
5 who have done some very detailed studies. And they have
6 differentiated the Lower San Andres in the Guadalupe
7 Mountains -- which is quite a ways from here --
8 according to sequence stratigraphy in the outcrop.

9 And they believe part of it is Leonardian because
10 it's got Leonardian fossils and all that which could
11 make it equivalent to Bone Spring.

12 It looks very similar to what we see here. You
13 can't equate these log signatures to that. But from
14 practice out here, looking at places where they complete
15 a well, an oil or a producing well in the Upper
16 San Andres, it would appear that the Upper and Lower
17 San Andres boundary is normally somewhere in the order
18 of 400 feet, 300 to 400 feet below the top.

19 I would be happy to find a specific way in which
20 we do that. It does equate to this log signature here.
21 And that is consistent pretty much with practice where
22 disposal wells have been designated as Lower San Andres,
23 and they approach that depth for their open hole or
24 perforated section. So that is the result.

25 Now, the question that was actually asked is do

1 you differentiate or how can you differentiate that, and
2 there is quite a bit of difference between what we would
3 see and has been interpreted as San Andres over here and
4 what we see in terms of thickness and what has been
5 interpreted as San Andres farther away in the back reef.

6 And this is where all the geology done in various
7 places kind of comes together. There's a lot of changes
8 in facies -- that's f-a-c-i-e-s -- laterally. We all
9 know that. This is a very complicated system.

10 And so what you see out here -- when we are
11 getting into the close interfingering with Goats Sea
12 Brief at the bottom of this Capitan Aquifer or possibly
13 other rocks -- differs in log signature and tends to
14 have less of these inner-bedded siltstones, sandstones
15 with the limestones that we see further in the back
16 reef.

17 So I have come to sort of an empirical conclusion
18 that the Upper and Lower San Andres seems to be
19 generally identified somewhere in at about 300 to
20 400 feet below the top of San Andres. There's a very
21 nice lithologic change at 350 feet in those points.
22 That might be a little bit high for some of these
23 places.

24 So that is the -- that's the crux of the problem
25 of trying to differentiate Upper and Lower San Andres

1 from the point of view of somebody going into the
2 records and trying to recreate an exact boundary marker
3 between them. Nevertheless, I think we know from
4 practice about where it is.

5 Q. Dr. Powers, let's move on to Exhibit No. 6. Tell
6 us what that is.

7 A. Exhibit No. 6 is a map of the elevation at the
8 top of Grayburg. It was copied -- cropped a little bit
9 but copied from the 1956 version of the Roswell
10 Geological Society's Irregular Symposia of Oil and Gas
11 Fields of Southeastern New Mexico. They've published a
12 number of these.

13 And what it is is a map that was developed from a
14 large number of wells prior to this time, and the Oasis
15 salt water disposal well is generally -- the area being
16 proposed is generally located on here by a red circle.

17 And what is -- the reason this is presented is
18 because containment involves, in my understanding,
19 involves several different elements. And one of them
20 would be natural obstacles or natural ways in which
21 fluids can move vertically, i.e., faults.

22 And so this particular map prepared by people who
23 had no interest in this particular project, does not
24 show any faults. I do not see any particular reason in
25 the data presented here or in the contouring to put any

1 faults in here. And so that is one illustration of why
2 I think this area shows through these units no faults.

3 Now, the reason the Grayburg, top of Grayburg is
4 useful is because it is approximately 400 feet above the
5 top of the San Andres. And if there's tectonic faults
6 that postdate and would allow things to move up, then we
7 would think that they would probably show up in this
8 unit as well.

9 Q. In terms of Exhibit No. 5, which is a cross
10 section in this structure map on top of the Grayburg, do
11 you see any comparison or does the cross section
12 illustrate any faulting that you can see in the cross
13 section?

14 A. The cross section, just as a note, shows -- you
15 know, the vertical scale is as close to uniform as I
16 could make it. The horizontal scale is not. There is
17 no horizontal scale there. They are simply spaced out.

18 So when I looked at this cross section, the first
19 area that concerned me was the area in the middle there
20 where there is a rather sharp difference between those
21 two middle wells, 29-820 and 27-009. They are located
22 something on the order of a mile apart.

23 And that was an area that I felt needed to be
24 looked at. It is in the eastern segment -- I mean
25 section of township 20 South, 36 East. That is also

1 shown here in the map on the top of Grayburg. And the
2 limits of the Grayburg at that time were around section
3 34.

4 You see the steepening of the dip in there. And
5 so that was one of the areas that I wanted to think
6 about a little bit further, even though it's
7 approximately a township away from the proposed unit.

8 Q. In terms of being a township away, what
9 conclusion can you draw from that alone in terms of
10 injection?

11 A. I don't expect the injected fluids to intersect
12 anything that would be there, would be that far away.

13 Q. Let's move on to Exhibit 8. Tell us what that
14 is.

15 A. Exhibit No. 8 -- do you mean 7 or 8?

16 Q. I'm sorry. Seven.

17 A. Exhibit No. 7 is a similar map across a fairly
18 similar area of the top of Penrose. It continues -- it
19 shows a little bit of the same kind of structure, which
20 is a very sharp steepening of deep to the west, slightly
21 south of west.

22 And so that remained an area of sharp structure.
23 There are some wells up there that indicate it is
24 probably just a dip and not necessarily a fault. But
25 that's again still quite a ways away from the proposed

1 unit or proposed well.

2 Q. And how much higher is Penrose than the
3 San Andres?

4 A. Well, it would be on the order of 500 feet, give
5 or take. Give or take on who defines Penrose out here.

6 Q. Some people call it the Grayburg?

7 A. No. Penrose would be part of the Queen.

8 Q. Okay.

9 A. Or equivalent to the Queen, depending.

10 Q. Let's go to Exhibit 8. What is that?

11 A. Exhibit 8 is a very small map of the area where
12 this fairly sharp dip is. And this is data that I
13 created over a relatively short time on the top of
14 Rustler.

15 The top of Rustler is shown in this cross
16 section. It is a well known marker out in the Permian
17 Basin, commonly tabled Top of Anhydrite on geophysical
18 logs, and it is easy to pick and one I am very familiar
19 with.

20 What I was concerned with here again is what is
21 this sharp contour in here and what does it do in the
22 area at and beyond the area of either the Grayburg or
23 Penrose. And since there's some well data in there, I
24 took a look at it.

25 And it again shows the area where the sharper

1 inclination is in the 2,300, 2,200 contours, is in that
2 similar area. There are the odds and ends of anomalous
3 single wells. And those have not been resolved yet.

4 But, in general, what it does is it looks as if
5 it flattens out to the west, in general.

6 And, again, I don't see any particular reason to
7 put a fault out there despite its distance from the
8 proposed salt water disposal well.

9 Q. In terms of difference in depth, what is the
10 difference between the Rustler and the Lower San
11 Andres?

12 A. Well, the Rustler here is -- varies, of course,
13 across this area (indicating), but its depth over here
14 is on the order of, you know, 1,000 feet to maybe
15 1,500 feet, depending on where you see it, versus
16 another 2,400, 2,500 to 3,000 feet for those other
17 units.

18 So, again -- the reason for doing this was simply
19 to check off those areas where it might be rational to
20 interpret a fault or conceivable to interpret a fault.
21 We're at the edge of the central basin platform in
22 general here, and so these dips, they are not new, they
23 are nothing I discovered. They are well-known in this
24 area.

25 Q. In terms of pathways, does this show anything?

1 A. I do not believe there's any pathway associated
2 with this.

3 Q. How about in terms of the Penrose or the
4 Grayburg --

5 A. Or in those. There are fewer data however. But
6 I still do not see a probable pathway.

7 Q. Let's go to Exhibit No. 9. What is that?

8 A. Exhibit 9 represents a small selection of
9 disposal wells, salt water disposal wells, in the
10 vicinity of the proposed location. The proposed
11 location is the red dot labeled 1 in section 17. The
12 green dots are salt water disposal wells located --
13 ranging from the south to the north of the proposed
14 site. And they are -- they are all approximately, give
15 or take a little bit, co-distant from the Capitan Reef.

16 Q. Looking at that No. 1, the green well, tell us
17 about what kind of injection rates occurred on that
18 well.

19 A. The Anderson No. 1 well is a well that was
20 converted from a prior production well. And over the
21 course of its production, which was somewhat limited,
22 about 14 -- a cumulative record in the OCD files is
23 about 14 million barrels were disposed before it was
24 plugged and abandoned due to problems with the well.

25 Q. Now, attached to this exhibit are a number of OCD

1 orders approving the salt water disposal wells; is that
2 right?

3 A. That is correct.

4 Q. And this particular well was originally approved
5 by No. R 12375, which is about the middle of this
6 packet -- is that correct? Originally the application
7 of Smith and Marrs, Inc.

8 A. Correct.

9 Q. And that was OCD case No. 13511?

10 A. Correct.

11 Q. So what this illustrates is there has been a lot
12 of injection just by that well alone; is that right?

13 A. Yes.

14 Q. Anything further on this exhibit?

15 A. Say that again. I'm sorry.

16 Q. Anything further on this exhibit?

17 A. No, I think that's sufficient on this exhibit.

18 Q. Let's go to Exhibit No. 10. And tell us what
19 that is.

20 A. Exhibit No. 10 is a download of salt water
21 disposal wells in southeastern New Mexico. And, in
22 particular, there are, on pages two and three, there are
23 a series of wells that were -- where the office name,
24 Hobbs, is highlighted in green.

25 And there is a label that says San Andres salt

1 water disposal. This listing includes API numbers, well
2 names, and location and operators, et cetera.

3 Q. The highlighted wells on this exhibit, where are
4 they located generally?

5 A. Generally they are located within one to two
6 townships, broadly, within -- from the proposed well
7 site.

8 Q. Anything else?

9 A. Yes. They are labeled San Andres because they
10 involve San Andres disposal in some form or another.

11 And so as I looked at -- I looked at well files
12 at the OCD. I did not have sufficient time to delve
13 into every hearing case and so on. But what I noted --
14 I wanted to see and noted was the involvement of the
15 San Andres, the designation of the San Andres, the
16 designation of the Glorieta, any designation of Lower
17 and Upper San Andres to try to help in understanding the
18 differentiation between Lower and Upper San Andres and
19 also the kinds of completion and so on.

20 And the broad summary that I drew -- which I was
21 trying to just ascertain the Lower San Andres and how it
22 is being used -- is that these all involve San Andres
23 but not all of them are exclusively San Andres and not
24 all of them are necessarily Lower San Andres as far as I
25 can tell.

1 The differentiation between them when I cannot
2 otherwise figure it out -- if I find a pressure caste on
3 the casing, that empirically probably differentiates
4 lower from upper, because when it seems to include the
5 upper and has a measurement, then the pressures are
6 positive on the tubing.

7 So that is what I was attempting to do by looking
8 at this list, to ascertain as much as we could about
9 what San Andres salt water disposal wells are in
10 southeastern New Mexico and how they have been -- how
11 they have been completed, how they are being utilized.

12 Q. Let's look at Exhibit No. 11. What is that?

13 A. One of the questions that I had when I was
14 approached and broadly presented with some of the
15 concerns is how do -- how do we distinguish between
16 these two formations, how can we tell that there can be
17 containment vertically, for example, to protect the
18 rights of people who have production in various zones.

19 And so among the things that I asked for was data
20 on pressure. And one of the parts of the data that
21 starts to show up in OCD records, particularly in the
22 last couple of years, are specific well records of the
23 pressure data on the tubing in salt water disposal
24 wells.

25 And so when we see these wells -- and these are

1 just a few wells that appear either by OCD records
2 and/or by my observations, seem to be completely
3 restricted to the Lower San Andres, that they all have
4 negative pressures. And, apparently, this is well known
5 in the area. This is not a mystery. It is just a
6 matter of looking at the records and seeing how we can
7 differentiate them.

8 And so this is just simply a few examples of
9 those. I don't know how many examples there could be
10 obtained, but, at least, these are a few of those where
11 I am pretty sure this is a lower San Andres and not
12 completed into something else.

13 Q. In terms of injection, what does negative
14 pressure mean?

15 A. Well, it means if you load the hole up with --
16 load the casing or tubing up with water, that you do not
17 have to pressurize it. You do not have to pump on it.
18 It will take water.

19 And it is commonly designated in older well
20 records, gravity feed, gravity flow. Hooked up, saw a
21 decline in the water level through X number of minutes,
22 calculated as so many barrels per minute, per hour, per
23 day, whatever.

24 Q. I have often referred to taking water on a
25 vacuum; is that correct or not?

1 A. Yeah, I mean, it's not literally a vacuum. It is
2 just simply that -- when you put pressure on that -- or
3 load it up with a fluid, that it -- the internal
4 pressure on the formation is less than the pressure in
5 that tube.

6 Q. Okay. Let's go on to Exhibit No. 12. What is
7 that?

8 A. In order to try to contrast this to display a
9 natural separation between these units, we pulled some
10 records from wells completed and having production from
11 the Grayburg/San Andres unit, which is a unit out here.
12 And, again, this is not many -- I am sure there are
13 many, many more that we can pull, but these are a few in
14 the area. And what these show is a tubing pressure as
15 you might expect in a gas well is positive.

16 Q. So, geologically, what does that tell you in
17 terms of Upper and Lower San Andres?

18 A. These are separated units.

19 Q. And in terms of upward migration of produced
20 water, what happens?

21 A. Well, the pressure is greater; in the upper one,
22 it should be going downward.

23 Q. Let's go to Exhibit 13. What is that?

24 A. The other thing that --

25 MR. PADILLA: Let me preface this for the

1 Examiner. Mr. McMillan asked me to bring water analyzes
2 relating to -- within the AOR. And that is why we have
3 brought this.

4 A. The other thing that came to mind immediately for
5 me was, can we illustrate by fluid pressures,
6 chemistry -- what can we use to illustrate the
7 separation of these two units. And water analyzes was
8 another possibility.

9 And so water analyzes was graciously provided for
10 a couple of wells from the newer analyzes from the
11 Grayburg/San Andres, upper San Andres unit, two wells
12 that Apache has.

13 And, you know, the problem is that I have so far
14 been -- unable to find any record of a water analysis
15 that can be exclusively attributed to the Lower San
16 Andres. So this was an attempt to provide information.
17 And while it is good information, it does not do what I
18 had hoped we could do with this data, because, so far,
19 as I say, we have not been able to show a sample or find
20 a sample.

21 I'm sure they exist somewhere in somebody's files
22 in some office or some archive or whatever. But so far
23 I have been unable to find one that I can attribute
24 exclusively to the Lower San Andres. So I cannot use
25 this at this time based on the information that I have.

1 Q. So what do these water analyzes show?

2 A. Well, as we look at them -- and the last page on
3 this is a map just showing the location; the dot in the
4 lower part is the proposed location for the Oasis salt
5 water disposal well. And so the other two are located
6 to the north, respectively about three miles and a
7 little over five miles. So they are not real close.

8 But they are high quality analyzes in that
9 respect. And they show, for example, in the -- the 433
10 well shows chlorides and sodium that total between them
11 about 8,400 milligrams per liter. There's some sodium,
12 potassium, magnesium, sulfate, et cetera. And so we
13 wind up with close to 10,000 milligrams per liter total
14 in the -- as a sum of things.

15 And then if we look at the other well -- if we
16 look at the other well, which is a 440, it shows a
17 little bit higher, 11,000 chloride, 7,700 sodium. So we
18 are talking about around 18,000 -- yes -- almost 19,000
19 there plus some sulfates, as you might expect. These
20 are back reef rocks and they're associated with sulfate
21 rocks, so we would expect some sulfates in these.

22 And we see calcium in there. Between the calcium
23 and the sulfate, they are starting to approach -- they
24 are not at saturation, it does not appear, but there's
25 quite a bit of calcium and sulfate in here.

1 This particular water is more saline than the
2 other. And that is about as far as we can push -- right
3 now that is about as far as I can push the water
4 analyzes as an attempt to show the differentiation and
5 isolation or separation or containment, if you prefer,
6 between the two, lower and Upper San Andres.

7 Q. Now, there is a third study there that you have
8 there. What is that? It is part of this exhibit.

9 A. Part of which exhibit?

10 Q. Exhibit 13. It is titled Geology and Ground
11 Water Conditions --

12 A. Yes. Correct. And it's a compilation of waters
13 and it -- the publication is actually dated 1961, but --
14 and I have a copy of it here. But the data are commonly
15 quite a bit older.

16 It shows -- it shows the San Andres in 2138 and
17 it shows the total dissolved solids there of about
18 93,000. But, again, there is no differentiation for
19 certain here as to where that came within the
20 San Andres.

21 And then there is another part behind this, which
22 I believe was also presented earlier. I think this is
23 just a reattachment to what was presented earlier. The
24 Howse San Andres in 2138-11 is one of the closer ones in
25 there.

1 And the Howse San Andres -- excuse me for a
2 moment while I refer to some earlier -- it shows it in
3 section 11. And I looked at the Howse salt water
4 disposal San Andres in section 12. And that one -- that
5 one had a lot of discussion -- no, I'm sorry. The Howse
6 is the one that had a lot of discussion with OCD,
7 regarding completion or recompletion of that.

8 This one, the top of the San Andres, was at
9 4,150. And the open hole appears to have -- sorry --
10 4,307 -- and the perforations began at 4,332 and ended
11 at 4,842.

12 So it looks like it is more or less a large part
13 of the San Andres, including the upper San Andres in
14 39-193. They are not the same well. As far as I can
15 tell, they are not the same well. And so I don't know
16 for sure on this other one, this Howse one that is
17 labeled in 11, or whether that is a mistake at this
18 point, putting it in section 11 or whether there is one
19 that didn't show up in the other listing. So that is
20 unresolved.

21 Q. That would only be a section away, right?

22 A. That would be a township away. And if it is
23 section 11 or 12, it would be about a township and a
24 half away.

25 Q. So you can't really make a chemical

1 differentiation between the Upper and Lower San Andres
2 because you can't get a Lower San Andres water sample?

3 A. At this point, I have no samples with a chemical
4 analysis that I have seen that are clearly identified
5 with the Lower San Andres.

6 Q. Okay. Let's go to Exhibit 14. What is that?

7 A. Exhibit 14 is a partial record of a publication.
8 And the first page of it shows the cover of the
9 document. It is SEPM, Core Workshop No. 13. The title
10 number of it was Subsurface and Outcrop Examination of
11 the Capitan Shelf Margin, Northern Delaware Basin.

12 And the inside -- the next page is the inside
13 cover showing that it was organized and edited by Paul
14 Harris and George Grover.

15 The next few pages are simply the table of
16 contents to show the position of the couple of pages
17 that follow.

18 On the last page, it shows a title, The Role of
19 Hydrogen Sulfide in the Evolution of Caves in the
20 Guadalupe Mountains of Southeastern New Mexico, by H.R.
21 DuChene and J.S. McLean.

22 And what Harvey and John were doing in here is to
23 re-examine the -- again the explanations of how you find
24 sulfate in Carlsbad Caverns and the many hypotheses
25 involving acid speleogenesis and so on, some of which

1 postdate this paper.

2 The critical diagram that I wanted to use here is
3 on page 479, figure 3. And it is titled, Potentiometric
4 Surface of the Capitan Aquifer and Associated Deposits.

5 This is actually a smaller and a slight
6 simplification of the original paper written by Bill
7 Hiss in 1980, which I did not have available to make as
8 an exhibit at the time. I do have a copy of the
9 publication here.

10 But it is a paper in which Dr. Hiss had gone
11 through and had done something that we have commonly
12 done at the WIPP project, the same process in general,
13 which is to try to understand what the pressure
14 gradients are in an aquifer or an aquifer system.

15 If you have water levels measured in different
16 wells or pressures measured in different wells at
17 different depths and they have different highly
18 differing salinities and specific gravities, then the
19 pressure exerted at a certain horizon by that head, that
20 water above that point, will differ because of the
21 differing specific gravities.

22 So what he did, which is a fairly common
23 exercise, is to use the specific gravities and to
24 convert those to what is called freshwater equivalent
25 heads. So we are treating all the waters as if they

1 were 1.000 specific gravity, nice pristine water with
2 fundamentally no syutes.

3 When he did that, what he believed was exhibited
4 by those data is a potentiometric surface and a gradient
5 to that potentiometric surface.

6 It is relevant to the site that is being proposed
7 because the site that is being proposed for the salt
8 water disposal well in T20 south, 37 east is located
9 between the 2,600- and the 2,500-foot elevations. And
10 we see the general trend with this potentiometric
11 surface is that fluid flow should be expected to flow
12 generally from the northwest towards the southeast
13 towards the site, and then across and potentially away
14 to the east, away from the site and away from the
15 Capitan.

16 Q. When you say "site" --

17 A. I mean the proposed salt water disposal well
18 site, correct.

19 Q. So if there is going to be any movement, it's
20 going to be away from the Capitan Reef; is that fair to
21 say?

22 A. That is what you would expect from this
23 potentiometric data.

24 The Hiss report is a bit more detailed and
25 includes indicators such as -- he thinks they are fairly

1 well connected in this area and stuff like that. But
2 the original explanation of the methodologies are in his
3 dissertation, not his papers. But it's not a difficult
4 exercise.

5 Q. Anything further on Exhibit 14?

6 A. No.

7 MR. PADILLA: I move the introduction of
8 Exhibits 4 through 14.

9 EXAMINER GOETZE: Any objection?

10 MS. MOSS: No objection.

11 EXAMINER GOETZE: Exhibits 4 through 14 are
12 so entered.

13 (APPLICANT OASIS WATER SOLUTIONS EXHIBITS 4
14 through 14 WERE OFFERED AND ADMITTED.)

15 MR. PADILLA: And we will pass the witness
16 at this time.

17 EXAMINER GOETZE: Your witness.

18 MS. MOSS: I would be remiss at this time if
19 I did not move procedurally for you to dismiss the
20 application on the basis that this witness ordered a
21 water sample from the place where this was proposed and
22 the water sample was not provided and unless I
23 misunderstand -- and I can explore this with the
24 witness -- what has been provided shows numbers that are
25 most likely protectable waters.

1 So at least for the record, I'm asking you
2 to dismiss the application on that basis.

3 EXAMINER GOETZE: I understand. And we take
4 great latitude in the fact that you are walking a fine
5 line here. But in most cases we could not permit an SWD
6 because we do not necessarily have that information
7 prior to its being completed.

8 We will note your protest and your
9 application for dismissal, but I think we are going to
10 proceed with this case and offer you the opportunity to
11 present and question the witness.

12 MS. MOSS: Okay.

13 CROSS EXAMINATION

14 BY MS. MOSS:

15 Q. I think the area that I would most like to
16 explore first has to do with Exhibit 9, at least in
17 terms of cross-examination. What is the interval that
18 Oasis proposes to inject in its application?

19 A. Excuse me for just a moment while I pull that
20 exhibit.

21 Q. Thank you.

22 A. In the application the proposed interval is
23 4,170 feet to 4,900 feet.

24 Q. And in No. 9 there are a number of wells north of
25 the proposed injection site. And you spoke specifically

1 about No. 1 when you were questioned by the applicant's
2 attorney.

3 What is the injection depth for that well?

4 A. Let me check here.

5 EXAMINER WADE: Can you also let us know
6 which order you're referring to when you find it?

7 THE WITNESS: This would be Exhibit No. 9
8 and looking approximately in the middle. This is the
9 number 1 in a red circle. It's the Smith and Marrs
10 case. It is case No. 13511, a little past the middle.

11 EXAMINER WADE: Okay.

12 MS. MOSS: It's the order number 5-12375.

13 THE WITNESS: Yes.

14 A. And what it says is that it is to -- in the order
15 it is to go from 4,350 feet to 5,180.

16 Q. And what is the difference between that and what
17 is asked for in the application?

18 A. Could you clarify that question? I mean, I think
19 I understand, but please clarify.

20 Q. I think it has more than one possibility. What
21 do you see as the significance in the difference between
22 the 4,170 to 4,900 and the 4,350 to the 5,180?

23 A. That is an interval that they either agreed to or
24 were directed to dispose of. And as we look at a log
25 cross section, is where we start to see differences, and

1 this is where -- the closest well is this 06141 well.

2 And so we are working here with a well that in
3 the OCD records says that the top of San Andres is at
4 340 feet. And so I don't -- I do not recall off the top
5 of my head where the top of San Andres is in the
6 Anderson No. 1.

7 What we look at laterally here is we see -- I
8 would actually be tempted if I was looking at this
9 geophysical log here, I would probably raise that
10 correlation a little bit, but I would put it where it
11 says it is in the OCD file in terms of the depth.

12 So top of the San Andres here is 3,840. They are
13 proposing to be about 330 or more feet below the top of
14 the San Andres. If I interpreted this here and put it
15 here, which I think is consistent with these other
16 wells, then we would be another 40 to 50 feet deeper.

17 So it would be -- if I went with that, then we
18 would be instead of -- let me make sure I do my math
19 correctly. I said 330 feet, so maybe we would be 360 or
20 370 feet, something like that, below the top of San
21 Andres.

22 Q. Going back to Exhibit No. 9.

23 A. Yes.

24 Q. Would you turn to the first page that has been
25 marked in a red circle with the number five, Border No.

1 R-1277. On the second page, will you tell us what the
2 injection zone that was approved there was?

3 A. 4,490 to 4,950.

4 Q. And the next page is number 8, R-6855, finding
5 number 3 --

6 A. 4,300 to 4,852 feet.

7 Q. And do you know that all of the well examples you
8 gave are consistent with that 4,300 number? I'm trying
9 not to go through each one and make this last longer.

10 A. Okay.

11 Q. Okay, "yes" you do?

12 A. Yes.

13 Q. So in each of the examples that you gave, the
14 lower number was 4,300 or higher?

15 A. Okay. Yes.

16 Q. All right. So this is now Exhibit 6. And if
17 you look in the lower right-hand corner -- I have to go
18 back. I'm sorry.

19 A. Sure.

20 Q. Given what Exhibit 9 shows us about the lower
21 number being 4,300, can you give us your opinion why the
22 interval that is requested by the applicant would be
23 consistent with what's offered in Exhibit 9?

24 A. I didn't present that number, so I can't
25 speculate as to the reasoning.

1 Q. Okay. Thank you.

2 So now going back to Exhibit 6, in the lower
3 right-hand corner there's some lines, and then to the
4 right of the squiggly line furthest to the right, it
5 says, Minus 400 apex?

6 A. Approximately, oil/water contact.

7 Q. Can you just tell me what the significance of
8 that is, please?

9 A. In 1956 or thereabouts, when they logged this and
10 knew presumably from looking in wells the approximate
11 oil/water contact was at that point.

12 This is a -- you have to recognize this is a kind
13 of a generic log. And they don't always specify -- I
14 didn't see any specification as to where this log came
15 from, which well it came from.

16 But what it's showing is a determination at that
17 time, relative to the stratigraphy, approximately where
18 the oil/water and the water/gas contacts were.

19 Q. And how does that relate to the applicant's
20 application?

21 A. Well, at that time, the oil/water contact --
22 which assume is different now after a lot of
23 production -- the oil/water contact was about 200 feet
24 below the top of the San Andres.

25 Q. And just for the record, remind me what the

1 relationship of that is to what was being proposed?

2 A. Well, what it would say is that in the -- in this
3 particular unit that they were looking at here, whatever
4 they were showing here, in terms of information about --
5 you know, this is a structure contour on top of the
6 Greyburg and this is a Greyburg and we're looking at a
7 unit. And relative to the top of the San Andres at that
8 time -- you know this is a moving thing with
9 production -- so the oil/water contact was about
10 200 feet, in this generic representation, was about
11 200 feet below that.

12 So, in theory, here, if we are looking at just a
13 San Andres/Grayburg unit, there was water in possibly
14 the lower 200 feet of the Upper San Andres.

15 MR. BRIGGS: What depth is that?

16 THE WITNESS: It varies. It depends on
17 where I'm at.

18 EXAMINER WADE: You wouldn't be unable to
19 ask questions at this point.

20 EXAMINER GOETZE: But good try. Continue,
21 please.

22 Q. (By Ms. Moss:) I guess the question is this.
23 That minus 400 level, if you had a marker, would you be
24 able to mark that across the entire field?

25 A. At this time that is relative to sea level. So

1 minus 400 feet would put it down approximately here on
2 this particular well. But this isn't, I am sure --
3 given the API number was not drilled back then.

4 Q. When do you think it was drilled?

5 A. What is that?

6 Q. When was it drilled?

7 A. I don't remember. But it's a 3,400 number. I am
8 sure it wasn't drilled before 1956.

9 Q. I think -- and I could be incorrect that the
10 question was -- would that minus 400 go across -- could
11 you draw a line across --

12 A. I could. All I'd have to do is go down here --
13 from sea level, all I have to do is go down here; there
14 is 100, 200, 300, 400 feet. So over here it would be
15 approximately there, and it would just progress across.
16 That would, you know, put it out here in the Capitan.

17 Q. Okay. Thank you.

18 MS. MOSS: So I think that would be all the
19 questions I have for you, and I would like to call
20 Mr. Holm for rebuttal.

21 EXAMINER GOETZE: It's procedural. We get
22 questions, too.

23 MS. MOSS: Thank you. I am so sorry.

24 EXAMINER GOETZE: Counsel.

25 EXAMINER WADE: I don't have any questions.

1 EXAMINER GOETZE: And Mr. Jones.

2 EXAMINATION BY EXAMINER JONES

3 EXAMINER JONES: At the Lovington Sands, do
4 you see those in here, Mr. Powers? They usually show
5 around the back --

6 THE WITNESS: I am not sure because there is
7 nothing here that I would be willing to put the mark on
8 the map. I don't know if the Lovington Sands are -- I
9 didn't see any reference to it identified, and I am not
10 sure that it's here. I just don't know.

11 EXAMINER JONES: What about this oil/water
12 contact business? There's a big business with the
13 residual zone in the vacuum and also the Hobbs and
14 especially over in the Wassin Field in the San Andres,
15 the gradational from the maximum oil to the maximum
16 water, do you see any of that here?

17 THE WITNESS: I have not looked for that.

18 EXAMINER JONES: So you are kind of looking
19 at stratigraphy here and continuity and presence of
20 units, stratigraphic units most of all?

21 THE WITNESS: Yes. I really -- I really
22 wanted to know how do we differentiate Upper and Lower
23 San Andres out here, what are the criteria, and if those
24 criteria do exist somewhere, I would like to know them.
25 I just haven't found them yet.

1 I know that people are making a decision on
2 this. But I also know that in the industry, maybe not
3 here in your department, but in the industry, I know
4 that, you know, one man's Penrose is another man's Queen
5 and on and on or a Premier or then we're -- if they come
6 from Texas, then we see Clear Fork and we see other
7 things.

8 So I am looking for something like that,
9 because I believe if I was operating a salt water
10 disposal well out here, I would be extremely interested
11 in making sure that I didn't disrupt anybody else's
12 rights.

13 EXAMINER JONES: Okay. Thank you.

14 EXAMINER GOETZE: And we haven't forgotten
15 your redirect. Counsel has reminded me, so you will
16 have the opportunity after I get done.

17 EXAMINATION BY EXAMINER GOETZE

18 EXAMINER GOETZE: With regards to the water
19 analysis, we have samples taken from the North Monument,
20 Grayburg, San Andres unit. This is a water flood. Why
21 would this be representative of something --

22 THE WITNESS: Yeah, it probably isn't. I
23 don't know what it is doing here.

24 EXAMINER GOETZE: Okay. Fine.

25 Next in our definitions of the UIC program,

1 we tend to want to have a description of the confining
2 layer. Applicant has made a petition for a 4,170 to
3 4,900 foot open hole. What is keeping us in those
4 numbers?

5 THE WITNESS: Well, I would say that the
6 defining moment would come when the hole was drilled and
7 the geology was actually determined in that hole, rather
8 than a -- you know, many times there's a number that is
9 is put forward to you, and that becomes modified on the
10 basis of real data.

11 And I would hope that that real data would
12 be there and would be acquired such that you would have
13 great confidence that they had done that, unless you
14 specify it.

15 EXAMINER GOETZE: I understand. But with
16 open hole, you don't have that ability to go back unless
17 you run casing.

18 THE WITNESS: Yes.

19 EXAMINER GOETZE: So the question gets to be
20 at this point in time, really we have no answer if it is
21 such that what we have asked for in this application
22 does not become reality and this hole becomes nothing
23 more than something to be plugged and abandoned.

24 THE WITNESS: Uh-huh.

25 EXAMINER GOETZE: I'll leave that as my last

1 question. And I will let you have your opportunity to
2 redirect if you wish.

3 REDIRECT EXAMINATION

4 BY MR. PADILLA:

5 Q. Dr. Powers, I neglected to ask you whether -- I
6 think you've testified that, in your opinion, water --
7 you testified water would flow away from the Capitan
8 Reef. And you also indicated that the distance from the
9 proposed well to the Capitan Reef on the far side, the
10 left side of the cross section is too far for any
11 migration given that there are no pathways.

12 Is that fair to say?

13 A. I would say that there -- I didn't testify to
14 that exactly. But what I would say is that given the
15 potential with the porosity and apparent -- apparent but
16 not -- I haven't found a measurement of the permeability
17 in this zone -- and the potentiometric surface and the
18 apparent direction of flow in there, that there is no
19 reason to believe that we will find the water from that
20 salt water disposal well in the Capitan six miles away.

21 Q. Now in terms of the confinement questions, would
22 this water, injected water, be basically confined -- or
23 would be confined in the Lower San Andres?

24 A. I believe if the well is completed and the casing
25 is properly cemented and all of the engineering

1 activities that are required to design and construct
2 this well are carried out and it is completed only in
3 the Lower San Andres, that it will be confined.

4 Q. Dr. Powers, in your opinion, is approval of this
5 application in the best interest of conservation of oil
6 and gas and protection of correlative rights?

7 A. I do.

8 MR. PADILLA: No further questions.

9 EXAMINER GOETZE: At this point, your
10 ability for rebuttal is presented to you.

11 STATE LAND OFFICE REBUTTAL

12 MS. MOSS: May I call Anchor Holm.

13 EXAMINER GOETZE: We are done with this
14 witness. Thank you very much.

15 DR. POWERS: Thank you, sir.

16 EXAMINER GOETZE: Let's take a five-minute
17 break.

18 (Brief recess.)

19 EXAMINER GOETZE: Back on the record. Then
20 at this point let us present your witness. Let's take
21 your witness, and have him state his name and be sworn
22 in by the court reporter.

23 ANCHOR HOLM

24 having been first duly sworn, was examined and testified
25 as follows:

DIRECT EXAMINATION

1
2 BY MS. MOSS:

3 Q. Mr. Holm, have you testified specifically in
4 connection with this application before the OCD?

5 A. Oh, yes, at the September hearing.

6 Q. And were you accepted as a qualified expert at
7 this time?

8 A. Yes.

9 MR. PADILLA: We conceded his
10 qualifications.

11 EXAMINER GOETZE: He is so qualified and
12 he's back on record as being an expert witness.

13 Q. So I would like to explore with you the manner in
14 which water from the Capitan can flow into the site
15 which is proposed by the applicant.

16 And first I will show you number 5, which is the
17 exhibit right here, which was introduced by the
18 applicant today.

19 Can you explain to me how water from the Capitan
20 can come to this site?

21 A. As a result of Dr. Hiss's work and of the report
22 that we'll be referring to, it demonstrates that the
23 back reef portion of the reef -- that's the Artesia
24 Group portion of it -- has been flushed by fresh water.
25 And the only source of fresh water below the Salado is

1 coming from the Capitan.

2 There is no other sources of fresh water that I
3 am aware of below that that I've studied anywhere in the
4 Permian Basin, this portion in particular.

5 So to explain why the waters in the Grayburg San
6 Andres formation as far east as Hobbs are diluted down
7 to as little as 5,000 milligrams per liter of chlorides,
8 has to be flushed by fresh water. And the only source
9 of fresh water is the Capitan which is connected to the
10 Pecos River and the mountains that are down to the south
11 in Texas. And they are all flowing and discharging
12 going east from the aquifer at that point.

13 I am requesting the next exhibit.

14 Q. So the next exhibit comes from Exhibit 14, which
15 was introduced today by the applicant. Can you explain
16 the difference in the contours and how that impacts --

17 A. This is a map of the potentiometric surface of
18 the Capitan and Shelf Aquifer System. That is what this
19 map represents (indicating).

20 What it shows you is that in the upper portion --
21 this is the highest potentiometric surface and that
22 water is flowing southward at that point into the
23 Capitan Reef.

24 You go over here to the Pecos River, and you get
25 an abrupt change. And that water level matches the

1 river levels. In fact, Lake McMillan is a major
2 recharge of the system. And it is what is -- the Pecos
3 River historically has been dissolving the salts and
4 allowing the upper formations, Rustler included, to then
5 subside as the salt is removed by solutioning.

6 And it is always solutioned by fresher water.
7 Fresh water comes mainly from this area, from the Pecos
8 River. It then enters the Capitan Reef. And these
9 contours do demonstrate that the flow is along the
10 access of the reef. And that is because on these
11 potentiometric surfaces ground water flows at right
12 angles to the line.

13 However, in the area around the vicinity of this
14 particular well -- and I did plot on here the well point
15 on the left-hand side to this cross section as being in
16 section 31 of 20 South, 36 East. And I plotted a
17 similar one over in section 16 next to the proposed well
18 on the right-hand side.

19 When you draw a line at right angles to cross
20 this potentiometric surface line, that water is flowing
21 east from the Capitan Reef and it discharges over in the
22 vicinity between Hobbs and Eunice, somewhere over in
23 there.

24 That is where the flow is moving according to
25 pressure data. And this pressure data is how you'd

1 calculate ground water flow.

2 The key here is to remember that it generally
3 flows -- ground water flows at right angles to the --
4 these are isopleths. That's constant pressure or
5 constant head lines. That's your direction of flow.

6 So you can see when you are leaving this high
7 pressure area, there is some of it that goes straight
8 down to the southeast toward Hobbs. But a lot of it is
9 going more southerly and wants to go into the Capitan.

10 Part of that is because the Capitan Reef and the
11 connected back reef has very high permeability. How do
12 we know that from this map?

13 Below permeability area is this area to the north
14 where the contours are close together. When it is close
15 together that means that the natural formations are
16 acting kind of like a dam. They can hold water behind
17 the dam and it takes a long time to get through it and
18 then it comes out of the bottom of the river.

19 That is what you're seeing here. It's coming
20 down and coming out the bottom at the river. But that
21 river is a township or two to the north of this proposed
22 site.

23 The distance between these potentiometric
24 contours is an indication of the permeability or
25 hydraulic conductivity, in ground water terms, of the

1 rocks. And that says -- close together is very low
2 permeability; farther apart, high permeability.

3 Q. Does this exhibit show you additional things
4 about the permeability?

5 A. This is Exhibit 3 that I presented in September,
6 State Land Office Exhibit 3. It shows that the area of
7 the proposed disposal well is inside the fleshed zone of
8 the Capitan Reef. In fact, it's almost dead center.

9 Definitely the Grayburg, San Andres has been
10 flushed here. And that becomes the main question, the
11 containment zone must be able to demonstrate that it has
12 low permeability, so that if you inject below it in the
13 Lower San Andres that you are confident that it will not
14 go up into the Lower San Andres and Grayburg.

15 So that's what this is, and that's the water we
16 want to protect, because we can also use that water.
17 Since it has lower chlorides, it is something of value
18 to the state land office.

19 So we believe that everything presented here
20 demonstrates that Dr. Hiss's report was correct.

21 Going back if I can to Exhibit 14, if you look at
22 where section 31 in 20 South, 36 East is located on this
23 map -- that's this well, the approximate area, and you
24 estimate what is the pressure at that point; well, it's
25 between the contour of 2,700 feet above sea level and

1 2,600 feet. I estimated somewhere around 2,630, would
2 be my guess, 2,630 feet. That is the pressure of the
3 head over here (indicating). You do the same exercise
4 at the site of the well at the other end of our cross
5 section, and that correlates to be about 2,570 feet.
6 60 feet of drop in hydraulic head between the Capitan
7 Reef and here.

8 That water is flowing through there, and it has
9 hydraulic head to drive it through. Where is it going
10 to go through? The Capitan rock itself is over here.
11 Yet we know it is flowing over there. So it is going to
12 continue to flow right through here, which would include
13 the Grayburg and the Upper San Andres and may or may not
14 include the Lower San Andres.

15 We have no data on the Lower San Andres. We
16 don't know whether they are connected or not. On these
17 disposal wells that are existing out there, we don't
18 know whether any of that is staying in zone. I don't
19 know what tests have been made public, but I don't see
20 any in the record.

21 So I'm confident that the water is flowing, and
22 it's flowing in this area. And everything is below the
23 Salado. The Salado is the regional aquatard that, in
24 fact, traps the oil in this particular field. The oil
25 field that's in this region, it's trapping that oil

1 right there. And that oil is staying above the
2 oil/water contact. And here, it's been being produced
3 over the last few decades.

4 So I know that this is all the lowest point of
5 protectable oil resources, minus 400 feet. We need to
6 be down below that, at an elevation of minus 700 feet or
7 so.

8 So that's my recommendation to you if this is
9 allowed. And I would recommend also that the applicant
10 be required to provide the OCD a ground water sample
11 from the Lower San Andres to demonstrate its water
12 quality and demonstrate it has not been flushed by the
13 Capitan Reef.

14 MS. MOSS: I have no further questions.

15 EXAMINER GOETZE: Cross, Mr. Padilla?

16 CROSS EXAMINATION

17 BY MR. PADILLA:

18 Q. Dr. Holm --

19 A. I'm not a Ph.D., sir. Just a professional
20 engineer in Texas.

21 Q. Then Mr. Holm, you testified here before and you
22 brought -- and now you've testified about Exhibit 3.
23 And I think we are talking about the same one --

24 MR. PADILLA: May I approach the witness?

25 EXAMINER GOETZE: Please.

1 MR. PADILLA: This is page 2, but I can't
2 remember how you marked the exhibits.

3 EXAMINER GOETZE: What exactly is the
4 exhibit? Is it the chloride concentration?

5 MR. PADILLA: We have a flushed zone and we
6 have a low chloride concentration. I think he was
7 talking about this one.

8 THE WITNESS: I am showing a more general
9 map that shows from the Pecos River over to Hobbs.

10 MR. PADILLA: Okay.

11 BY MR. PADILLA (cont'd):

12 Q. Let me direct your attention to your flushed zone
13 where you have chloride concentrations.

14 A. And this would have been the exhibit that we
15 presented before that was subsequent to the one I talked
16 from. It has actual data on it.

17 Q. And then you also presented this exhibit which
18 was reduction of a larger map.

19 A. Yes. That the data was taken from.

20 Q. Right. And the larger map is this map --

21 A. That is correct. That is Resource Map 4, I
22 believe.

23 Q. I have this upside-down. In the exhibit that I
24 handed you there, as I understood your testimony back at
25 the first hearing, it was that you were trying to

1 demonstrate that there were low chlorides below 10,000
2 parts per million; is that what the purpose of that
3 exhibit was?

4 A. Yes. And usually somewhere around 5,000
5 chlorides would be equivalent to 10,000 milligrams per
6 liter of total dissolved solids.

7 Q. Did you cherry-pick the low chloride content
8 wells?

9 A. I picked all the ones that appeared to be in
10 there that were in the Grayburg, San Andres. And on
11 that bigger map, it is specific as to the formation.

12 MS. MOSS: The question was only answered by
13 implication, and it was a serious question. So if you
14 would be kind enough to ask him to answer the question.

15 On the record we have a question that says
16 did you cherry pick.

17 EXAMINER GOETZE: No. He gave best evidence
18 based upon the fact that he found the values in the
19 zones, so I would assume that meant he provided the
20 relevant information.

21 MS. MOSS: Thank you very much.

22 Q. (By Mr. Padilla) This map contains all zones
23 that Dr. Hiss did; is that right?

24 A. Yes. He does have a lot of the zones in there.
25 It does not include a lot of the ones, I believe, that

1 are deeper than the Artesia Group.

2 Q. If I recall --

3 A. It would be below what this cross section is.

4 Q. You specifically talked about the well that had
5 2,600 psi -- parts per million.

6 A. I see a 2,400 on here.

7 Q. Right.

8 So what I'm asking is can you pinpoint for me
9 here the 2,400 foot well that you showed down in this
10 area -- the 2,400 parts per million?

11 A. The 2,400 chlorides are in the San Andres
12 Drinkard. And on this map that's in -- it's on the west
13 line between Township 36 and 37. And it's all in
14 Township 20 South.

15 And that would be near section 18 in Township 37
16 East, 20 South.

17 Q. Is this well that has 40,000 San Andres Drinkard
18 in the vicinity of that 2,400 parts --

19 A. It is to the south of that.

20 Q. And that's not far, is it?

21 A. No, it is not.

22 Q. And why wasn't that in your exhibit?

23 A. See, I left off a Queen one, but that wasn't
24 related -- I should have put that on there.

25 Q. You should have put the 40,000 --

1 A. Yes. But that is probably -- that seems
2 anomalous simply because it is a factor of ten or more
3 higher than other wells in the formations that we are
4 focused on. So this one looks anomalous for some
5 reason.

6 We have an offset Grayburg with 3,500 chlorides.
7 And this one is 40,000. And the San Andres Drinkard is
8 in a deeper formation. So maybe the Drinkard in San
9 Andres are saltier than the Lower or Upper San Andres.
10 But we don't know for sure.

11 Q. That would change your contours, the 40,000
12 chloride --

13 A. You would have to draw a circle around that and
14 then go and investigate --

15 Q. But that wasn't included in there?

16 A. It's included in his contours, and I have copied
17 his.

18 Q. And it is the same map that was submitted?

19 A. Correct.

20 Q. You testified at the last hearing that water
21 flowed at a certain rate through here towards Hobbs.
22 Can you remind us of what that speed was?

23 A. The speed?

24 Q. Yes.

25 A. Based upon this --

1 Q. The flow rate.

2 A. Yes. Based upon this head difference of
3 approximately 60 feet of head loss over seven and a half
4 miles, it has a gradient that I calculated of .0015 feet
5 per feet of hydraulic gradient. That would push that
6 water probably somewhere at a rate between 100 and
7 200 feet per year, would be the natural or ambient
8 groundwater flow from west to east.

9 Q. And that would be in the disposal zone?

10 A. It would include the Grayburg/San Andres.
11 Whether that includes the disposal zone in the lower
12 portion, Mr. Hiss's report does not address that Lower
13 San Andres.

14 Q. But you haven't brought anything here either to
15 disprove that, correct?

16 A. That's correct. I am confident that the Upper
17 San Andres and the Grayburg have been flushed. There's
18 a good possibility since they're similar rocks and you
19 can have vugular porosities. And we know that the Lower
20 San Andres takes water rather easily. That could be
21 connected, may not be. We don't know at this particular
22 point the answer to that.

23 Q. What would the pressure be in the Lower San
24 Andres if they were connected?

25 A. Based upon your exhibit on the Bradenhead test,

1 they went on a vacuum of as much as minus 22 psi. I
2 assume that's psi, not ounces. I don't know the answer
3 to that. Assuming it is the larger number, 22 psi, of
4 water -- and we got nothing in but salt water in the
5 tubing at that time --

6 (Interruption.)

7 A. Since they are disposal wells, you would have
8 produced water in the tubing. There would be no oil, no
9 gas. And if it stabilized at 22 psi when they shut the
10 well in in a negative manner, then you could back
11 calculate a fluid level that might be some 100 feet or
12 more below the surface.

13 That's what it would take to pull that kind of a
14 pressure on it. But I don't have the density data to do
15 a precise calculation. But that would be an estimate.

16 So 100 to 200 feet below the well head is where
17 it is standing pressure-wise. And that would say it did
18 have pressure probably as high or higher -- probably
19 higher than what the pressures are in the Grayburg/San
20 Andres.

21 Q. Are you assuming that's a final pressure?

22 A. That's the pressure shortly after they shut in
23 the well. So it is not a stabilized shut-in. And I
24 don't know how much farther it would go if it was shut
25 in for 72 hours.

1 Q. Sir, I am trying to understand --

2 A. We don't have bottom hole pressure data.

3 Q. Not so much pressure data here, but are you
4 expanding the limits of the Capitan Reef when you say
5 that water is flowing northeast?

6 A. The scientific data proves that it's flowing to
7 the northeast, and it has flushed and it is discharging
8 into Texas. And they continue to map it on further
9 there.

10 But we haven't presented anything here. We stuck
11 to New Mexico.

12 Q. But are you saying that this whole area,
13 southeast New Mexico, ought to be shut in for salt water
14 disposal or --

15 A. Only the portions that have protectable waters in
16 it. So I don't want that water to be damaged by
17 introducing higher chloride waters into it and degrading
18 that water quality.

19 Q. If the water is moving away as Dr. Powers
20 testified, how would you be affecting the reef itself?

21 A. It does not affect the reef. The fresher water
22 comes from the reef, passes through these zones in route
23 to Texas. It does not come from the north.

24 The north is a very low queue, a very low
25 quantity of flow. And that is what the hydraulic head

1 contours demonstrate, low flow here, high flow here.

2 So it's going where you have higher permeability.
3 Water is lazy and goes the easiest pathway, even if it's
4 further.

5 Q. But as I understood your case, you are now
6 saying -- as far as I understood your testimony before,
7 was that this well was too close to the reef. And now
8 you are saying, your case now seems to be a flushing
9 effect of some sort that dilutes the chlorides.

10 A. Well, the reef itself is relatively close. But
11 it is doubtful that anything injected at this particular
12 site would flow upgradient seven miles.

13 So I doubt if it would directly affect the
14 Capitan Reef. But in the process, it may affect the
15 waters from the Capitan Reef that are flowing to the
16 east. And that is just as protectable.

17 Q. And you don't have any water samples?

18 A. I just have water data from a variety of things,
19 including some of the units that we've got. Everything
20 I've checked so far corroborates the data from
21 Dr. Hiss's report within 20 percent.

22 Q. Mr. Holm, I think I asked you at the last hearing
23 when we were here whether the State Engineer had taken
24 jurisdiction over the waters that we are talking about,
25 at least the waters that you are testifying about. And

1 I believe your answer was no.

2 A. So far I think they are still evaluating how to
3 assume that responsibility. But I have not seen
4 anything that formally declared that, even though they
5 are obligated under the Memorandum of Understanding to
6 look at it.

7 MR. PADILLA: I have nothing further.

8 EXAMINER GOETZE: Very good. Redirect?

9 MS. MOSS: Just one question.

10 REDIRECT EXAMINATION

11 BY MS. MOSS:

12 Q. For this application, this proposed disposal
13 facility, is there an acceptable interval which would
14 allow disposal but not raise concerns about impacting
15 protectable waters?

16 A. Well, based primarily upon that water/oil
17 contact, which is somewhere in the vicinity of minus
18 400 feet, where the state land office has historically
19 required a 300-foot buffer below that because they felt
20 from their previous studies that 300 feet of rock would
21 be sufficient to protect the shallower oil and gas
22 resources.

23 Q. Would that be consistent with the wells that were
24 approved in Exhibit 9?

25 A. Yes. It would put us somewhere between a depth

1 of 4,300 or 4,450, somewhere in there would be the
2 appropriate top of injection.

3 MS. MOSS: Okay. I have no further
4 questions. Thank you.

5 EXAMINER GOETZE: Thank you. You are not
6 going to go through a rebuttal, are you?

7 MR. PADILLA: No.

8 EXAMINER GOETZE: That's good. I appreciate
9 that. Closing statements.

10 MR. PADILLA: Sure. I already made my
11 closing statement the last time. But, very briefly, I
12 think we've demonstrated in answer to your question with
13 regard to separation between Upper San Andres and Lower
14 San Andres in terms of protecting correlative rights of
15 producers of the Upper San Andres, which is a producing
16 zone here, so we have proven it two different ways,
17 structurally and through pressure data.

18 We could not find a sample of the Lower San
19 Andres water to the extent that this -- well, I am sure
20 that the applicant is not going to drill a well just to
21 get a water sample here, and just can't find it in terms
22 of either to drill right through it to the lower
23 formations. But there's very little production or no
24 production in the Lower San Andres in this area. And so
25 that's the basic reason that there are no water samples

1 from the Lower San Andres.

2 In terms of -- we've had this academic
3 discussion here of geology and Dr. Hiss and he is the
4 authority. And Dr. Powers has countered anything that
5 Dr. Holm's said in terms of flowing rates.

6 But in terms of protectable waters, it would
7 seem to me that this had to be a declared water basin.
8 If it's protectable water, then the State Engineer who
9 has jurisdiction here should be the one that -- should
10 be an indispensable party in this proceeding. And we
11 don't have that.

12 The land office wants to sell water at some
13 point. And there is no definitive answer or -- as to
14 when that would happen or how that would happen. But I
15 think the jurisdictional issue is paramount here. The
16 land office is trying to do what the State Engineer
17 ought to be doing.

18 But I think geologically we've separated the
19 Upper San Andres, Lower San Andres, and the pressure
20 would indicate -- the pressure data indicates that the
21 water is not going to flow.

22 I think we've made our case.

23 EXAMINER GOETZE: Any statement?

24 MS. MOSS: It is not clear to me whether a
25 jurisdictional challenge has just been raised. If that

1 is the case, and if, in fact, there's an indispensable
2 party who should be here and you don't have
3 jurisdiction, then we would have to start from the
4 beginning.

5 Is that what you're suggesting?

6 MR. PADILLA: No, I am not. I am just
7 simply saying if you haven't shown that these are
8 protectable waters other than what you are bringing up
9 here and you don't have a declared water basin with
10 10,000 chlorides -- below 10,000 chlorides that would be
11 protectable. So I am just simply saying if you don't
12 have that, then the application ought to be approved.

13 MS. MOSS: I will just keep to a closing
14 statement.

15 EXAMINER GOETZE: Thank you very much.

16 And I will point out that it is the Safe
17 Water Drinking Act which is the authority for this, not
18 the State Engineer or anything else. This is the USC
19 program and the authority derived from the definitions
20 provided in USC.

21 Proceed with closing.

22 MS. MOSS: In closing, I would say that the
23 applicant has not demonstrated anything that would
24 suggest that you should discount my expert's testimony,
25 what he introduced of Dr. Hiss, and, interestingly,

1 everything that the OCD has done in the past. He may
2 not know exactly why the OCD --

3 (Interruption.)

4 MS. MOSS: We don't know from Exhibit 9 that
5 was introduced by the applicant why the OCD has never
6 allowed an interval such as the one which is being
7 proposed. But through the testimony of Mr. Holm and
8 what he introduced from Mr. Hiss, it is clear that there
9 is very likely protectable water in this area. And
10 while it is our duty to protect the oil and gas as well
11 as protectable water, that is not simply a matter of
12 sale as may have been suggested. It is our legal duty
13 to assure the protectable water does not have oil and
14 gas disposal put into it.

15 So I would ask you, at a minimum, to require
16 that we know where this disposal is going or simply to
17 stick to what the evidence has shown and what you have
18 done in the past and enforce an interval that would be
19 consistent with the evidence and what you have done
20 before. Thank you.

21 EXAMINER GOETZE: Very good. So in final
22 note, it is not Dr. Holm and the author is Hiss who is
23 the compiler of the information.

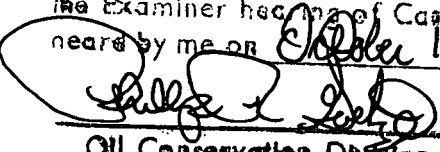
24 MS. MOSS: I hope that wasn't unclear.
25 Thank you for correcting.

1 EXAMINER JONES: And the vacuum measurements
2 have to be in inches, not in psi.

3 EXAMINER GOETZE: With that final note from
4 the engineer, Case No. 15307 is taken under advisement.
5 And Docket No. 29-15 is closed.

6 Thank you, folks, for your time and patience
7 in coming back over and over again.

8
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10 (Time noted 5:30 p.m.)
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17

18 I hereby certify that the foregoing is
19 a complete record of the proceedings in
the Examiner hearing of Case No. 15307
heard by me on October 1, 2015.
20  , Examiner
21 Oil Conservation Division
22
23
24
25

1 STATE OF NEW MEXICO)
 2) ss.
 3 COUNTY OF BERNALILLO)
 4
 5
 6

7 REPORTER'S CERTIFICATE

8
 9 I, ELLEN H. ALLANIC, New Mexico Reporter CCR
 10 No. 100, DO HEREBY CERTIFY that on Thursday, October 1,
 11 2015, the proceedings in the above-captioned matter were
 12 taken before me, that I did report in stenographic
 shorthand the proceedings set forth herein, and the
 13 foregoing pages are a true and correct transcription to
 the best of my ability and control.

14 I FURTHER CERTIFY that I am neither employed by
 15 nor related to nor contracted with (unless excepted by
 the rules) any of the parties or attorneys in this case,
 16 and that I have no interest whatsoever in the final
 disposition of this case in any court.

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