

BEFORE THE DEPARTMENT OF WATER RESOURCES  
OF THE STATE OF IDAHO

IN THE MATTER OF APPLICATION )  
FOR PERMIT NO. 63-32573 IN )  
THE NAME OF M3 EAGLE LLC )  
\_\_\_\_\_ ) VOLUME V  
(Pages 954 through 1205)

BEFORE  
HEARING OFFICER: GARY SPACKMAN

Date: April 24, 2009 - 9:00 a.m.  
Location: Idaho Department of Water Resources  
322 East Front Street  
Boise, Idaho

REPORTED BY:  
JEFF LaMAR, C.S.R. No. 640  
Notary Public

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1 APPEARANCES:  
 2  
 3 For M3 Eagle LLC:  
 4 GIVENS PURSLEY LLP  
 5 BY MR. JEFFREY C. FEREDAY  
 6 MR. MICHAEL P. LAWRENCE  
 7 601 West Bannock Street  
 8 P.O. Box 2720  
 9 Boise, Idaho 83701-2720  
 10 For North Ada County Groundwater Users  
 11 Association:  
 12 BY MR. JOHN THORNTON  
 13 5264 North Sky High Lane  
 14 Eagle, Idaho 83616  
 15 For Eagle Pines Water Users Association and  
 16 Individually:  
 17 BY MR. ALAN SMITH  
 18 3135 Osprey Road  
 19 Eagle, Idaho 83616  
 20 Appearing Individually:  
 21 BY MR. NORMAN L. EDWARDS  
 22 884 West Beacon Light Road  
 23 Eagle, Idaho 83616  
 24 ///  
 25 ///

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1 APPEARANCES (Continued):  
 2  
 3 Also Present:  
 4 Jerry Peterson  
 5 Jason Smith  
 6 David Head  
 7 Aaron Marshall  
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1 THE HEARING OFFICER: Let's go on the  
 2 record. We're recording today. The date is  
 3 April 24th, 2009. It's approximately 9:20 or  
 4 9:15 a.m. in the morning. And this is a  
 5 resumption of the M3 Eagle hearing.  
 6 And based on agreement between the  
 7 parties, we've suspended the testimony of Ed  
 8 Squires, and we have Dr. Spence Wood here, is my  
 9 understanding, Mr. Fereday.  
 10 MR. FEREDAY: That's correct.  
 11 THE HEARING OFFICER: Okay. Dr. Wood, if  
 12 you'd raise your right hand, please.  
 13  
 14 SPENCER WOOD,  
 15 having been called as a witness by M3 Eagle LLC,  
 16 was duly sworn and testified as follows:  
 17  
 18 THE HEARING OFFICER: Thank you. Please be  
 19 seated.  
 20  
 21 DIRECT EXAMINATION  
 22 BY MR. FEREDAY:  
 23 Q. Please state your name and give your  
 24 business address.  
 25 A. My name is Spencer Wood, W-o-o-d. My

1 business and residence is 421 East Crestline Drive  
2 in Boise.

3 Q. I note that Exhibit 32E contains your  
4 resumé.

5 Is that an accurate resumé, sir?

6 A. Yes, that's correct.

7 Q. Could you give us a very brief  
8 description of your educational and experiential  
9 background?

10 A. Yes. I have an undergraduate  
11 geophysical engineer degree from Colorado School  
12 of Mines, a doctorate in geology from Cal Tech.

13 I was four-and-a-half years with a  
14 major international oil company overseas, as an  
15 exploration geophysicist, two years as a research  
16 geologist with the U.S. Geological Survey, and  
17 then 27 years as a professor at Boise State  
18 University. And I am a registered professional  
19 geologist in Idaho.

20 Q. What is your experience working with  
21 the geology in Ada County?

22 A. Well, early on, Will Burnham and I set  
23 out to map -- geologically map the foothills of  
24 Boise. Subsequently, we became interested in  
25 geophysical logging. Along with Mr. Ed Squires,

1 we developed geophysical logging of water wells in  
2 the Western Snake River Plain. We published a  
3 number of papers and reports on those results.

4 And then when the Treasure Valley  
5 Hydrologic Project came along, I assembled the  
6 geological information for that project, then  
7 assembled data and published papers on the Western  
8 Snake River Plain since that time.

9 Q. Have you examined cuttings from well  
10 bores in the foothills area in the Boise Valley  
11 area?

12 A. Yes, I have.

13 Q. Is that part of your normal course of  
14 study in trying to evaluate the geology of the  
15 area?

16 A. Yes. The subsurface geology obtained  
17 from careful examination of cuttings from wells  
18 and well information is essential to understanding  
19 the geology of the area.

20 Q. I'd like you to refer to Exhibit 19,  
21 please. I think 19A through H are a number of  
22 papers and reports. And I'd just like you to  
23 identify those, please.

24 A. Let's see. Do I have them in a folder  
25 here?

1 THE HEARING OFFICER: One of your binders.

2 THE WITNESS: Okay. Okay. Here we go.

3 Okay. Exhibit A are the logs of  
4 petroleum exploration wells in the Western Snake  
5 River Plain.

6 Q. (BY MR. FEREDAY): Are those some of  
7 the logs that have been mentioned by Mr. Squires  
8 in his testimony, or do you know?

9 A. Well, I believe -- I missed the first  
10 part of his testimony. Perhaps he did mention  
11 them. I'll go into them in more detail.

12 Q. Okay.

13 A. Exhibit B is a report I did for Hydro  
14 Logic over the M3 properties where I interpreted  
15 magnetic anomaly data and also compiled all the  
16 geological mapping, much of it unpublished, on the  
17 Eagle area and on north into Freezeout Hill.

18 And Exhibit C is a U.S. Geological  
19 Survey open-file report, which was an extended  
20 field trip from the Owyhee Mountains across into  
21 the Boise foothills.

22 Q. That's authored by you?

23 A. That's authored by me and reviewed by  
24 the U.S. Geological Survey.

25 Exhibit D is a peer-reviewed paper I

1 published in a volume on the Snake River Plain by  
2 the Idaho Geological Survey.

3 Exhibit E is a study done by  
4 Mr. Squires and myself for the Treasure Valley  
5 Hydrologic Project, in which we identified  
6 characteristics of geophysical logs to help us  
7 understand the hydrogeology of the area.

8 Exhibit F is a little hard to read,  
9 but it's the mudstone facies map that I prepared  
10 for the Treasure Valley project. And I'll say at  
11 this point, it's the same as the base of the  
12 Pierce Gulch Aquifer, although at that time we did  
13 not call it that.

14 Exhibit G is a paper I published early  
15 on on the delta systems of which the Pierce Gulch  
16 Aquifer is part of across the plain. And this is  
17 an outside peer-reviewed journal in the  
18 American -- Bulletin of the American Association  
19 of Petroleum Geologists.

20 And Exhibit H is a study I did back in  
21 1981 for the Department of Water Resources on the  
22 geothermal geology of the Nampa and Caldwell area.

23 Q. Does that last study, the geothermal  
24 study that you mentioned, have relevance to this  
25 matter; and if so, in what way?

1 A. Well, it was my first paper of the  
2 early involvement that tried to pull together the  
3 subsurface geology of the Western Snake River  
4 Plain --

5 Q. Okay.

6 A. -- which really hadn't been done  
7 before.

8 Q. Okay. Thank you very much.

9 A. Okay.

10 Q. What is the work you've been asked to  
11 do by Hydro Logic in this matter?

12 A. Well, in 2007 I reviewed the  
13 conceptual groundwater flow model that hydrologic  
14 had put together, and of course the Pierce Gulch  
15 Sand Aquifer concept. Then I compiled the field  
16 geologic mapping of north Ada County. And then I  
17 interpreted the magnetometer survey lines that had  
18 been done through the M3 properties and adjoining  
19 areas.

20 2008, I wrote the sort of facts known,  
21 opinions held at the request of the attorney.

22 2009, I constructed cross-sections of  
23 the petroleum exploration wells that very clearly  
24 show the top of the mudstone in the deep wells  
25 throughout the Western Snake River Plain, and

1 reinterpreted seismic data I had looked at back in  
2 1981 for the Department.

3 Q. Now, when you speak of the Western  
4 Snake River Plain in this context, to what area  
5 are you referring that's of relevance to this  
6 water right application?

7 A. Well, generally, west of Mountain Home  
8 is the area that I've concentrated on. And it's  
9 the large depositional base, and it was formerly  
10 occupied by a lake 3 or 4 million years ago.

11 Q. Okay. Could you explain the Pierce  
12 Gulch sand and how they are related to the  
13 subsurface in this area?

14 A. Yeah. We've known for over 20 years,  
15 and I published in 1994 this concept that river  
16 deltas flow -- or were built out over the deep  
17 lake mudstone of the Western Snake River Plain.

18 I think the understanding of it came  
19 more clearly as we looked into the Treasure Valley  
20 Hydrologic Project data that I put together. Now  
21 we understand the history of the Pierce Gulch sand  
22 and this delta system over these very thick  
23 mudstones that lay out in the plain are related to  
24 the lake rising to the very -- its very top level  
25 and finding a spill point over into Hells Canyon.

1 And as the lake cut down, sands were scavenged  
2 from the side and built out over the plain.

3 You simply can't get sand out in the  
4 middle of a lake basin because it's still water,  
5 without first building a delta platform which is  
6 prograded out over the plain.

7 Q. Could you explain what "prograded"  
8 means.

9 A. Well, "prograde" just means to advance  
10 forward. And in this case, it's the advancing of  
11 a sand body delivered by rivers, and where they  
12 hit the still water it simply advances forward by  
13 avalanching off the front and then building  
14 another platform and moving still forward and  
15 filling in the lake basin.

16 But it switches. It doesn't just go  
17 in one direction. Ultimately, this sand  
18 depositional process switches and fills in the  
19 entire available basin of the still lake water.

20 Then I would say next the Pierce Gulch  
21 sand -- in 2007, Mr. Squires showed me resistivity  
22 logs they had begun to obtain for the M3 property.  
23 And it was a real -- how do you say, a real moment  
24 to see that those new wells now were being drilled  
25 where we really had excellent geophysical and

1 geological data taken by Hydro Logic on wells in  
2 the M3 area. There was just no question that we  
3 were looking at exactly the same depositional  
4 system and same geophysical log characteristics.

5 Q. Would you refer to Exhibit 44,  
6 figure 6, please, and perhaps figure 2 as well.

7 Perhaps we can get those up on the  
8 screen.

9 MR. THORNTON: That was Exhibit 44,  
10 figure --

11 MR. FEREDAY: Exhibit 44, figure 6, and  
12 Exhibit 42, figure -- I think it's A(4)(2),  
13 figure 2.

14 THE WITNESS: I think you're there. Right  
15 there. Let's see, 44, figure 6. I have it here.

16 MR. FEREDAY: Well, as long as the Hearing  
17 Officer has it in front of him.

18 THE HEARING OFFICER: Let me make sure.

19 THE WITNESS: Yeah, that's the correct  
20 figure.

21 THE HEARING OFFICER: Okay.

22 MR. FEREDAY: And it's up on the wall as  
23 well, if you'd like to look at that.

24 THE WITNESS: That helps a lot.

25 THE HEARING OFFICER: It is interesting

1 that I have two figure labels on these, just so  
2 you know. We need to refer to the one at the top  
3 of the page, apparently.

4 MR. FEREDAY: Yes.

5 Q. Dr. Wood, I noticed that this  
6 Exhibit 44, figure 6, also is designated in  
7 smaller type as figure 24.

8 Did that come out of a previous  
9 report? Is that the reason why?

10 A. Yes, that came out -- I think the  
11 figure 24 is out of the Idaho Geological Survey  
12 report. It's the clearest figure. It's been  
13 slightly redrafted from when Mr. Squires and I  
14 originally drew this picture back in 2001.

15 Q. Has the picture been changed?

16 A. It has not been changed. The  
17 writing's been cleared up a bit.

18 Q. So tell us what this figure shows,  
19 please.

20 A. Well, in the mapping of the geological  
21 features of the Boise foothills, there's a very  
22 clear formation in the foothills that Mr. -- the  
23 late Mr. Burnham and I mapped. And we called it  
24 the Pierce Gulch sand, after its best exposure and  
25 a quarry there at Pierce Gulch.

1 picture.

2 I think we should go to the next --

3 Q. How about Exhibit 44, Exhibit -- or  
4 excuse me, Exhibit 42, figure 2, and actually,  
5 it's A(4), figure 2. Mr. Squires spoke of this  
6 yesterday.

7 Could you describe that, please.

8 A. Yes. This -- I want to explain just  
9 very briefly what we mean by a geophysical  
10 signature. This is well-known in petroleum  
11 exploration because it's critical to finding oil  
12 and gas in some basins.

13 But the very subtle feature is we have  
14 these deepwater mudstones that are deposited in  
15 still water on these resistivity logs. They have  
16 a very low electrical resistivity. They conduct  
17 electrical current because they have fastened  
18 ions, electrical ions on them.

19 Anyway, as we work our way up -- this  
20 might be a good one to show, is test well, I  
21 believe it's 3. There's a very subtle increase in  
22 resistivity over it, looks like about almost a  
23 hundred feet here. And we see that in the other  
24 ones over a lesser amount.

25 That subtle increase in resistivity,

1 And there it very clearly overlies  
2 this very thick mudstone that we call the mudstone  
3 facies of the Terteling Springs formation. And  
4 that's the Pierce Gulch sand. In the foothills  
5 there's these oolitic limestones, which are these  
6 interesting carbonate sands. I won't get into  
7 detail on it, but they form a very good marker bed  
8 for top of the mudstone.

9 We realized then when United Water  
10 drilled the Swift well and Mr. Squires, then at  
11 United Water, obtained these excellent geophysical  
12 logs of that well as well as careful examination  
13 of the cuttings, that in this upper sand right  
14 here we were looking at exactly the same sand  
15 that's in the foothills.

16 And then I was aware that farther out  
17 into the basin at the MacMillan well and some of  
18 the other wells, we see exactly the same sand in  
19 the basin. So that was the first association with  
20 what -- geologists name geological formations by  
21 where they're best exposed at the surface, and  
22 that is in Pierce Gulch. And then it's always  
23 been difficult to match the foothills with the  
24 subsurface until these excellent geophysical logs  
25 had been obtained. Now we have a very clear

1 it just starts there, and then abruptly we get a  
2 high increase in the electrical resistivity that's  
3 characteristic of fresh-water-saturated sands.  
4 But the important part is just this very subtle  
5 increase. And that's characteristic of the  
6 sediments that are deposited out in front of the  
7 delta in the deep water that's telling you that  
8 courser material is getting out there by  
9 avalanching and by turbidity currents, and then  
10 finally begins to avalanche sands that come right  
11 off the delta front. And then after that, the  
12 river then builds out over the top of that, and  
13 you get this sequence of sand.

14 But at times the river switches, and  
15 you get these little mudstone layers that are  
16 independent -- where you get quiet water or the  
17 lake rises over the former riverbed, but then the  
18 river will switch back and resumes sedimentation.  
19 So we see this characteristic signature over most  
20 of the Western Snake River Plain.

21 Q. I'd like you to refer to Exhibit 44,  
22 please, figure 8. And while you're looking for  
23 that, I'll refer back to the previous figure 2  
24 that was in the water right application. That  
25 figure 2 of Mr. Squires described that as having

1 put those -- that, as you call it, that signature  
2 on one straight line so they could be compared one  
3 to another.

4 Do you agree with that?

5 A. Yes, that's correct. Just, it's for  
6 illustration purposes.

7 Q. Uh-huh.

8 A. It's not to show that it's an  
9 absolutely flat bed across there. It's just to  
10 illustrate that this signature appears in all of  
11 these wells.

12 Q. The bed is not flat, is it?

13 A. No, it's not. It's tilted very  
14 gently, only a couple -- at the most, a couple of  
15 degrees from the foothills into the basin.

16 Q. Okay. Exhibit 44, figure 8 is up on  
17 the screen now. And I see that that is maybe not  
18 quite as good a copy as in Exhibit 44 itself.  
19 There's the other example in Exhibit 44.

20 Can you describe what this is, please.

21 A. Yeah, that's much better. This was  
22 put together from seismic reflection data, which  
23 is oil company data that's been used to explore  
24 for oil and gas out in the western plain. We're  
25 looking fairly deep, 4,000 feet below sea level in

1 this case.

2 And the western plain basin is  
3 comprised of these faulted, very irregular  
4 volcanic basements, many of the faults not  
5 propagating into the upper sedimentary section.

6 But it was the breakup and the  
7 subsidence that formed this enormous lake basin,  
8 and then it filled entirely with mud out in the  
9 basin. And because the lake was filling up and  
10 rising, mud was deposited out in the basin. And  
11 it kept the deltas from prograding out into the  
12 plain so that the shoreline sands are deltas. And  
13 we call this the sand facies of the Terteling  
14 Springs formation.

15 It's these sands that have been sort  
16 of maintained against the foothills because the  
17 lake was always rising and the sand could never  
18 get out. It was always trapped over a distance of  
19 several miles from the granitic boundaries of the  
20 foothills.

21 Okay. Then the next thing that  
22 happens geologically is that the lake begins to  
23 find an outlet at the upper end of Hells Canyon  
24 and starts falling. And so these shoreline sands  
25 started to erode, and they built out over the

1 Snake River Plain. So we now see, of course, in  
2 the foothills the Pierce Gulch sand, but then out  
3 in these wells, out into the western plain, we see  
4 this very characteristic geophysical log  
5 signature, increasing resistivity, and then  
6 abruptly many sands of high resistivity, in this  
7 case out in the Caldwell area.

8 And this feature is seen over the  
9 entire part of the Western Snake River Plain. And  
10 it is the major aquifer system, starting with the  
11 Pierce Gulch sand.

12 Q. Is that the Pierce Gulch Sand Aquifer,  
13 in your view?

14 A. Yeah, the bottom of it is the Pierce  
15 Gulch Sand Aquifer, the first major sands that  
16 come out over the mudstone. So for the Treasure  
17 Valley Hydrologic Project, I mapped from seismic  
18 data and from wells this surface, which I called  
19 the top of the mudstone. Now it can also be  
20 referred to as the base of the Pierce Gulch Sand  
21 Aquifer.

22 Q. I'd like you to refer to Exhibit 19G,  
23 please, just to explain what that shows. I  
24 believe it's some seismic logs from deep well --  
25 deep oil exploration?

1 A. Let's see. What's the exhibit number?

2 Q. 19G.

3 A. Let's see. I think we're going back.

4 Q. And there's a figure in there that I'd  
5 like you to refer to, please.

6 A. Okay. This figure, yeah. This is  
7 from the paper I put out to explain how lake delta  
8 systems form and are distributed in the Western  
9 Snake River Plain.

10 And what I pointed out in this -- and  
11 it's a little hard to see -- are these exploration  
12 wells that were drilled by oil companies  
13 throughout the Western Snake River Plain that show  
14 this characteristic delta signature. And I posted  
15 the elevations of the base of the delta system,  
16 top of the mudstone, underneath each of the wells.  
17 So it's widespread over all of this area of the  
18 western plain and over into Oregon.

19 And we're now mapping the foothills  
20 east of Weiser. We also see it in the foothills  
21 east of Weiser.

22 Q. Okay. Dr. Wood, I'd like you to refer  
23 now to Exhibit 45, figure 3.

24 A. Okay. Figure 45 is a map that  
25 shows --

1 Q. Excuse me. Figure --  
 2 A. If I have it right. Figure 3 in  
 3 Exhibit 45.  
 4 Q. Let's see if we have the -- it's a map  
 5 that -- there. I think it's close to this one.  
 6 Yeah, this map. Good.  
 7 THE HEARING OFFICER: Beyond the numbered  
 8 pages.  
 9 Q. (BY MR. FEREDAY): Figure 3 of  
 10 Exhibit 45, do you recognize this, sir?  
 11 A. Yes, I do. This is a map that I  
 12 prepared.  
 13 Q. And what does it show us?  
 14 A. Okay. Let me -- of course this is  
 15 Boise, and this is Caldwell (indicating). This is  
 16 a topographic map.  
 17 The Swift well of United Water Idaho  
 18 is here (indicating), and the Pierce Park sand  
 19 outcrop area is in the foothills up here  
 20 (indicating). This is where we first identified  
 21 it and named it.  
 22 And then what I showed.  
 23 Q. Excuse me, Dr. Wood. You just  
 24 mentioned the Pierce Park sand.  
 25 A. Sorry. It will get confusing because

1 we did call it that at one time. We've now  
 2 formally called it the Pierce Gulch sand. It's  
 3 synonymous with the top of the mudstone also.  
 4 Q. Okay.  
 5 A. That's the Swift well location. The  
 6 next well is the M3 No. 1 well. And the next well  
 7 is the Star Water and Sewer well here. The next  
 8 well is a deep petroleum exploration well drilled  
 9 by El Paso Natural Gas back in the '50s, and then  
 10 a group of wells over here, particularly the Ted  
 11 Daws well, in the Payette River Valley.  
 12 And what will be critical is to see  
 13 that that geophysical log signature appears in the  
 14 Payette Valley in these wells. And that's the  
 15 next --  
 16 Q. Exhibit 45, the very next figure, I'd  
 17 like you to refer to that and tell us what that  
 18 is, sir.  
 19 A. Okay. This is sort of a standard  
 20 approach of petroleum exploration, and water work  
 21 also, showing these geophysical logs and how these  
 22 formations map. So this is the Swift well  
 23 (indicating). This is the base of the Pierce  
 24 Gulch Sand Aquifer here (indicating). This is the  
 25 M3 wells with the base of the Pierce Gulch Sand

1 Aquifer shown on the geophysical logs  
 2 (indicating). Here it occurs near the bottom of  
 3 the Star well, and then in this deep exploration  
 4 well out by Caldwell.  
 5 And then most importantly, over in the  
 6 Payette River Valley we see it again in the Ted  
 7 Daws well. And here's this characteristic  
 8 increase in resistivity and this abrupt increase.  
 9 And this unit, then, in here is called -- is the  
 10 Pierce Gulch sands. Very clearly logged in the  
 11 Ted Daws well there just north of New Plymouth by  
 12 the river, and then in a number of wells over  
 13 towards Payette and across into the -- into  
 14 Oregon.  
 15 Q. Now, Doctor --  
 16 THE HEARING OFFICER: Mr. Fereday, before  
 17 we go on, I have some concerns about -- and maybe  
 18 just for the purposes of reconnaissance, the  
 19 references are okay. But for me in listening to  
 20 Dr. Wood's testimony, his references to "this is,"  
 21 "here is," I'm concerned that the record is not  
 22 reflecting what it is that he's referring to at  
 23 all.  
 24 MR. FEREDAY: Yes.  
 25 THE HEARING OFFICER: And consequently,

1 anybody reviewing it would not have any idea  
 2 unless maybe the labels are good enough here. But  
 3 I think it would be a stretch.  
 4 Q. (BY MR. FEREDAY): Dr. Wood, the  
 5 figure you're discussing right now is figure 4 in  
 6 Exhibit 45; correct?  
 7 A. That's correct.  
 8 Q. And this shows -- is it correct to say  
 9 that this shows the extensiveness of the Pierce  
 10 Gulch Sand Aquifer through the points denoted on  
 11 this figure, including out to the Ted Daws well?  
 12 A. Yes, that's correct.  
 13 Q. And is it also correct to -- at least  
 14 to explain to me as a layperson that this figure 4  
 15 is setting up sort of a three-dimensional  
 16 schematic to show the continuity of this unit  
 17 through this area?  
 18 A. Yes, that's correct.  
 19 Q. Okay. All right. So how extensive is  
 20 the Pierce Gulch Sand Aquifer, Dr. Wood?  
 21 A. Well, it's extensive over much of what  
 22 I consider the Western Snake River Plain lowlands.  
 23 And it's occurred in petroleum exploration wells  
 24 in the Caldwell area south of Nampa, and then this  
 25 well north of Caldwell called the Webber State

1 No. 1 well shown in the diagram, as well as over  
2 in the Ted Daws well north of New Plymouth in the  
3 Payette River Valley.

4 And there the -- the overall sand  
5 section there just north of New Plymouth,  
6 encountered by this Ted Daws well, is about  
7 500 feet thick.

8 Q. Okay.

9 A. Above the mudstone, I should add.

10 Q. Okay. You mentioned earlier that you  
11 prepared some materials with regard to this  
12 geology for the Treasure Valley Hydrologic Project  
13 in I believe you said 1997?

14 A. That's correct, yes.

15 Q. What was that that you prepared for  
16 them, and what became of it?

17 A. Well, I -- what we wanted to prepare  
18 was the -- was the elevation of geological  
19 surfaces that would be important for groundwater  
20 modeling of the Western Snake River Plain. I  
21 prepared a map of the faulted volcanic basement,  
22 which may have been used. I'm not sure. And then  
23 I prepared a map of the top of the mudstone, which  
24 is the base of the Pierce Gulch Sand Aquifer that  
25 we're now discussing, and showed -- used that

1 petroleum information -- that petroleum  
2 exploration information, the Ted Daws well being  
3 one of them out at New Plymouth, to fix the  
4 elevation of the top of the mudstone.

5 And I projected contours on up into  
6 the Payette River Valley by Leatha. And there I  
7 showed an inferred thickness of sandy sediment  
8 over the mudstone of about 300 feet.

9 It's interesting now -- and I -- that  
10 was my major involvement with the -- with the  
11 project, except Mr. Squires and I put together a  
12 report trying to understand geophysical logs of  
13 the area. And then more recently I have come back  
14 and read the 2004 report showing the groundwater  
15 model.

16 Q. Now, which report is that?

17 A. That's the 200- -- Christian Petrich's  
18 report in 2004 on groundwater modeling of the  
19 lower Boise River Valley.

20 Q. Was that in the Treasure Valley  
21 Hydrologic Project?

22 A. That's in the Treasure Valley  
23 Hydrologic Project.

24 I was surprised to see that they  
25 established a no-flow boundary in the divide

1 between the Boise River Valley and the Payette  
2 River Valley, and they virtually ignored the --  
3 the sandy sediments that projected and were of  
4 substantial thickness on the north into the  
5 Payette River Valley.

6 Q. Is it --

7 A. And so they essentially put a  
8 groundwater dam all along that topographic divide.  
9 And it simply doesn't make sense.

10 Q. Okay. In your opinion -- do you have  
11 opinion as to whether the Pierce Gulch Sand  
12 Aquifer extends at least in some part into the  
13 Payette River Valley?

14 A. Yes, it certainly does extend into the  
15 Payette River Valley. There's no question about  
16 it.

17 Q. Okay. Let's examine, if we can, the  
18 question of faulting in north Ada geology.

19 Have you mapped faults in the Treasure  
20 Valley at north Ada County?

21 A. Yes, I have. We've mapped the exposed  
22 faults in the foothills of Boise, and I've been  
23 working on maps farther off to the west.

24 Q. And you testified earlier that you  
25 interpreted the magnetometer data that M3 Eagle

1 acquired on their property?

2 A. Yes, I did.

3 Q. And what was the purpose of that  
4 magnetometer survey?

5 A. Okay. Well, when I compiled the  
6 geology and began to look at aerial photography of  
7 the M3 area in this part of north Ada County, it  
8 was clear that there are really no geologic strata  
9 and markers that you can see clearly at the  
10 surface in which to identify faulting and to  
11 identify the layers. The only information is  
12 coming from the detailed cuttings examination and  
13 geophysical logging that has been done by Hydro  
14 Logic.

15 So one method I said where we could  
16 locate faulting in the volcanic basement, not  
17 necessarily in the sediments, but in the volcanic  
18 basement is using a magnetometer.

19 Q. Does the magnetometer, is it able to  
20 find faulting and sediments, generally?

21 A. No, it cannot. Absolutely cannot.

22 The only magnetic response is from magnetized  
23 volcanic rock. And sediments are transparent.  
24 They don't see it.

25 Q. Do you have a map of the faults that

1 you produced for M3?  
 2 A. Yes, I do. And that should be  
 3 Exhibit 19B.  
 4 Q. And is that figure 1 from 19B, the --  
 5 A. That's correct.  
 6 Q. -- multicolored map?  
 7 A. That is the figure.  
 8 Q. And could you tell us what 19B,  
 9 figure 1 shows, please.  
 10 A. Okay. The lines -- the heavy colored  
 11 lines, the gray line, the blue line and the black  
 12 lines that have been put on there all relate to  
 13 some measure of faulting somewhere in the geologic  
 14 section.  
 15 Let me start first with the blue  
 16 lines, which are identified by driller's logs and  
 17 a clear indication that there's faulting, that  
 18 there's a shift of strata across those areas that  
 19 are outlined in blue.  
 20 The black lines are where we actually  
 21 see the fault breaking strata at the surface.  
 22 The gray lines, then, are in this area  
 23 where it's very difficult to see anything but  
 24 sandy soil. But they detect faulting only in the  
 25 volcanic basement.

1 Q. Now, Dr. Wood, just so I'm clear on  
 2 this, when you say "black lines," are you  
 3 referring to the thin, black lines, sometimes  
 4 dashed, that don't have shading around them?  
 5 A. That's correct.  
 6 Q. And when you refer to the "blue  
 7 lines," you're referring to the ones that are  
 8 dashed but do have shading?  
 9 A. That's correct.  
 10 Q. Can you use your pointer, please, to  
 11 note these.  
 12 A. Okay. The blue line is shown here  
 13 (indicating) just northwest of Eagle, which the  
 14 West Boise/Eagle fault, as we understand it. And  
 15 the -- the black lines are, for instance, the  
 16 Freezeout Hill fault that's exposed on the  
 17 highway. And then in geological mapping the black  
 18 lines occur here, and they're dashed where we see  
 19 similar features exposed and we're confident in  
 20 correlating that the fault extends between them.  
 21 Q. What about the lines such as the --  
 22 the West Boise/Eagle fault that is shaded in blue?  
 23 What does the blue shading tell us?  
 24 A. Okay. The blue shading says that we  
 25 have very different rock types on either sides of

1 that line. And there just northwest of Eagle we  
 2 know that most of the water wells here drill  
 3 mudstones. And those have been identified as  
 4 mudstones of the Terteling Springs formation.  
 5 Q. You're pointing to the northwest in  
 6 the lower blue line?  
 7 A. Northwest of Eagle, northwest of that  
 8 blue line.  
 9 Southwest of that blue line is  
 10 predominantly sandy sediments. And the first one  
 11 that we really drilled and got subsurface data on,  
 12 I believe, is the Lexington Hills well. But it  
 13 was known from driller's logs that all the logs  
 14 here show very productive sandy sediments.  
 15 Q. Now, where you're pointing there with  
 16 that lower blue-shaded line, isn't that northeast  
 17 of Eagle? I think you might have said  
 18 "northwest."  
 19 A. I might have said northwest. But it  
 20 is northeast of Eagle, correct.  
 21 Q. Okay. And what about the gray-shaded  
 22 lines, Dr. Wood? There are, I see, three of them  
 23 there on the map.  
 24 Could you describe what those are and  
 25 use your pointer?

1 A. Yes. The gray-shaded lines are  
 2 alignments of magnetic anomalies, in other words,  
 3 unusual magnetic -- earth's magnetic field that we  
 4 see along the profiles that were run down Little  
 5 Gulch and Big Gulch and Willow Creek.  
 6 So as those were done, we see a fairly  
 7 flat magnetic field, and then we see a sharp bump  
 8 at certain places along the traverse. And those  
 9 bumps line up rather well with these points. I  
 10 don't know what the letter numbers are, but  
 11 they're discussed in the report.  
 12 And they line up in a northwest trend,  
 13 and they align very well with the blue feature  
 14 that we call the West Boise/Eagle fault.  
 15 Q. So you're referring now to the --  
 16 A. To the gray lines.  
 17 Q. -- to the gray line that's furthest to  
 18 the northeast on this map?  
 19 A. That's correct, yeah.  
 20 Q. What about the gray line that is down  
 21 across what's been called the panhandle of the M3  
 22 property there to the west of that previous  
 23 gray-shaded line? What can you tell us about that  
 24 one?  
 25 A. Okay. Those are also, I want to say,

1 bumps or anomalies in the earth's magnetic field  
2 that occur. And because they occur on the  
3 southern line along the union canal and in the  
4 northern line along Willow Creek, we connect those  
5 two to say yes, there is a fault-like feature here  
6 in the volcanic basement.

7 Q. And what do you -- what do you  
8 conclude about that fault-like feature in terms of  
9 its propagation toward the surface, or do you have  
10 any opinion?

11 A. Yes. There is -- there is no other  
12 information that would indicate that it propagates  
13 to the surface. There's nothing in the surface  
14 geology. There's no spring alignment, there's  
15 nothing in shifted strata that we could see, and  
16 there's nothing in the correlation of wells that  
17 have been done across that fault that would  
18 suggest that the fault actually propagates up into  
19 the sedimentary section that includes the Pierce  
20 Gulch Aquifer.

21 My conclusion is that all evidence  
22 would indicate it's in the volcanic basement only.

23 Q. Have you evaluated, Dr. Wood, any  
24 geophysical cross-sections in this area to cast  
25 any further light on this question as to whether

1 faulting propagates into the Pierce Gulch Sand  
2 Aquifer?

3 A. Yes, I have. We have a large  
4 collection of data that was obtained in 1981 by  
5 the Department of Water Resources. But I hadn't  
6 looked at it until recently. And if you can show  
7 the next map, which we go back to --

8 Q. If you could refer to Exhibit 44,  
9 figure 3, that might help. It's a cross-section,  
10 I'll represent to you, that Mr. Squires testified  
11 about yesterday.

12 A. Okay. Okay. We're going to back up  
13 and not talk about the seismic data at this time.

14 Q. Okay.

15 A. What I want to show now, then, are the  
16 geophysical logs that have been correlated by  
17 Hydro Logic, I believe down Big Gulch starting  
18 with the M3 test well 2, M3 test well 4, M3 test  
19 well 1, and over to the Star Sewer water supply  
20 well. What I --

21 Q. Dr. Wood, is that a reasonable  
22 cross-section, in your opinion, for evaluating the  
23 fault at the head of Big Gulch there across the  
24 panhandle as to whether it might cause an offset  
25 in the overlying sediments?

1 A. Yes. It's a very reasonable  
2 cross-section, the correlations of the strata that  
3 have been done, in some detail now, by Hydro Logic  
4 are excellent. It's about as good as it gets in  
5 geological correlations.

6 And there's no indication of a shift  
7 that would be attributed to a fault between test  
8 well 1 and 4, and the Stewart -- and the Star  
9 Sewer well. That line just continues rather  
10 evenly at a dip, I think around 1 degree or about  
11 100 feet per mile, and that's typically the dip of  
12 the Pierce Gulch Aquifer as we go out into the  
13 plain.

14 It may be only a depositional dip. It  
15 may not even involve a great deal of sagging of  
16 the plain, just to deliver sands out over the  
17 delta system. They may have been delivered on an  
18 inclination of about a degree.

19 Q. Dr. Wood, I'd like you to refer now  
20 back to Exhibit 45, figure 2.

21 A. Figure 2. Okay.

22 Q. This is from Exhibit 45. It's  
23 figure 2.

24 Can you tell the Hearing Officer what  
25 these two graphical depictions show.

1 A. Okay. This is in a north-south line  
2 that goes through the town of Middleton, Idaho,  
3 about 8 miles to the west of the M3 properties.

4 Q. Now, what kind of a line was this?  
5 Was it a seismic line?

6 A. Excuse me. This is a seismic  
7 reflection line done by Chevron Oil Company  
8 exploring for oil and gas. And I won't go through  
9 too many details. What it does, it simply gets  
10 echoes off of strata in the deep earth, and  
11 they're processed by sophistication --  
12 sophisticated information theory to weed out all  
13 the difficult noise and problems, and try to show  
14 the strata as accurately as can be portrayed.

15 And what I want to point out is  
16 characteristic faults you can follow in the  
17 subsurface basement as lines that have a very  
18 strong, dark pattern here, and then break over  
19 into these curves, which is -- indicates a broken  
20 basalt strata.

21 Q. Now, Dr. Wood, just a housekeeping  
22 question here.

23 A. Yeah.

24 Q. This is entitled "figure 2" in  
25 Exhibit 45, but it's also on the small print there

1 noted as figure 3.  
 2 Why is that?  
 3 A. Figure 3 --  
 4 Q. Did it come from some other report?  
 5 A. Yeah, it came from another report that  
 6 was done for Hydro Logic in just this year  
 7 examining this for -- to see if the only -- and  
 8 closest available seismic data shows the nature of  
 9 faulting in the subsurface.  
 10 Q. Dr. Wood, are these -- do you consider  
 11 these seismic data in figure 2 of Exhibit 45 to be  
 12 reliable data, the kind of data that you would  
 13 rely on in your profession?  
 14 A. Yes, very much so. It's the best  
 15 continuous picture one can obtain of the  
 16 subsurface. There's really no other way known to  
 17 image strata in the subsurface with any degree of  
 18 accuracy.  
 19 Q. With regard to the slanting, solid,  
 20 black lines -- there are four of them on the upper  
 21 figure -- could you describe what those are and  
 22 what they tell you about faulting and potential  
 23 faulting of the surface deposits?  
 24 A. Yes. Well, let me note first on the  
 25 right-hand side, this is a scale of depth below

1 the surface down to 5,000 feet. So the basin is  
 2 very deep north of Middleton, as it is beneath the  
 3 western M3 properties.  
 4 The red line is interpreted as the top  
 5 of the volcanic basement, mostly a basalt, which  
 6 incidentally has a strong magnetic signature.  
 7 It's what we can image with a magnetometer. We  
 8 can image the location of these broken strata in  
 9 the volcanic basement.  
 10 Now, the other lines are sedimentary  
 11 strata that have some contrast that do show up.  
 12 But we don't know exactly what they are until we  
 13 drill a well into them.  
 14 This higher one (indicating) up at the  
 15 very top correlates well with the Pierce Gulch  
 16 Sand Aquifer in many wells. It's about 2,000 feet  
 17 deep here north of the town of Middleton. And  
 18 what we see in trying to trace these faults up,  
 19 that they break the volcanic basement. Some don't  
 20 even enter the sedimentary strata at all. This  
 21 one (indicating) does go up through this level of  
 22 sedimentary strata up to about 3,000 feet.  
 23 Q. And you're speaking of the one second  
 24 from the right?  
 25 A. Yeah, second from the right. And then

1 the fourth one -- or third one from the right  
 2 breaks to about the same level. And similarly the  
 3 fourth one to the left -- yeah, to the left of the  
 4 right margin, yeah.  
 5 Q. Do any of these faults, in your  
 6 opinion, truncate the Pierce Gulch Sand Aquifer?  
 7 A. No, they do not. And this was a  
 8 feature that we noted back in 1981 when we did the  
 9 report for the Department, a geothermal study in  
 10 Nampa when we first obtained these lines. We did  
 11 not show faulting on these seismic sections in the  
 12 shallow section.  
 13 However, I should add -- I want to be  
 14 straight forward on this -- that out in the  
 15 Nampa/Caldwell area and some areas, we do see  
 16 faulting at the surface, but it's rarely more than  
 17 about 30 feet. And that's in the 1981 report.  
 18 So the faulting created a very deep  
 19 basin out here early on. That's why the lake is  
 20 here, faulted down. And since that time, faulting  
 21 has waned and the lake has filled up with  
 22 sediments. And it was -- the last major episode  
 23 of sediments were the deltas going out across the  
 24 plain. And at that time faulting was not -- there  
 25 was faulting going on, mind you, but it was not

1 great. Tens of feet.  
 2 Q. Dr. Wood, in your opinion, based on  
 3 what you've seen in figures like this and the  
 4 other work that you've done and considering that  
 5 you have seen some small offset faults out to the  
 6 west, do you have an opinion as to whether if  
 7 small offset faulting occurred in the PGSA it  
 8 would significantly interrupt groundwater flow?  
 9 A. Yeah, I have a -- my view or my  
 10 opinion is that faulting involves tens of feet,  
 11 maybe 20 feet. And these shifts simply shift sand  
 12 against sand. That section is a very sandy  
 13 section. And if there's faulting, it's sand  
 14 against sand, and all of the Pierce Gulch sand  
 15 faulting that I have observed, the fault zone is  
 16 just a very narrow, centimeter-wide zone of  
 17 faulting, also sandy, and would create no  
 18 significant flow boundary at all.  
 19 Q. In some areas the fault contact is  
 20 wider than a centimeter; isn't that true?  
 21 A. Well, it's true in the Terteling  
 22 Springs formation. When we get down to the older  
 23 rocks, there are some fault zones that are perhaps  
 24 a foot or 2 wide that have smears of clay in them  
 25 that probably aren't major hydrologic boundaries,

1 but they've not been evaluated.  
 2 But by the time you get up where  
 3 you're dealing with mostly faulted sandy section  
 4 and we're dealing with 20, 30, 40 feet of slip, we  
 5 don't see fault-barrier type of fault zones -- or  
 6 flow-barrier type of fault zones. Excuse me.

7 Q. Dr. Wood, did you hear Mr. Squires'  
 8 testimony yesterday about the up-dip area of the  
 9 Pierce Gulch Sand Aquifer on the M3 Eagle  
 10 property?

11 A. No, I did not. I was not here for  
 12 that testimony --

13 Q. Okay.

14 A. -- in the morning.

15 Q. In your opinion, Dr. Wood, does the  
 16 Pierce Gulch Sand Aquifer exist beneath the M3  
 17 Eagle property?

18 A. Well, it does exist in the western  
 19 part. And Hydro Logic has I think very clearly  
 20 mapped, based on their subsurface -- on their  
 21 geophysical logs and drilling, they very clearly  
 22 mapped where the -- where that top of the mudstone  
 23 base of the Pierce Gulch sand trends across the  
 24 property.

25 Q. Dr. Wood, have you reviewed the IDWR

1 staff's March 2nd memorandum? It's Exhibit 50, if  
 2 you'd like to refer to it.

3 A. Yes, I have.

4 Q. Has the staff raised questions in that  
 5 memorandum that leads you to change any of your  
 6 opinions?

7 A. No, they have not.

8 MR. FEREDAY: No further questions.

9 THE HEARING OFFICER: Okay. Mr. Thornton,  
 10 cross-examination?

11 MR. THORNTON: Okay.

12  
 13 CROSS-EXAMINATION

14 BY MR. THORNTON:

15 Q. Dr. Woods (sic), might as well start  
 16 with this figure here that is up, Exhibit 45,  
 17 figure 2.

18 On -- can you identify what the  
 19 distance is from the M3 property where this data  
 20 was collected?

21 A. Yeah. This is a north-south line  
 22 through the town of Middleton. It's located in  
 23 the labeling on the lower panel. It's 8 miles to  
 24 the west of the -- the west end of the M3  
 25 properties.

1 Q. Okay. And then I believe you've  
 2 also -- have you also been a part of the  
 3 discussions with the north Ada County technical  
 4 working group?

5 A. I have been to two meetings. I've  
 6 been out of the country for many of them.

7 Q. Okay. And have you been part of the  
 8 discussions where they're looking at collecting  
 9 more information, either seismic or magnetometer  
 10 readings?

11 A. I was at one meeting.

12 Q. Okay. And would you support the need  
 13 to collect that additional information to better  
 14 describe that area?

15 A. Well, first of all, let me explain  
 16 that the magnetometer data that we've established  
 17 only shows the faulted volcanic basement. And I  
 18 don't believe that's relevant to the groundwater  
 19 situation.

20 Nevertheless, the purpose of doing  
 21 that is to identify faults that might propagate up  
 22 into the subsurface if they're observed based on  
 23 other information, major hydraulic barriers  
 24 identified in testing or in major shifts in the  
 25 log -- geophysical strata.

1 So that's all you're going to get out  
 2 of a magnetometer survey. It's not going to -- it  
 3 probably creates more questions than it's going to  
 4 resolve.

5 Seismic data shows it rather clearly.  
 6 But I also want to point out that even on this  
 7 kind of seismic data a fault will not be detected  
 8 that has, say, shift of 50 feet. The resolution  
 9 is just not that good.

10 So it's not clear to me what a very  
 11 expensive seismic data -- and it is expensive.  
 12 You have about a 25-, \$30,000 up-front cost. It's  
 13 not clear you'll get excellent data, and you're  
 14 running about \$5,000 per mile, whether that's the  
 15 best place to put money if it's available.

16 Q. And in your expert opinion, would you  
 17 say that the data represented up on the graphs  
 18 here represents conditions in the M3 area?

19 A. Yes, I -- similar -- certainly on the  
 20 right-hand side, yes.

21 Q. Okay. All right. And then can you  
 22 describe how the seismic reflection profiles  
 23 illustrated here were calibrated or  
 24 ground-truthed.

25 A. They're ground-truthed at wells. In

1 other words, to really know what all these lines  
2 mean on a seismic reflection panel, one has to run  
3 the seismic line through a well where you have  
4 very good geological and geophysical logging data.

5 Q. And are you aware of that data being  
6 collected on this -- on this line of data  
7 collection here?

8 A. Well, yes, this line does then extend  
9 to a network of lines over by Caldwell, which then  
10 goes through -- through several deep wells that  
11 were logged by petroleum exploration companies.

12 Q. Okay. All right. And do you know who  
13 was the seismic expert that delineated the various  
14 strata in that?

15 A. It was myself.

16 Q. Okay. All right. Earlier there's a  
17 lot of -- hold on just a second. If -- excuse me.

18 Okay. Regarding the seismic  
19 information here, what effect has seismic  
20 activity, such as earthquakes, had on the faulting  
21 that has been studied in the area? And in  
22 relationship to, say, major quakes that may have  
23 been in the 1980s or so, as we experienced.

24 A. Well, I think we're drifting pretty  
25 far from the groundwater situation. The only

1 This is in Exhibit 44, figure 4. If you could  
2 have that in front of you.

3 A. Okay. I have that in front of me.

4 Q. Okay. Good. And then I don't know if  
5 it's even possible to pull that up. Okay.

6 On that figure if you would look at  
7 like the M3 Eagle test well No. 3 on the far  
8 left-hand side.

9 A. Yes.

10 Q. And then those resistivity areas, when  
11 you're looking at the Terteling Springs -- I guess  
12 column of -- it appears that that line is fairly  
13 straight and uniform; is that correct?

14 A. That's -- the line that correlates the  
15 wells is fairly straight, yes.

16 Q. Okay. And then what does it -- in  
17 your opinion, what does it mean when those lines  
18 are very straight without much change in terms  
19 of --

20 A. Oh, when the lines are straight, it  
21 indicates to me that we're looking at the sort of  
22 gentle tilting of strata without any major fault  
23 disruptions.

24 Q. Okay. Would that also mean that it's  
25 fairly consistent material in that area in terms

1 major faulting that occurred is way off in the  
2 Lost River range in eastern Idaho, and it doesn't  
3 relate to what we're talking about today.

4 Q. No effect. Okay. I appreciate that.

5 A. Yeah.

6 Q. Okay. There's been a lot of  
7 discussion, and you gave testimony to the Pierce  
8 Gulch sands prograding out into the lake basin; is  
9 that correct?

10 A. That's correct.

11 Q. Okay. And are the Pierce Gulch sands  
12 that are being talked about, are they just a  
13 unique feature just in the Pierce Gulch area?

14 A. No, they are not. They're widespread  
15 over much of the Western Snake River Plain. They  
16 do change character. In other words, as you get  
17 out towards, oh, perhaps 10, 15 miles from the  
18 mountain front, the sands become finer.

19 The sands are very, very coarse in  
20 the -- or very, very -- I say they're coarse,  
21 let's put it that way, in the M3 area and in the  
22 Swift well and in other places where I've examined  
23 them near the mountain front.

24 Q. Okay. All right. And if we could  
25 turn to -- let me pull this out for a second.

1 of its resistivity?

2 A. Well, I'm not sure quite what you're  
3 asking me about consistent material.

4 Q. Is it appropriate -- excuse me,  
5 Dr. Woods.

6 Is it appropriate -- I can make sure  
7 we're talking about the same one, Mr. Hearing  
8 Officer, just point to that. And I could do that  
9 with Mr. Fereday too.

10 THE HEARING OFFICER: Sure. Do you want to  
11 approach the witness?

12 MR. THORNTON: So we can go up here  
13 together, I guess.

14 Q. What I just wanted to look at is --  
15 this is what I would consider straight versus the  
16 different signature here.

17 A. I see.

18 Q. So if you could just describe this as  
19 being fairly uniform without much variation, you  
20 know, in a horizontal fashion, I guess, and then  
21 this one here.

22 So this is indicative of what, when  
23 it's very consistent?

24 THE HEARING OFFICER: Okay. Again,  
25 Mr. Thornton, when you're referring to something

1 as "this," and that may be very clear to Mr. Wood,  
2 it may be very clear to Mr. Lawrence.

3 MR. THORNTON: I appreciate that.

4 THE HEARING OFFICER: It's unknown to  
5 everybody else here in the room.

6 MR. THORNTON: Okay. And maybe I can  
7 improve upon that. I'm not sure. I hope so.

8 Q. In the resistivity logs that describe  
9 that portion in the Terteling Springs Mudstone on  
10 M3 well No. 3 --

11 A. Yeah.

12 Q. -- it appears to be fairly consistent,  
13 not much variation, along the Y-axis.

14 And I was wondering if you could  
15 describe why that appears to be so consistent.

16 A. Okay. I think I see what you're  
17 getting at. In the M3 Eagle test well No. 3 -- I  
18 don't have depths here. It's really difficult to.  
19 But what's labeled as the Terteling Springs  
20 Mudstone is that pro-delta signature of very  
21 gradually increasing resistivity before -- you  
22 know, just below the sands of the Pierce Gulch  
23 Sand Aquifer.

24 Q. Okay.

25 A. When we get to the M3 Eagle test

1 well 4, that zone is correlated to sort of a spiky  
2 looking zone -- zone on the well logs that must be  
3 about, oh, 80 feet thick or so with another sand  
4 below it shown by the resistivity logs.

5 Okay. So what you're getting or  
6 what's happening here -- let me go on one further.  
7 As we get out to the State and Linder well, then  
8 we're back to a geophysical log signature that's  
9 very similar to the M3 test well No. 3. In other  
10 words, a monotonous, low resistivity mudstone and  
11 then a gradually -- although rather abruptly here  
12 but usually it can be both ways, increasing  
13 resistivity into the main sand sheet of the Pierce  
14 Gulch Sand Aquifer.

15 Q. Okay.

16 A. The reason that's spiky and a little  
17 higher resistivity is probably because there's  
18 sand avalanching and silt being deposited more so  
19 than just clay at that point. But it is a  
20 gradually increasing and then the abrupt  
21 resistivity change where it's correlated in the --  
22 in the test well No. 4 is indicative of the delta.  
23 I don't have any problem there.

24 Q. Okay.

25 A. We do get variations in that -- in the

1 mudstone off the edge of the delta, just because  
2 of the direction of avalanching sand, turbidity  
3 currents, and whatnot.

4 Q. Okay. And thank you. And I believe I  
5 can see that's an abrupt change.

6 So the resistivity logs that are shown  
7 for the Pierce Gulch Aquifer, whether it's in test  
8 well No. 3 or test well No. 4 or on the United  
9 Water statement or well, there -- I believe I  
10 heard you just say that the variation on an X/Y  
11 axis is due to a combination -- or is that  
12 variation along the X/Y axis due to a combination  
13 of both sand and clays and interbedded material?

14 A. Yeah, that's -- the variable one, of  
15 course, is the test well 4.

16 Q. Right.

17 A. Yeah.

18 Q. Okay. And so would you describe the  
19 Pierce Gulch Sand Aquifer as a continuous sand of  
20 the same consistently all the way through  
21 vertically for that however many feet, whether  
22 it's a couple hundred feet to several hundred  
23 feet?

24 A. Well, it looks well over a hundred  
25 feet. Looks like a hundred feet thick throughout

1 those strong resistivity signatures of Pierce  
2 Gulch sand in all three wells. So it's well over  
3 a hundred, but not quite 200 feet thick in all of  
4 those wells.

5 Q. Yeah. And so would you say that is  
6 consistent sand mixture, or would it be looking --

7 A. Well, there's very thin interbedded  
8 mudstones. I think they're only a few feet thick,  
9 and those are shown by the spikes to the left of  
10 the low resistivity spikes.

11 Q. And is that what you referred to  
12 earlier in your earlier testimony as when the lake  
13 may have built back up and then you had the  
14 fluvial action of finer soil material over the  
15 lake that deposited on top of the sand?

16 A. Yeah, there's several possibilities.

17 It's simply overbank flooding onto a very small  
18 floodplain that was then re-occupied by the sand  
19 depositing river. It could be a period of just  
20 off the main course for a while.

21 Q. Okay.

22 A. It could be a slight rise in the lake  
23 level.

24 Q. Okay.

25 A. All three are possible to get very

1 thin interbeds of mudstone within the sand  
2 aquifer.

3 Q. I believe I heard you say that it  
4 wasn't a continuous, constant makeup of the same  
5 texture of material throughout the whole Pierce  
6 Gulch, it varied?

7 A. Oh, it does vary. But I should also  
8 add -- because I kind of think -- I see where you  
9 might be driving -- that the mudstone interbeds  
10 are thin and discontinuous, whereas the sands in  
11 such a predominantly sandy section as this --

12 Q. Okay.

13 A. -- are interconnected.

14 Q. Okay. And could you describe, then,  
15 above the Pierce Gulch Sand Aquifer, as I believe  
16 you did in your paper, which was Exhibit No. 68,  
17 your paper on the hydrogeologic framework of the  
18 Boise Valley in southwest Idaho, how are the  
19 deposits above the Pierce Gulch Aquifer different  
20 than the Pierce Gulch, both in their nature of  
21 placement as well as the type of material?

22 A. Okay. I see here on the log and  
23 elsewhere they're called undifferentiated alluvial  
24 aquifers and aquitards. And frankly, that has not  
25 been studied. We feel most of it is a river

1 system delivering sand to a delta front that's  
2 farther out into the lake basin.

3 But it's interesting to me, we -- I  
4 would say until United Water Idaho and then the M3  
5 project started doing geophysical logs, we really  
6 had no data on that upper section that would allow  
7 us to try to match up units. I would say I have  
8 no opinion right now because this has not been a  
9 focus of study since good data has been obtained.

10 Q. Okay. All right. In your -- let me  
11 find this, if you'd hold on for just a second,  
12 please.

13 In your knowledge of this area of the  
14 Treasure Valley, what do you consider the sources  
15 of recharge to the Pierce Gulch Sand Aquifer?

16 A. That -- I think that's a difficult  
17 question that the Treasure Valley Hydrologic  
18 Project wrestled with. You know, it must be  
19 losing reaches of the Boise River system, losing  
20 reaches of the canals and the flood irrigation  
21 system, for the most part, and some of the  
22 foothills tributary streams. And as we go over  
23 into the Payette River Basin, we don't know.

24 Q. Okay. And are you familiar with the  
25 Treasure Valley Hydrologic Project? I believe you

1 referred to that earlier.

2 A. Well, somewhat familiar with it. I  
3 didn't read the later reports. I only contributed  
4 the initial geological data to that project.

5 Q. Okay. All right. And then as far as  
6 I know, based on what I think I just heard you  
7 say, is that you're not real sure of the area of  
8 recharge for the Pierce Gulch.

9 I mean can you point to it on a map or  
10 legend?

11 A. No, I have not studied that. And I  
12 guess in my opinion, previous studies that have  
13 been done really haven't had the rigor that's  
14 necessary to make a clear statement. There is  
15 some knowledge of the -- of the losing reaches of  
16 the Boise River. I'm not sure how extensive that  
17 knowledge is. It really requires wells that are  
18 properly completed with piezometers to know where  
19 you have downward or upward gradients in the  
20 groundwater system.

21 Q. Okay. Are you aware of any M3 report  
22 that's identified the location of the recharge for  
23 the Pierce Gulch Sand Aquifer?

24 A. No, I'm not aware of a report that has  
25 specifically addressed that subject.

1 Q. Okay. Getting back to the Pierce  
2 Gulch sands, if I understood your testimony, did  
3 you say that the Pierce Gulch sands weren't just  
4 in the Pierce Gulch area, but they were on the  
5 margin of the -- roughly the upper elevation of  
6 the lake spread over a wide area? And I would  
7 suggest, would you potentially find the Pierce  
8 Gulch sands, that geologic formation of the sands  
9 built up above the lake, could you find those  
10 along -- you'll find them along the Boise front;  
11 is that correct?

12 A. Yes, they occur in the western part of  
13 the foothills. We don't see them in the eastern  
14 part of the foothills. They've been uplifted and  
15 stripped off if it was there. We don't see it  
16 down in Owyhee County on the south side where many  
17 geological studies were done early on.

18 So we've identified it here as a major  
19 depositional system that we now, then, looking at  
20 the subsurface data, can follow over quite some  
21 distance in the western plain.

22 THE HEARING OFFICER: We need to change the  
23 tape, Mr. Thornton.

24 MR. THORNTON: Okay.

25 MR. FEREDAY: Mr. Hearing Officer, would

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1 now be a good time to take a quick break?  
2 THE HEARING OFFICER: It would.  
3 (Recess.)  
4 THE HEARING OFFICER: All right. We are  
5 recording again.  
6 Mr. Thornton, you may continue your  
7 cross-examination.  
8 MR. THORNTON: Okay. Thank you.  
9 Q. Dr. Woods, just before we had a break,  
10 I believe you identified that the Pierce Gulch  
11 sand, that formation, if you will, the deposits  
12 above the lake were found in the western foothills  
13 of the Boise -- western side of the Boise front,  
14 but not the eastern side; is that correct?  
15 A. That's correct.  
16 Q. Okay. And do you know where that  
17 break occurs at?  
18 A. At about Crane Creek.  
19 Q. Crane Creek. Okay. Thank you.  
20 And then in terms of when I asked you  
21 the question in terms of the recharge area or the  
22 sources for the Pierce Gulch Sand Aquifer, I  
23 believe you said it could be a com- -- although  
24 you didn't know the exact location, you did  
25 believe it was a combination possibly of the Boise

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1 River, seepage from canals and irrigation and  
2 other rivers coming in or drainages coming into  
3 the Boise front; is that correct?  
4 A. That's correct.  
5 Q. Okay. And so -- and I believe also in  
6 your document 6- -- let's see. It's 68 on your  
7 hydrogeologic framework. In that I believe you  
8 identified that there was communication between  
9 the shallower aquifers to the deeper regional  
10 aquifer.  
11 THE HEARING OFFICER: Let's let him find  
12 that document.  
13 THE WITNESS: Well, you identified 68. I  
14 see it. I have it in front of me. It's the  
15 hydrogeologic framework of the Boise Valley in  
16 southwest Idaho?  
17 Q. (BY MR. THORNTON): Correct. And in  
18 this paper I believe you describe the upper layers  
19 as kind of a mixture of everything from coarse  
20 type gravels to finer material, kind of a mixture,  
21 some aquitard, some gravel layers, sand layers in  
22 the upper -- or in the shallower, I should say,  
23 aquifers; is that correct?  
24 MR. FEREDAY: Objection. I would  
25 appreciate it if Mr. Thornton would refer to some

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1 part of this Exhibit 68 to which he's referring,  
2 rather than just characterizing it.  
3 MR. THORNTON: Okay. All right.  
4 THE HEARING OFFICER: So do you want me to  
5 rule on the objection?  
6 MR. THORNTON: I'll rephrase the question.  
7 THE HEARING OFFICER: Okay.  
8 MR. THORNTON: If I could just have a  
9 minute to find that paragraph, if you would,  
10 please.  
11 Q. Okay. At the opening paragraph in  
12 there you're characterizing, in general, the basin  
13 where you state "The groundwater basin of the  
14 Western Snake River Plain, figure 1, is most  
15 simply viewed as a great bathtub filled with  
16 layers upon layers of mud sediment with scattered  
17 somewhat interconnected layers of sand." And then  
18 you go on to say, "Sand aquifers are common in the  
19 shallow part of the section of sediment, but their  
20 occurrence can be elusive." And obviously, you've  
21 collected more data since then and more  
22 information.  
23 Would you still agree with that, in  
24 that general sense?  
25 A. Well, that statement or this paper was

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1 simply to inform people working in other basins of  
2 the kinds of problems that we faced when we have  
3 tried to piece together the geological and  
4 hydrological picture of the Western Snake River  
5 Plain.  
6 And so when I say "elusive," I mean  
7 you can't trust the well driller to go out there  
8 with a willow stick and find sand. That's what I  
9 mean by "elusive," because believe me, there's  
10 been a number of water wells -- a great many water  
11 wells that have been located by drillers without  
12 any knowledge whatsoever of what's in the  
13 subsurface.  
14 Q. Okay. Thank you.  
15 Would you agree that the shallower  
16 groundwater systems overlaying the deeper regional  
17 or what we're terming as the Pierce Gulch Sand  
18 Aquifer, do they have communication between them?  
19 A. I'm sorry. Communication between --  
20 Q. Do the shallower aquifers have  
21 communication with the deeper regional or the  
22 Pierce Gulch Sand Aquifer?  
23 A. That -- I believe that to be the case.  
24 It's a difficult thing to prove because you can't  
25 see the subsurface that clearly.

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1 Q. Yeah.  
2 A. So it's only in water wells and very  
3 careful hydrologic testing that you can prove that  
4 statement.  
5 Q. Okay.  
6 A. But it's likely. We'd certainly be  
7 aware that that's something to look for.  
8 Q. Okay. And would also be supported by  
9 you saying that the potential recharge for the  
10 Pierce Gulch may be a combination of the river,  
11 the irrigation canals, irrigation returns, and all  
12 that?  
13 A. Yes.  
14 Q. Okay. Thank you.  
15 What I'd like to refer to is  
16 document -- or Exhibit No. 19. And it's titled --  
17 and I'm not sure of the tab. I don't believe we  
18 have the tab numbers. But the name of the  
19 document is "Seismic Expression and Geological  
20 Significance of the La Costra Delta," and there's  
21 a particular figure 2.  
22 A. I have it. It's 19G.  
23 Q. Thanks. 19G. And figure 2. And we  
24 looked at this earlier.  
25 And could you describe what is

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1 generally depicted again in that figure, when you  
2 have a chance to get to it?  
3 A. Yes. This is based on work we did out  
4 at Caldwell where we first clearly identified the  
5 deltaic system coming -- or on top of the  
6 mudstones in the central part of the Western Snake  
7 River Plain.  
8 The picture is mainly to show that  
9 that delta system, that top of the mudstone,  
10 beginning of the sandy section, is identified at  
11 many wells shown -- the elevation of the top of  
12 the mudstone in feet shown in brackets on that map  
13 at each of the wells where they were identified at  
14 that time.  
15 Q. Okay.  
16 A. I don't know what else. There's a  
17 number of other things shown. I'm not sure what  
18 you're referring to specifically.  
19 MR. THORNTON: Okay. And I want to make  
20 sure that -- the Hearing Officer may not have that  
21 figure 2.  
22 THE HEARING OFFICER: Okay. I am in 19G.  
23 THE WITNESS: One more page. It should be  
24 this one, yeah.  
25 THE HEARING OFFICER: Okay.

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1 Q. (BY MR. THORNTON): And the Pierce  
2 Gulch sand, I believe you said, extended over not  
3 just the Pierce Gulch area, but would you agree  
4 that the Pierce Gulch sand occurred along a large  
5 amount of at least the eastern and maybe -- yeah,  
6 the eastern margin of that original lakebed, or  
7 was it just unique to the Boise front?  
8 A. No, no. It's not unique to the Boise  
9 front. It's -- it's -- it extends well out into  
10 the basin, clear to that point called D(f)(1).  
11 That was a Champlin Petroleum well. It's very  
12 clear in those well logs. And then all the way  
13 west over into -- into the Weiser area and the  
14 Payette area.  
15 Q. So this Pierce Gulch formation, was  
16 that a result of a mixture of alluvial and  
17 colluvial material coming down and depositing it  
18 against the lake surface? Is that --  
19 A. I don't think that's an accurate  
20 representation. Certainly not colluvial, if you  
21 understand colluvial being hill slope material.  
22 Q. Right.  
23 A. It's -- it's the -- it's the result of  
24 river systems coming out of the mountain areas,  
25 delivering sands out into a lake, and then

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1 building that sand system out over the deep lake  
2 basin.  
3 Q. Okay. All right. And is Pierce Gulch  
4 sand typically from a granitic origin?  
5 A. Yes, that's correct.  
6 Q. Is that possibly why on the western  
7 side of the basin I think I heard you say -- maybe  
8 on the Owyhee side, I believe I heard you say you  
9 haven't necessarily found it over there?  
10 A. Yeah, I've speculated that because we  
11 didn't have such large drainage systems coming off  
12 the Owyhee front that it wasn't clearly identified  
13 there by the early workers mapping the plain.  
14 Q. And then is it found in where the --  
15 is the Pierce Gulch found in areas where the  
16 current-day Payette River comes through like Black  
17 Canyon area, that canyon? Do you find that Pierce  
18 Gulch sand in that area?  
19 A. Not in the Black Canyon -- around the  
20 Black Canyon Dam. That's -- of course, the  
21 foundations are on basalt -- on that basaltic  
22 basement rock that we've been referring to.  
23 Q. Right.  
24 A. And the next group of sediments on top  
25 of that we would associate with the sandy facies

1 of the Terteling Springs Mudstone.  
 2 Q. Okay. Do you find any of what you  
 3 would call the Pierce Gulch sands upriver from the  
 4 town of Emmett, seeings how that drains from  
 5 largely a granitic area, at least farther up  
 6 above?

7 A. No, not upriver from the town of  
 8 Emmett. However, the base of them does occur  
 9 north of there by the VanDusen Ranch.

10 Q. Okay. So it does there. Okay. Then  
 11 at this same figure 2, in your opinion is there  
 12 the potential for some of the discharge of the  
 13 Pierce Gulch Sand Aquifer to go from Boise over  
 14 towards the mark D(f)(1)? Or in your opinion,  
 15 does it all go towards the Payette River? It  
 16 appears that --

17 A. I think we're stretching quite a bit.  
 18 I don't have the piezometric level map of the  
 19 Pierce Gulch Sand Aquifer for that area of  
 20 D(f)(1). And so the direction of flow that you're  
 21 indicating, you know, it -- that can't be answered  
 22 with the information that's in front of me.

23 Q. Okay. So do you know how much of the  
 24 Pierce Gulch Sand Aquifer goes towards the Payette  
 25 River versus goes towards Notus into the Snake

1 River? Do you have any idea of how much of that  
 2 aquifer system, where it goes?

3 A. Well, we're talking about the sand  
 4 distribution and not the water flow, am I correct?

5 Q. Well, fair to say. Yeah, let's say  
 6 the sand distribution. Yes.

7 A. Okay. Now, if you'll rephrase the  
 8 question.

9 Q. I will.

10 A. I think I've indicated many times how  
 11 extensive it is. If you'd be more specific.

12 Q. And thank you. I'll try to do that.

13 The Pierce Gulch sand system or the  
 14 expression of the Pierce Gulch Sand Aquifer, based  
 15 on figure 2, was that in a very localized area  
 16 starting -- originating in Boise and spreading  
 17 directly towards Emmett, or was there potential  
 18 for it to be fanned out over this lake and  
 19 covering a large area, as I believe you had said  
 20 there was some expression of that in D(f)(1)?

21 A. Yeah, it clearly fanned out over a  
 22 very large area of the western plain, all the way  
 23 south of Nampa where we recognize it.

24 Q. Okay. All right. And excuse me for a  
 25 minute.

1 So in your opinion, do you know if the  
 2 majority of the recharge of the sand -- of the  
 3 Pierce Gulch Sand Aquifer where it may be  
 4 recharged in the Boise Valley, does most of that  
 5 go to the Payette River? Could some of it go  
 6 towards Parma, Notus, some towards Caldwell, or do  
 7 we know?

8 A. I would say that we do not have a good  
 9 measure of -- of where the water ultimately goes  
 10 in -- you know, where the sink is. Where it  
 11 ultimately discharges, let's say, except that it  
 12 must discharge in the lower valley where there are  
 13 some piezometer wells that show that these are  
 14 upward gradients and it's a discharging system.

15 Q. Okay. And I'll try to -- hopefully  
 16 last questions on the Pierce Gulch sand.

17 Was that, in your opinion, created by  
 18 a variety of streams, ancestral -- I better not  
 19 use that term after yesterday -- the Boise River  
 20 system, possibly some of the streams off the Boise  
 21 front, Dry Creek, or the Payette River? Could  
 22 they all potentially -- the Weiser river, could  
 23 they all potentially have deposited --

24 A. They all potentially could have  
 25 contributed to it, as well as could have the Snake

1 River.

2 Q. Okay. Okay. All right. Thanks for  
 3 that. Okay. If I could have you turn to  
 4 figure -- I mean, excuse me, Exhibit 45.

5 A. Okay.

6 Q. And on Exhibit 45, when you have a  
 7 chance to get that, then I'll be talking and  
 8 asking questions on figure 4.

9 A. Yeah, I have that in front of me.

10 Q. Okay. And I believe figure 4 -- oh,  
 11 I'm sorry. Make sure that Mr. Spackman has that.

12 A. Let's see. Where is it?

13 THE HEARING OFFICER: You're looking for  
 14 figure 4?

15 MR. THORNTON: Yeah, figure 4. I'm sorry.  
 16 I don't have a page number. It's roughly halfway  
 17 through.

18 THE WITNESS: That's the figure we're  
 19 referring to.

20 THE HEARING OFFICER: All right. I'm  
 21 looking at the bottom reference again. All right.  
 22 I have it.

23 MR. THORNTON: The bottom reference? I'm  
 24 sorry.

25 THE HEARING OFFICER: Well, I have two

1 figure references. So I have to keep in mind  
2 which one.  
3 MR. THORNTON: And on my --  
4 THE HEARING OFFICER: It's at the top of  
5 the page.  
6 MR. THORNTON: It's titled "Hydrogeologic  
7 cross-sections based on dip exploration  
8 boreholes."  
9 Q. The question that I have for you,  
10 Dr. Woods, is did you earlier say that the dip of  
11 the slope of the lakebed was fairly gentle,  
12 probably not much more than 2 degrees?  
13 A. That's correct.  
14 Q. Okay. And then when we look at  
15 figure 4 -- my eyesight isn't as good as what it  
16 used to be, but on the different resistivity  
17 logs -- excuse me, my eyes got to get focused  
18 here -- on the El Paso, whatever, Natural Gas one,  
19 which is the second to the right in that figure --  
20 and do you see that particular one?  
21 A. Yeah, I do see that one.  
22 Q. Okay. And then to the left of that is  
23 the -- something like the Oroco Oil and Gas  
24 Company test well?  
25 A. Correct.

1 Q. And then the lines are extended  
2 showing the Pierce Gulch Sand Aquifer's between  
3 those two; is that correct?  
4 A. That's correct.  
5 Q. All right. And do you know  
6 approximately how many miles that is between those  
7 two?  
8 A. Well, there is a mileage scale given  
9 on the upper right of this figure. And you would  
10 like to know between --  
11 Q. Okay.  
12 A. -- El Paso Natural Gas Webber State  
13 and the Ted Daws No. 1 well?  
14 Q. Yeah.  
15 A. Let me scale that for you.  
16 Q. And I apologize. I didn't even see  
17 that scale myself.  
18 A. About 18 miles.  
19 Q. Okay. And then from the M3 Eagle  
20 wells, it would be, again, another 20 miles  
21 between the M3 test well No. 1 and possibly the  
22 Oroco test well -- or the Oroco Oil and Gas well,  
23 would you say could be 20, 30 miles?  
24 A. Well, you need only look at the map on  
25 the -- which is Exhibit -- no, it's on --

1 Q. Figure 3?  
2 A. It's on the facing page, figure 3.  
3 Q. Thank you.  
4 A. And those are sections that -- that  
5 grid there. Let's see.  
6 You're questioning now between M3 and  
7 which one?  
8 Q. M3 and the El Paso Natural Gas. And  
9 thank you for going to that figure. It's much  
10 easier on my eyes.  
11 A. And the Webber State well?  
12 Q. Yeah.  
13 A. El Paso Natural Gas, Webber State?  
14 Q. Yeah.  
15 A. Okay. On that map it's marked with  
16 red crosses, the 6-mile township boundaries.  
17 Q. Uh-huh.  
18 A. So you can use that as a reference.  
19 Q. Sure.  
20 A. And it looks like we're about  
21 12 miles.  
22 Q. Okay. And is it possible that the  
23 Pierce Gulch sand that is identified in the M3  
24 test wells may have been deposited by a different  
25 river system than the sand -- Pierce Gulch sand

1 that is described at the El Paso Natural Gas?  
2 Could one be from the Boise River and one from the  
3 Payette River?  
4 A. Yes, that's possible.  
5 Q. All right.  
6 A. I mean I wouldn't want to say what  
7 rivers actually existed filling the plain.  
8 Clearly, the Snake River was pretty well trapped  
9 by the western plain.  
10 Q. Right. Yeah.  
11 A. Just what river systems were coming  
12 off of the mountain front to the north, that's not  
13 been studied in any detail.  
14 Q. Yeah. So there's some uncertainty  
15 there?  
16 A. Sure.  
17 Q. Okay.  
18 A. Yeah.  
19 Q. So is it also possible that from  
20 groundwater flow there could be discontinuity  
21 between M3 and the Pierce Gulch sand identified in  
22 the El Paso Natural Gas? Does one say that water  
23 flows from M3 -- with high certainty from M3 to  
24 El Paso?  
25 A. Well, let me explain. The flow of

1 water is governed by the pressure head in those  
2 wells. And I have no difficulty in visualizing  
3 hydraulic continuity. In other words, there could  
4 be a flow system that was interconnected. But the  
5 direction of flow, that's entirely determined by  
6 the piezometric level, the pressure level in the  
7 well. And it doesn't have a great deal to do with  
8 the elevation of the aquifer. It's the pressure  
9 that drives it.

10 Q. Okay. And is it possible that the  
11 water, based on the pressure metric information,  
12 could also flow from the Boise area towards Nampa  
13 and Caldwell? Maybe it's just -- or  
14 potentially -- I mean --

15 A. Let me say. We're not --

16 Q. Okay. I'll let you answer.

17 A. We're speculating without having a  
18 pressure level aquifer map in front of us. And so  
19 I'm just not going to comment.

20 Q. Okay.

21 A. If it's hydraulically connected  
22 permeable layers, depending on the pressure, the  
23 flow can go where the pressure drives it.

24 Q. Okay. Are you aware of such map, a  
25 pressure map for this area to help describe where

1 water flow goes?

2 A. Well, I believe TVHP did a map and did  
3 extensive water-level measurements on that limited  
4 area that they decided to model and study. But I  
5 don't have that in front of me.

6 Q. Okay. And perhaps we will go to that  
7 now, if I could. Okay. The last question on  
8 figure 3 of document Exhibit 45.

9 Is it plausible that there could be  
10 discontinuity in the sands between the M3 property  
11 going to the El Paso Natural Gas well, going over  
12 to the Virgil Johnson well, over such great  
13 distances? You've got three points there.

14 A. Yeah, I certainly would not propose  
15 that to a groundwater modeler or to a  
16 hydrogeologic study that there's a major  
17 discontinuity over the entirety of the Pierce  
18 Gulch Sand Aquifer. There is faulting  
19 identified -- I don't have that map in front of  
20 me -- out by the Caldwell area. So that's not the  
21 area you're referring to.

22 And -- but it's a small, you know, 10,  
23 20 feet type faulting in the shallow section. I  
24 just don't see any major geologic discontinuity in  
25 the question that you posed between the M3 and the

1 Ted Daws, Virgil Johnson wells.

2 But let me add also, we have very  
3 little data. The farthest north that we have a  
4 seismic line in that area is about ten miles north  
5 of Caldwell there by the --

6 Q. Okay.

7 A. That is the line that I showed earlier  
8 that -- that line just 3, 4 miles west of Caldwell  
9 that goes through the town of Middleton and  
10 extends north about as far as the Webber State  
11 No. 1 El Paso well.

12 Q. Okay.

13 A. And that's it for the seismic data  
14 that we've had available.

15 Q. Okay. All right. Thank you.

16 And are you aware of any expression  
17 of -- of water in the Leatha area coming --  
18 artesian wells, springs, wetlands in that area?

19 A. You know, I've not examined the area,  
20 but I did look at a map the other day, a USGS map,  
21 and it labeled some flowing wells in the Leatha  
22 area. That's correct.

23 Q. And do you know if those flowing wells  
24 are from water discharge from -- upgradient from  
25 Emmett, or if they're potentially water coming

1 across and underneath the Boise River to Emmett?

2 A. You know, I don't. Only in the water  
3 level map that's been produced by Hydro Logic  
4 where they carefully examine the data to be sure  
5 that they were looking at wells completed into  
6 deeper aquifers, and in those they do indeed show  
7 that flow does come from the Boise River over  
8 towards that area.

9 I don't know if they -- if those wells  
10 extend -- or they made measurements extending to  
11 Leatha. I believe there's one well over there.  
12 But again, the Payette River Valley really has not  
13 been extensively studied.

14 Q. Okay. All right. If you'll just give  
15 me a moment, please.

16 THE HEARING OFFICER: We'll go off the  
17 record for a moment, Mr. Thornton.

18 MR. THORNTON: Yeah.

19 THE HEARING OFFICER: Let's go off.

20 (Recess.)

21 THE HEARING OFFICER: We're recording  
22 again.

23 Mr. Smith, now, I think we need to  
24 just houseclean.

25 Mr. Thornton, have you finished your

1 cross-examination?

2 MR. THORNTON: I have finished my  
3 cross-examination.

4 THE HEARING OFFICER: Okay. Thank you.  
5 Except we did give or make a reservation here that  
6 you could come back if you find some reference  
7 you're looking for.

8 MR. THORNTON: Yeah, thank you.

9 THE HEARING OFFICER: Okay. Mr. Smith, you  
10 may examine.

11  
12 CROSS-EXAMINATION

13 BY MR. ALAN SMITH:

14 Q. Yes, Dr. Wood. I just have a couple  
15 of questions. On that short fault there in what  
16 we've called the panhandle, the southwest --  
17 southwest corner of the M3 property, on that short  
18 fault there it shows your magnetometer line just  
19 came across there in a couple of areas and showed  
20 that fault, but it doesn't show whether there was  
21 any effort to see if that fault extended further  
22 north or south.

23 Do you know whether it does or not?

24 THE HEARING OFFICER: Which document is  
25 this, Mr. Smith? I've --

1 THE WITNESS: It's 19B.

2 MR. ALAN SMITH: 19B.

3 THE WITNESS: Figure 1.

4 THE HEARING OFFICER: Okay. Proceed.

5 Q. (BY MR. ALAN SMITH): Are you with me?

6 A. The question was, was there any effort  
7 made to find out whether it extends north and  
8 south of there? No. There is the line down  
9 Willow Creek called the north line there. And we  
10 did not see that feature on that line, but it --  
11 and I don't know why.

12 The faulting in that volcanic  
13 basement's quite irregular, and I would say we  
14 just -- I don't know. It -- it likely extends  
15 south also. But again, it's only detecting  
16 something on the volcanic basement, and it's not  
17 something we see any evidence for in the shallower  
18 aquifer system.

19 Q. But it could extend further south, as  
20 far as you know?

21 A. Yes, it could.

22 Q. How about north?

23 A. And it could extend further north.

24 Q. So you really haven't studied that in  
25 detail?

1 A. No, we haven't studied it. We didn't  
2 think it an important feature because it doesn't  
3 show it offsetting the wells there that have been  
4 drilled in the lower part of the M3 property.

5 Q. Could that fault further south or  
6 further north rise up further than what you've  
7 found there where you show the fault on the  
8 panhandle?

9 A. No, it's not likely that it would cut  
10 shallower formations. In other words, it's a  
11 fault whose -- whose lifetime was dead back after  
12 it faulted the volcanic materials, and faulting  
13 then switched to other faults so far as shifting  
14 and taking up the stresses on the plain.

15 Q. So you think that fault, even if it  
16 extended further south, would still be in the -- I  
17 believe what you called the volcanic --

18 A. Yeah, down in the volcanic basement,  
19 or in the lower sediments.

20 THE HEARING OFFICER: Okay.

21 MR. ALAN SMITH: That's all I have.

22 THE HEARING OFFICER: All right. Very  
23 good. What I was intending to say was that we  
24 need to have a very cautious exchange.

25 So, Mr. Smith, when you ask the

1 question, wait, Mr. Wood, wait until the question  
2 is asked before you answer. Don't cut him off.

3 THE WITNESS: Okay.

4 THE HEARING OFFICER: Mr. Edwards,  
5 questions?

6 MR. EDWARDS: I have no questions for  
7 Mr. Wood.

8 THE HEARING OFFICER: Okay. Mr. Thornton,  
9 further cross-examination?

10 MR. THORNTON: I found the document. And  
11 what I cannot find right now are copies to enter  
12 that in as an exhibit. So it's part of the  
13 Treasure Valley Hydrologic report. And it's a  
14 document that's been on the website and referred  
15 to here already, but I didn't bring -- and I  
16 should have -- other copies of it. I've got a  
17 copy here I could give and put it in front of --  
18 there's one sentence in there that I wanted to ask  
19 Dr. Woods a question on.

20 THE HEARING OFFICER: Well, I don't want to  
21 prevent you from doing that. This is perhaps the  
22 kind of exhibit that might come in. I don't know  
23 the answer to that. So let's venture, if you want  
24 to.

25 MR. THORNTON: Okay. I would like to.

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1 So in Exhibit No. 209, which is the  
2 Treasure Valley Hydrologic Project, which is a  
3 very large detailed document that I believe M3  
4 has -- or Mr. Fereday has. And I could -- I'm  
5 not -- do you know, Mr. Lawrence, if you have that  
6 one here?  
7 MR. LAWRENCE: I believe our Exhibit 33  
8 contains the Treasure Valley Hydrologic Project.  
9 MR. THORNTON: Well, that's the executive  
10 summary, but this is a whole report. It's after  
11 that. Treasure Valley Hydrologic Project, and  
12 they have several --  
13 MR. FEREDAY: Simulation of groundwater  
14 flow.  
15 MR. THORNTON: Okay.  
16 MR. FEREDAY: Page 6.  
17 MR. THORNTON: What I'd like to ask --  
18 THE HEARING OFFICER: What are we  
19 looking -- I'm trying to find mine here.  
20 MR. LAWRENCE: Mr. Hearing Officer, in M3's  
21 Exhibit No. 33, Treasure Valley Hydrologic  
22 Project.  
23 THE WITNESS: 21 to 33.  
24 MR. FEREDAY: Which page are you on?  
25 MR. THORNTON: It's page 6 of the

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1 simulation of groundwater flow.  
2 MR. FEREDAY: I don't see the same.  
3 THE HEARING OFFICER: One of the concerns I  
4 have, Mr. Thornton -- and I need to go back down  
5 and look because I'm not sure I have all of the  
6 exhibits, your marked exhibits here with me. They  
7 may be in the vault. I thought all of those were  
8 brought up.  
9 MR. THORNTON: And this would also be  
10 Exhibit 33 --  
11 THE HEARING OFFICER: Okay.  
12 MR. THORNTON: -- of -- this --  
13 THE HEARING OFFICER: If we can refer to  
14 Exhibit 33.  
15 MR. THORNTON: Yeah, that would be  
16 perfectly fine with me.  
17 THE HEARING OFFICER: Very good. Go ahead.  
18  
19 FURTHER CROSS-EXAMINATION  
20 BY MR. THORNTON:  
21 Q. And, Dr. Woods, do you have  
22 Exhibit No. 33, "Assimilation of Groundwater Flow  
23 in the Lower Boise River Basin" in front of you?  
24 A. Yeah. I have that report in front of  
25 me, yeah.

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1 MR. FEREDAY: 33B.  
2 MR. THORNTON: I'm sorry?  
3 MR. FEREDAY: 33B.  
4 MR. THORNTON: 33B is the exhibit number.  
5 Q. On page 6, in about the second  
6 paragraph, a little below the center, there is a  
7 sentence that identifies the potentiometric  
8 surface contours in deeper zones indicate a more  
9 uniform westerly flow direction, and it refers to  
10 figure 2-3, which is on page 8.  
11 Earlier in the testimony we were  
12 discussing the potential groundwater flow  
13 directions in the Pierce Gulch Aquifer, is that  
14 correct, in your testimony earlier?  
15 A. I'm not sure that, you know, we've  
16 addressed that in my testimony.  
17 Q. Okay.  
18 A. But go ahead.  
19 Q. Okay. Were we talking about the  
20 Pierce Gulch Aquifer, the location, the spatial  
21 location of the Pierce Gulch Aquifer, in the  
22 larger lakebed area?  
23 A. Yeah, we did discuss the distribution  
24 of the Pierce Gulch Aquifer.  
25 Q. Okay. Did I ask you a question

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1 regarding the potential flow direction of water in  
2 the Pierce Gulch Aquifer?  
3 A. I believe you did ask a question to  
4 that effect.  
5 Q. Okay. And was your answer that you  
6 weren't sure which way the flow would be, it would  
7 be based on potentiometric data?  
8 A. Correct.  
9 Q. Would you agree that this document,  
10 the Treasure Valley Hydrologic Project, has one  
11 source of information on potentiometric head and  
12 the potential direction of flow for the deeper  
13 aquifer?  
14 A. Well, I'm dubious of these pictures.  
15 You look at the number of well points that they  
16 have here, particularly north of the Boise River,  
17 and, you know, you could sketch these in many  
18 different ways.  
19 Q. Okay.  
20 A. This data -- I mean and the wells have  
21 been examined in a great deal more detail by Hydro  
22 Logic in the area that you're referring to.  
23 And so I just -- I'm afraid, I have to  
24 admit, I dismiss a lot of the work that had been  
25 done for this study.

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1 Q. Okay. And did -- I believe I heard  
2 you say that on figure 2-3, that looking at those  
3 wells there, there could be a number of different  
4 flow directions?  
5 A. Yeah. You simply look, there's two  
6 wells shown north of the Boise River.  
7 Q. Uh-huh. And would you say that for  
8 the M3 data, would the additional wells that  
9 that -- with a high degree of confidence the water  
10 flows from the Boise to the Payette, or does it  
11 also -- potentially could spread out over many  
12 different flow directions?  
13 A. Well, let's refer specifically to the  
14 potentiometric map that has been drawn by Hydro  
15 Logic in the M3 area. And I don't have that in  
16 front of me, but if -- you know, the contours  
17 indicate a flow direction is going to be  
18 perpendicular to those contours. And if that's  
19 what it indicates, that's what it indicates, yeah.  
20 Q. And then over the potentiometric data,  
21 when they're spread miles apart, is it not true  
22 that the water could be spreading evenly over the  
23 delta and not just in one direction?  
24 A. That -- I have a difficult time  
25 answering that question. I don't know quite what

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1 it means by "evenly over the delta." Somehow we  
2 have a misunderstanding or misconception of the  
3 system.  
4 Q. Yeah. Maybe not a question answered  
5 as -- asked as well as it could be.  
6 Would the Pierce Gulch sand that is  
7 deposited on the lakebed that we've been talking  
8 about, is that, in your opinion, relatively  
9 uniform over everywhere from the Boise area, the  
10 Payette/Emmett area, the Weiser area, is that a  
11 uniform layer or does it vary?  
12 A. Well, it has interbedded mudstones in  
13 it, most of them fairly thin, and clearly shown  
14 where we have geophysical logs. So the extent of  
15 what you would want to call uniformity is shown by  
16 the geophysical logs. It's not one 400 or 200  
17 foot thick of nothing but sand. It has a number  
18 of interbeds, discontinuous interbeds of muds that  
19 might be 10, even 20 feet thick, certainly.  
20 Q. Okay.  
21 A. So I'm not quite sure what "uniform"  
22 means in regard to your question.  
23 Q. Okay.  
24 A. I hope I answered it.  
25 Q. To my satisfaction, you did.

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1 A. Okay.  
2 MR. THORNTON: And, Mr. Hearing Officer, I  
3 think that's all the questions I have.  
4 THE HEARING OFFICER: Okay. Redirect,  
5 Mr. Fereday?  
6 MR. FEREDAY: We have no questions.  
7 THE HEARING OFFICER: Okay. Thank you,  
8 Dr. Wood.  
9 MR. FEREDAY: We'll now recall to the stand  
10 Mr. Ed Squires.  
11 THE HEARING OFFICER: Mr. Squires, if  
12 you'll come forward, I'll remind you that you're  
13 under oath.  
14 MR. SQUIRES: I understand that I'm still  
15 under oath.  
16 THE HEARING OFFICER: Thanks.  
17  
18 ED SQUIRES,  
19 having been called as a witness by M3 Eagle LLC  
20 and previously sworn, testified as follows:  
21  
22 DIRECT EXAMINATION (Continued)  
23 BY MR. FEREDAY:  
24 Q. Mr. Squires, you have now heard the  
25 testimony from Dr. Wood with regard to the origins

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1 of the Pierce Gulch Sand Aquifer and related  
2 topics.  
3 What -- can you give us an  
4 understanding of what is known about the Pierce  
5 Gulch Sand Aquifer at this time, just maybe as a  
6 summary for us.  
7 A. Well, if you're speaking on a regional  
8 scale, I think there's a lot known. I think we  
9 have the benefit of a lot of deep exploration  
10 holes, cuttings, and geophysics that is, in my  
11 view, unusual and helpful.  
12 We have the benefit of several decades  
13 of geologic mapping where the units are exposed  
14 along the lake margins, both on the north and  
15 south part of the Snake River Plain.  
16 And so I think we have a fairly good  
17 understanding of the extensiveness, thickness, and  
18 nature of this large sand deposit.  
19 If you mean what do we know about the  
20 Pierce Gulch sand in the area of M3 Eagle and with  
21 respect to M3 Eagle's water right, I could speak  
22 to that.  
23 Q. I would appreciate it if you would.  
24 A. And if the Hearing Officer wouldn't  
25 mind, maybe I could draw a graph to that effect.

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1 THE HEARING OFFICER: Mr. Fereday, he's  
2 your witness.  
3 Q. (BY MR. FEREDAY): Yes, I would  
4 appreciate you doing that, if you think it would  
5 help illustrate your testimony.  
6 THE HEARING OFFICER: Just a minute,  
7 Mr. Squires. We need to put a microphone on you.  
8 So let me...  
9 THE WITNESS: This is just fine. I can  
10 just hold that. I'll be up here for a very  
11 limited time.  
12 MR. ALAN SMITH: Jeff?  
13 MR. FEREDAY: Yes.  
14 MR. ALAN SMITH: We could turn that machine  
15 off and take that map off of there, unless you  
16 want to use it.  
17 MR. FEREDAY: Can we go off the record for  
18 just a second?  
19 THE HEARING OFFICER: Yes. Let's go off.  
20 (Recess.)  
21 THE HEARING OFFICER: We are recording.  
22 Q. (BY MR. FEREDAY): Mr. Squires, I see  
23 you have gone to an easel and you are making a  
24 chart.  
25 I take it this is in support of your

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1 testimony about knowledge about the Pierce Gulch  
2 Sand Aquifer, the question I asked you?  
3 A. That is correct.  
4 Q. And what are you drawing there?  
5 A. What I was hoping to illustrate -- and  
6 again, I'm addressing the adequacy of the  
7 hydrogeologic data with respect to the M3 Eagle  
8 area, and particularly to its water right  
9 application.  
10 Q. Okay.  
11 A. Based on my experience with other  
12 water right applications and other groundwater  
13 development studies that I've done in the past.  
14 And I've prepared an X and Y-axis, and I've used  
15 an exponential equation that looks something like  
16 the Theis curve or drawdown curve or whatever to  
17 illustrate my point.  
18 Now, on the Y-axis I've plotted  
19 knowledge, and on the X-axis I've provided time  
20 and expense, time and cost. And I think that if  
21 you were to characterize what we know about the  
22 Pierce Gulch Sand Aquifer and its ability to  
23 produce water in a sustainable water supply for M3  
24 and far beyond, I think we are looking at that  
25 part of the curve (indicating).

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1 Q. You've made a mark around the steep  
2 part of the curve up to where it starts to  
3 flatten?  
4 A. That's correct. And I think that in  
5 terms of what we know and what we've produced and  
6 the aerial extent that we have pursued, I think  
7 that we perhaps know this amount of knowledge  
8 (indicating).  
9 I think where we are now is we're out  
10 here, you know, approaching an asymptote of some  
11 kind, where my graph is not changing very much.  
12 And so I think additional information that we're  
13 looking for is going to increase slightly in this  
14 direction, and not a whole lot in this direction  
15 (indicating).  
16 Q. And increase slightly in the  
17 right-hand direction and not much in the vertical  
18 direction?  
19 A. Well, I think it's not going to  
20 increase too much in the vertical direction  
21 because we're approaching an asymptote. But I  
22 think this here (indicating) -- and I said it was  
23 exponential. So this is arithmetic, and this  
24 is -- or they're both logarithmic, in my scenario  
25 here.

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1 So we're increasing a great deal in  
2 time. And I think we're talking about an area  
3 over here going forward (indicating). We're going  
4 to spend a lot of money for not a huge amount of  
5 knowledge that we're going to gain in this.  
6 Q. This is just an illustration; right?  
7 A. Yes, it's just a -- what I'm trying to  
8 portray here is we know an awful lot about this  
9 area, an enormous amount. I've never worked in an  
10 area where we know more about it.  
11 Q. And so your position is that further  
12 study will provide little knowledge at a great  
13 cost; would that be a summary?  
14 A. I think that's correct.  
15 Q. Okay.  
16 A. Again, I'm referring to our area, the  
17 M3 area, the Eagle area, the Eagle/Star area  
18 pertinent to this water right application.  
19 THE HEARING OFFICER: So the drawing exists  
20 for purposes of illustration?  
21 THE WITNESS: Yes.  
22 THE HEARING OFFICER: Rats. I was hoping  
23 for a differential equation.  
24 Q. (BY MR. FEREDAY): There's no equation  
25 associated with this drawing; isn't that correct,

1 Mr. Squires?  
2 The testimony of Dr. Wood touched  
3 on -- you may recall the question of the nature of  
4 the sands.

5 Do you recall that?

6 A. Yes.

7 Q. And the fact that course-grain sands  
8 were deposited in the -- what is now known as the  
9 PGSA grading to finer sands further out into the  
10 valley.

11 Do you recall that?

12 A. Yes.

13 Q. Could you tell us what you know about  
14 these sands themselves in the Pierce Gulch Sand  
15 Aquifer?

16 A. Well, I think I spoke to that  
17 yesterday, that along the front we talked about  
18 the fact that the sands in the M3 area have been  
19 reworked, so that they're very clean and coarse  
20 and somewhat uniform, and they have high  
21 permeability.

22 Dr. Wood indicated that they grow  
23 finer as you go out into the basin more, and  
24 that's been my experience.

25 Q. I see you have a jar there in front of

1 you.

2 Could you tell us what that is?

3 A. Sure. In one of our recent field  
4 trips out to the Boise foothills, I actually took  
5 a sample of the Pierce Gulch sand, because we're  
6 all talking about the Pierce Gulch sand, so I  
7 thought it would be illustrative to bring in a  
8 sample of it. This is taken from the type  
9 locality in Pierce Gulch where there's a deep --  
10 or an extensive pit where the sand has been mined.

11 And, you know, it's probably a wall  
12 that I'm going to say 150 feet thick that shows  
13 very clearly the -- the texture of the Pierce  
14 Gulch sand. And it's free of fines, nature. And  
15 this is an unadulterated sample just taken from  
16 that outcrop. So anyone who's interested,  
17 actually wants to see what the sand looks like,  
18 here it is.

19 Q. Thank you.

20 A. Again, just for illustrative purposes.

21 Q. Mr. Squires, I'd like you to refer to  
22 Exhibit 45, figure 4, please. And I'll represent  
23 to you that this is one of the exhibits about  
24 which Dr. Wood testified and was cross-examined.

25 A. Figure 4?

1 Q. Correct.

2 A. Yes.

3 Q. Could you explain figure 4 in light of  
4 the cross-examination of Dr. Wood, which at least  
5 sounded to me like it was inquiring about the  
6 slope of the lines that are included on there.  
7 Could you explain to the Hearing Officer how those  
8 lines are derived, please.

9 A. I'm not sure I followed that line of  
10 questioning, but I will do my best to put --  
11 perhaps explain the slope of the lines in this  
12 diagram, because it comes back fundamentally to  
13 the idea that this is a dipping aquifer. And that  
14 means it has a geometry that expresses itself in  
15 these wells.

16 And so if we go to a page earlier in  
17 the same exhibit, to figure 3 that shows the lines  
18 of section -- we talked about the lines of section  
19 pretty exhaustively yesterday -- and the dotted  
20 lines on this map are the same points that are  
21 shown in cross-section in figure 4.

22 And so, for example, if you look at  
23 the Webber State, the No. 1 Webber State petroleum  
24 exploration well, and the line goes rather steeply  
25 up to the north and slightly west to the Ted Daws

1 well. That -- and we've got an aquifer that might  
2 be dipping. And if I could illustrate it with  
3 this document.

4 Let's say that this is dipping the  
5 direction that we think the Pierce Gulch is  
6 dipping, which is to the southwest, now what we're  
7 doing is we're not going directly down dip, we've  
8 got a well that's out here near, you know,  
9 Caldwell, and now we're moving back up to the  
10 Payette Basin.

11 So we're moving up the dip of the  
12 aquifer. So that's why the lines appear to be --  
13 the connected lines that indicate the Pierce Gulch  
14 Sand Aquifer appear to rise up or come up. So you  
15 have to take that into account within the changes  
16 in the section. And --

17 Q. So does this section, figure 4 of  
18 Exhibit 45, express information that is consistent  
19 with the cross-sections that you showed us  
20 yesterday with regard to the geometry of the  
21 Pierce Gulch Sand Aquifer?

22 A. I think that it's very clear to me.  
23 And one of the things that I didn't hear Dr. Wood  
24 touch upon in these particular geophysical logs is  
25 that not only do we have the progradational fining

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1 downward of the pro delta that he spoke about, but  
2 we also have the other signature of the smaller  
3 Terteling Springs sand down below that in the  
4 middle of the mudstone, sandwiched by the  
5 mudstone. You see that in all these deep  
6 exploration wells.  
7       So it's a very diagnostic, very  
8 distinguishing feature that is pretty hard to  
9 dispute.  
10       Q. If the aquifer dips to the southwest,  
11 then how does it potentially produce water flowing  
12 toward the Payette? Could you explain that.  
13       A. Well, in my view, it's because, as  
14 Dr. Wood pointed out, the sediments grow more fine  
15 grained to the basinward. And this is a normal  
16 occurrence.  
17       And so as they become more fine  
18 grained and as they become -- have more of a  
19 percentage of low-permeability sediments, they  
20 create a lower transmissivity.  
21       And so as we discussed previously,  
22 this sort of swath of sediments that are along  
23 the -- that are up near the high stand of the  
24 lake, which includes the M3 area, they appear to  
25 be a very high permeability, very high

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1 transmissivity in the aquifer.  
2       So if there's a constriction down  
3 valley, it starts to act as somewhat -- you could  
4 envision it as a partial dam, perhaps, so that the  
5 water -- just because the aquifer dips to the  
6 southwest does not necessarily mean that the water  
7 flows to the southwest.  
8       In fact, the high artesian pressures  
9 in the Star wells and in the areas in Caldwell,  
10 Star, where you have aboveground water heads of,  
11 you know, in excess of 40 feet, even up on the  
12 benches of Meridian, it's because they're getting  
13 backed up behind a lower permeability in the lower  
14 basin.  
15       And as I think Dr. Wood pointed out,  
16 now we have a very permeable swath that extends  
17 from M3 over toward -- to the northwest toward the  
18 Payette Basin. The Payette Basin is at a lower  
19 base level because it gets down to the Snake. It  
20 enters the Snake on a lower base level. It's more  
21 permeable. There's higher head at M3. Lower head  
22 in the Payette Valley. So the water wants to move  
23 what we call along strike, along this swath of  
24 higher permeability.  
25       And I guess I could go on a little bit

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1 more there that -- due to some of the questions  
2 that Mr. Thornton asked, that we are -- we have  
3 never postulated that all the water that flows  
4 through the M3 site goes to the Payette River. We  
5 think that it flows -- some of it flows to the  
6 Payette River, some of it flows to the Snake  
7 River, some of it flows back to the Boise River,  
8 if that answers your question.  
9       Q. Yes. Thank you.  
10       To perhaps get back on the track we  
11 left yesterday about the reports, studies, and  
12 progress you made, I guess, up this curve that you  
13 just drew for us in working for M3, could you  
14 describe for us your test well program leading to  
15 a monitoring program for this aquifer?  
16       A. Well, sure. We have a strong  
17 conviction that the most meaningful and most  
18 tangible information that we derive in a  
19 groundwater study is the actual study of the  
20 rocks, the geology. And the only way that we can  
21 get hands-on information and real information like  
22 this sand that we've got here on the table is from  
23 wells.  
24       But it provides us a lot more than  
25 just physical cuttings and a physical

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1 representation of the sands, because we drill the  
2 bore -- yes, we get the sands, but then we also,  
3 as we discussed, we get these geophysical logs  
4 that we keep talking about that we compare to the  
5 cuttings and that are very diagnostic, because  
6 they are not subjective like a driller's log.  
7 They're very definite in what they record. So  
8 they provide a uniform basis that's the same from  
9 place to place.  
10       Q. Mr. Squires, the sands -- the  
11 cuttings, if you will, that you've drilled on the  
12 M3 site from your test wells, does it resemble the  
13 sand in this jar on the table in front of you?  
14       A. Yes.  
15       Q. Okay.  
16       A. Also from the test wells, you have an  
17 added benefit of being able to obtain the  
18 chemistry of the aquifer. So that's yet another  
19 line of evidence that allows us to correlate from  
20 well to well, and to some extent determine the  
21 flow within the aquifer.  
22       And then another large component of  
23 our investigations is monitoring. We're very,  
24 very pro monitoring. And these test wells also  
25 provide a means to monitor the aquifer, not only

1 before development, but during the development and  
2 after the development. And we strive very  
3 ardently to use wells that are of known  
4 construction, that are long-term designated wells  
5 that can't be used for any other purpose. They  
6 can't be used for pumping. They can't be used for  
7 water supply.

8 And so that they are -- they're  
9 constructed, built, and sited for a specific  
10 purpose in the hopes that they will be able to  
11 maintain well on into the future.

12 Q. Could you explain your monitoring  
13 program, then, to date at -- connected with the M3  
14 project.

15 A. Well, our monitoring program is pretty  
16 aggressive in the M3 area. Of course, we take a  
17 very aggressive approach. And when I say  
18 "aggressive," I mean we're monitoring a lot of  
19 water levels right now. We have digital data  
20 logger recorders in something like 24 different  
21 zones of the aquifer at this time.

22 And we're monitoring still on an  
23 hourly basis, because it's the early data that  
24 helps us to figure out what's connected to what  
25 and to tell us when we need to monitor. And this

1 digital data is backed up by now monthly  
2 measurements in all the wells to make sure that  
3 the data recorders are recording properly and that  
4 they're properly calibrated.

5 Q. Are those monthly measurements done by  
6 hand?

7 A. Yes, they are.

8 Q. Are they done by you or your staff  
9 under your direction?

10 A. Yes, they are.

11 Q. And how have those monthly  
12 measurements stacked up in terms of calibrating  
13 your instruments? Have your instruments been  
14 shown to be fairly accurate?

15 A. They have, in most cases. You know,  
16 they're very technical and persnickety  
17 instruments, and sometimes there's some anomalies.  
18 But that's why we have a large coverage.

19 But I would add that, you know, we  
20 probably won't monitor at this intense level on  
21 into the future because we will have basically the  
22 annual fluctuation pretty figured out. And so  
23 that will help us to show when we really need to  
24 monitor, and we'll be able to cut down the cost  
25 and the frequency of monitoring.

1 Q. How many new wells did you drill?  
2 Maybe you testified about this yesterday. But if  
3 so, I'd still like you to say, how many wells did  
4 you drill on the site to serve as monitoring  
5 wells?

6 A. We drilled four.

7 Q. And what do those wells now contain in  
8 terms of monitoring stations?

9 A. Well, in every case we made them into  
10 multilevel piezometer nests, meaning that we  
11 continued 2-inch tube wells to various depths of  
12 the aquifer, in some cases to the Terteling  
13 Springs Aquifer underneath, several layers of the  
14 aquifer, and in a few cases into overlying the  
15 so-called undifferentiated aquifers. And in three  
16 cases we actually have piezometers completed into  
17 the unsaturated zone underlying the Pierce Gulch  
18 sand.

19 Q. What would be the reason for  
20 completing a piezometer into the unsaturated zone?

21 A. Well, remember that the type of wells  
22 that we drilled, they're mud-filled holes. That's  
23 what keeps the hole open so we can obtain the  
24 geophysical logs and to construct the wells, as  
25 opposed to the drill and drive methods that we

1 spoke about yesterday that most domestic wells are  
2 drilled with.

3 So when we drill the well, we don't  
4 really know whether a zone is unsaturated or not,  
5 although we get indication on the resistivity logs  
6 that they are. So we completed the tubes into the  
7 unsaturated zone for several reasons.

8 One to confirm that, yes, indeed it is  
9 unsaturated; two, to be able to gauge things on  
10 the site, such as the planned reuse application  
11 for -- that M3 plans to reuse its treated  
12 wastewater and apply that to the lands so we would  
13 have an indication later if that water is getting  
14 down into the aquifer. We used it, to the extent  
15 that we could, when we did the Spring Valley 7  
16 aquifer test to show that the groundwater wasn't  
17 returning back into the aquifer, because it would  
18 have to first go through these shallow zones. And  
19 we've also been able to have it help us in our  
20 understanding of the barometric efficiency and the  
21 cemented nature of these aquifers.

22 Q. How long have you been monitoring  
23 groundwater levels in the M3 Eagle area?

24 A. Since almost the first day I met  
25 Mr. Brownlee back in 2006.

1 Q. How does groundwater monitoring help  
2 with modeling of an aquifer?

3 A. Well, it provides really the baseline  
4 data for the monitoring. I mean it is the  
5 calibration of the model, the surface of the water  
6 table, and the piezometric surface.

7 Q. Did you hear Dr. Wood's testimony with  
8 regard to Treasure Valley Hydrologic Project  
9 potentiometric flow map that used, in his  
10 description, two well data points to draw contour  
11 lines?

12 A. Yes.

13 Q. What can you tell us about the  
14 adequacy of the number of monitoring points that  
15 you have established vis-à-vis -- or use vis-à-vis  
16 the establishment or construction of a groundwater  
17 model?

18 A. Well, I -- I think that the Treasure  
19 Valley Hydrologic model was a regional scale  
20 model. You know, very large scale across the  
21 whole -- the whole basin, really. And the  
22 Treasure Valley, at least.

23 And, you know, we spoke with the --  
24 with Scott Urban at the outset of this project,  
25 and we interviewed him on two occasions and spoke

1 to him about his efforts and whether -- you know,  
2 his thoughts on the flow direction and the  
3 monitoring that happened over in the north Eagle  
4 area. And he conceded that, you know, there just  
5 wasn't very much data over there.

6 Q. Is that Scott Urban, formerly of the  
7 Idaho Department of Water Resources?

8 A. Yes.

9 Q. And one of the workers on the Treasure  
10 Valley Hydrologic Project?

11 A. Yes.

12 Q. Continue.

13 A. So it's true that there's not a lot --  
14 there wasn't a lot of information over there. But  
15 I also agree with Dr. Wood, that the  
16 researchers -- you know, they weren't focused on  
17 that area, I guess is what I'll say.

18 Q. What has monitoring shown so far in  
19 the Pierce Gulch Sand Aquifer, based on your own  
20 monitoring?

21 A. Well, it shows that there's a very  
22 pronounced annual fluctuation that we also talked  
23 about yesterday, where it's -- generally  
24 reaches -- the pressures in the aquifer generally  
25 reach their highest point in late December,

1 January, and February. And they reach their  
2 lowest, if my memory serves me, sometime about  
3 November. And then that seems to be pretty  
4 consistent in all the wells that we monitor.

5 Q. What type of amplitude are we talking  
6 there in terms of that seasonal fluctuation that  
7 you see?

8 A. Well, it varies. It varies with  
9 distance from the pumping center. If you recall,  
10 we looked at the State and Linder test well  
11 yesterday, and there was some discussion about the  
12 so-called spike in the State and Linder continuous  
13 data.

14 Well, that would indicate that that  
15 well is fairly close to a pumping well. And if --  
16 I think if I remember, there was maybe a 7-foot  
17 drawdown that occurred outside of the regular  
18 annual cycle. So if that well were to come on and  
19 pump continuously all the time, it would cause a  
20 greater amplitude in the signal measured at the  
21 State and Linder well.

22 But in the panhandle monitoring wells,  
23 i.e., test well No. 1, we see an amplitude  
24 somewhere on the order of about 15 feet. And  
25 that's because the panhandle is, as you know,

1 comes down toward Highway 16, and there's a number  
2 of pumping groundwater wells over in that area,  
3 the Willowbrook, the golf course, the turf farm.  
4 There's a number of pumping centers that are  
5 closer to that M3 test well No. 1. So the  
6 amplitude, the average interference effects, are  
7 greater there.

8 But if you go up in the gulch that are  
9 farther removed from the pumping centers, the  
10 amplitude is much smaller. You know, on the order  
11 of a foot in some cases.

12 Q. Has your monitoring over the last  
13 three years shown any regional -- anything -- any  
14 decline or increase or change that you would see  
15 as a regional long-term trend?

16 A. Well, we've been monitoring in some  
17 wells going on three years now. But the thing  
18 about monitoring -- I think one of the most  
19 important things about monitoring is -- and this  
20 goes to my earlier point that I want to emphasize,  
21 that it's the long-term nature of monitoring wells  
22 that are important.

23 A few years of data, you know, I don't  
24 believe that that's adequate to assess long-term  
25 trends in the aquifer, because there's a lot of

1 things, you know, going on: precipitation,  
2 drought, new wells. But after we monitor for a  
3 number of wells, we start to get an idea.  
4 So I would refer to not the M3  
5 monitoring wells, but to the wells that I designed  
6 and completed for United Water Idaho, the State  
7 Street test well, the State and Linder test well,  
8 the Swift test well, the Gary Lane test well, and  
9 all those similar, completed very similarly to the  
10 M3 test wells that we've been monitoring now for  
11 quite a number of years.

12 And those wells which have the full  
13 depth seals that we talked about, so they're  
14 measuring very discrete levels of the aquifer  
15 without interference from other levels, those are  
16 showing no decline, even in the face of declining  
17 precipitation over that same time period.

18 Q. Okay.

19 A. I think, if I could add, that also  
20 goes to Mr. Dittus' comments, which showed that  
21 his production wells that were completed in the  
22 Pierce Gulch Sand Aquifer and sealed from  
23 overlying and underlying aquifers also are not  
24 showing a decline, even under decades of pumping.

25 Q. Do you recall Mr. Smith's question --

1 I believe it was to Mr. Vincent -- with regard to  
2 pumping in the Pierce Gulch Sand Aquifer  
3 potentially affecting shallower aquifers overlying  
4 the PGSA?

5 A. I do.

6 Q. What can you tell us about your views  
7 about pumping in the PGSA potentially affecting  
8 shallower units?

9 A. Well, that's a large subject. We  
10 have -- we've certainly spoken in our reports to  
11 the fact that -- and again, it comes back to the  
12 dip of the aquifer. It's not only the dip of the  
13 aquifer, because it comes up closer to the surface  
14 as you move to the east.

15 The discussion was about the Lexington  
16 Hills well that's, you know, not that deep. And  
17 another thing that happened is as you move toward  
18 the mountain front, you also get more of a  
19 preponderance of sand. That's just a natural  
20 geologic occurrence.

21 So it's more permeable, less confined,  
22 and there's more continuity over there. All  
23 right? But as I move off to the west, to the Star  
24 wells, you get into a more confined situation  
25 where the connection through to surface waters is

1 more attenuated.

2 But to speak to Mr. Smith's comments,  
3 I think that it's a natural tendency to think  
4 about being first. In other words, if you're  
5 pumping in the Pierce Gulch and you're completed  
6 in a well over the Pierce Gulch, it makes sense to  
7 someone who may not understand the hydraulic  
8 principals of groundwater flow that if there were  
9 going to be declines they would first occur above,  
10 if you envision that the recharge is coming from  
11 above.

12 Q. Are you saying what a layperson might  
13 envision?

14 A. Yes. And I think our geochemistry  
15 shows really clearly that the recharge to the  
16 Pierce Gulch Sand Aquifer is not from above in the  
17 Eagle area.

18 And I also believe that if there were  
19 any declines in the overlying aquifers that were  
20 due to the Pierce Gulch sand -- from pumping in  
21 the Pierce Gulch sand, one must first -- one would  
22 first have to have drawdown in the Pierce Gulch  
23 sand. Because, for example, if you're having a  
24 decline in the overlying aquifers, and you're not  
25 having a decline in the Pierce Gulch Sand Aquifer,

1 then any declines in the overlying aquifers are  
2 not due to pumping in the Pierce Gulch Sand  
3 Aquifer, because it would be a causative  
4 relationship. You'd have to lower heads and  
5 gradients in the Pierce Gulch Sand Aquifer to  
6 induce that to move down.

7 MR. FEREDAY: Thank you.

8 Mr. Hearing Officer, it's after noon.  
9 Perhaps this would be a good time to break?

10 THE HEARING OFFICER: I agree.

11 (Lunch recess.)

12 THE HEARING OFFICER: Let's record.

13 Q. (BY MR. FEREDAY): Mr. Squires, I'd  
14 like you to refer to Exhibit 12, please. It's  
15 a -- I believe a roughly 300-page report, and ask  
16 you to identify it and tell us what it is.

17 A. Exhibit 12?

18 Q. Correct.

19 A. Exhibit 12 is a report from Hydro  
20 Logic discussing the measurements and analysis  
21 from 16 aquifer tests in the north Ada County  
22 area.

23 Q. I see that this is dated July 2008.

24 That's when it was completed, I take  
25 it?

1 A. That's correct.

2 Q. When did you begin this effort to put  
3 together this report?

4 A. Well, in terms of some of the tests  
5 here, they're tests that I carried out years ago,  
6 so in that context. For this particular report  
7 for M3, we realized that -- early on that we were  
8 going to develop a computer model, a numerical  
9 model for the groundwater flow in this area.

10 And so as I had previously indicated,  
11 one of the first things you do in this type of  
12 characterization study is obtain the available  
13 information that's out there.

14 So we set about contacting previous  
15 clients, major water users like United Water Idaho  
16 and others, and asking permission to use the test  
17 data, City of Eagle, et cetera.

18 Q. Now, these were previous aquifer tests  
19 in the area?

20 A. That's correct.

21 Q. And the purpose of this report, then,  
22 was to prepare for a model.

23 Were there any other purposes?

24 A. Well, another reason that we wanted to  
25 revisit these aquifer tests besides the need to

1 develop input for our computer model and -- was  
2 to -- we now had a basically refined conceptual  
3 model for the Pierce Gulch Sand Aquifer. We had  
4 mapped the base. We looked at the thickness. We  
5 did all this work with cross-sections that we  
6 spoke about.

7 Then we went back and we looked at  
8 these aquifer tests, because when these aquifer  
9 tests were done, that information was not  
10 available. So now we had new information on the  
11 thickness of the aquifer and the dip of the  
12 aquifer. And since the thickness of the aquifer  
13 is a large part of the calculation of  
14 transmissivity for the aquifer, we wanted to,  
15 number one, go back in, revisit the data in light  
16 of that.

17 And we also -- there were several  
18 long-term tests, including the City of Eagle,  
19 Lexington Hills test, a 30-day test and the Eagle  
20 field test. We wanted to verify that data and  
21 revisit it to make sure that we had good -- that  
22 we had looked at that data ourself and we had good  
23 information on it.

24 Plus, the final thing, is that many of  
25 these tests were analyzed with the improper

1 method, we felt. And so we analyzed the tests  
2 based on their own hydro-environments and with the  
3 appropriate methods that we felt were most  
4 applicable to the individual test.

5 Q. With respect to each of these previous  
6 tests, were they tests from wells that were  
7 completed in the Pierce Gulch Sand Aquifer?

8 A. Most of them were, yes.

9 Q. And some of them were not?

10 A. Some were in the overlying aquifers.

11 Q. Okay. What were the methods that you  
12 found to be inadequate in some of these tests?

13 A. Well, I'm going to -- my colleague,  
14 Mark Utting, who is the analyst on most of these  
15 tests and is fully immersed in looking at these up  
16 and down and around, I'm going to defer to him.  
17 He's going to be one of our experts that's going  
18 to testify later in the hearing. And so I will  
19 leave that discussion to him.

20 Q. What, in general, did this reanalysis  
21 of 16 aquifer tests show?

22 A. In general, it showed that we had  
23 undercalculated the transmissivity.  
24 Transmissivities were greater than previously  
25 thought. I think that's one of the major

1 contributions.

2 Q. What about the productivity of the  
3 Pierce Gulch Sand Aquifer, did this help you make  
4 any evaluations with regard to that?

5 A. Well, I think it supported all of the  
6 earlier data, that it was highly productive.

7 Q. Was this report provided to the  
8 Department of Water Resources --

9 A. Yes.

10 Q. -- at or near the time it was  
11 produced?

12 A. Yes.

13 Q. Mr. Squires, I'd like to next ask you  
14 about aquifer tests carried out on the M3  
15 property.

16 Were there aquifer tests that you  
17 carried out on the M3 property in support of this  
18 application?

19 A. Yes.

20 Q. And what tests are those? Could you  
21 just tell us what they are?

22 A. Sure. We did -- as part of this  
23 study, the 16 aquifer tests, one of those tests  
24 was a test of the Kling irrigation well that's now  
25 owned by M3 down in the lower part of the

1 panhandle of the M3 property.  
 2 Q. That's --  
 3 A. We did a 48-day test, using the Kling  
 4 well --  
 5 Q. Excuse me. A 48-hour test?  
 6 A. 48-hour.  
 7 And we also conducted a nine-day  
 8 constant discharge aquifer test using the Spring  
 9 Valley 7 well later on in the project.  
 10 Q. Okay. I want to ask you about both of  
 11 those aquifer tests, the Kling test and the SVR-7  
 12 test.  
 13 But before I do, could you tell me  
 14 whether you have done other aquifer tests in the  
 15 Treasure Valley prior to this?  
 16 A. I have.  
 17 Q. Approximately how many have you  
 18 conducted, and for whom? where?  
 19 A. Well, if you mean long-term aquifer  
 20 tests of many days, I've probably done perhaps ten  
 21 in the Boise Valley, 10 or more, 10, 12, somewhere  
 22 around there. That's using, you know, multiple  
 23 wells in a regional sense.  
 24 If you talk about smaller tests that  
 25 might last a day or a couple of days or part of a

1 day, I have done some kind of, you know, major  
 2 hydraulic tests with all of the production wells  
 3 that I've been involved with. So literally  
 4 hundreds of single well tests in this area.  
 5 Q. And specifically, what parts of the  
 6 Valley has this involved? Has it involved places  
 7 like Meridian, Caldwell? Where?  
 8 A. It's been pretty much all around the  
 9 Valley. When I was with United Water Idaho and  
 10 before I was with them, we did several long-term  
 11 tests of the Boise Fan Aquifer, the south Boise  
 12 area out around the state prison. We did tests in  
 13 east Boise, west Boise. We have done tests along  
 14 the margin, the foothills in the Boise area. I've  
 15 done perhaps 15 well tests for the City of  
 16 Meridian, a similar number for Caldwell. I've  
 17 tested many of the Kuna wells. Some private  
 18 clients.  
 19 Q. What about the cities of Caldwell and  
 20 Meridian, are their municipal wells completed into  
 21 the Pierce Gulch Sand Aquifer or some other  
 22 aquifer?  
 23 A. Some of them are.  
 24 Q. Are those productive wells into the  
 25 Pierce Gulch Sand Aquifer for Meridian and

1 Caldwell?  
 2 A. Some of the most productive wells we  
 3 have, yes.  
 4 Q. Have they shown decline trends, to  
 5 your knowledge?  
 6 A. When a new well comes online, there is  
 7 typically a few feet of drawdown over time, over  
 8 maybe four or five years as it adjusts to a new  
 9 level right in the vicinity of the well. But I'm  
 10 not sure I know what you're asking. But no, we've  
 11 seen no significant declines whatsoever. We  
 12 haven't really seen any declines, other than what  
 13 it takes to cause water to flow to the well.  
 14 Q. What about aquifer tests the Emmett  
 15 area, have you done any there?  
 16 A. I have.  
 17 Q. Do any of these tests that you have  
 18 conducted over the years conflict with any of your  
 19 findings to which you've testified so far with  
 20 regard to the Pierce Gulch Sand Aquifer?  
 21 A. No.  
 22 Q. Let's turn now to the Kling aquifer  
 23 test, Mr. Squires.  
 24 When was this done and why was it done  
 25 and could you tell us some of your conclusions

1 with regard to it?  
 2 A. Without looking for the document, it  
 3 seems to me it was --  
 4 Q. How about Exhibit 2, and also the  
 5 Exhibit 42, I think the application also has a  
 6 copy of your HLI 2007 report. I believe it may  
 7 have been discussed there.  
 8 A. If memory serves me, it was  
 9 November 2006. Yes, it was November 2006. No,  
 10 that's the date of the report. I always look at  
 11 the last picture.  
 12 What exhibit am I looking at for Kling  
 13 test? I've got it here. Just a minute.  
 14 Q. Are you looking at Exhibit 12?  
 15 A. I'm back to 12 because it's discussed  
 16 in that. Here we go.  
 17 Q. I'm sorry for leading you astray.  
 18 A. January -- I can give you the date of  
 19 the Kling well test.  
 20 January 9th through 11th, 2007.  
 21 Q. Okay. Why was this test performed?  
 22 A. Well, it was because we had a large  
 23 bore production well in existence on the M3  
 24 property, the old Kling irrigation well. So we  
 25 set about redeveloping and rehabilitating that

1 well, and we did a test pump of it, sort of an  
2 opportunistic test.

3 But our first goal was to try and  
4 determine that you could have productive wells on  
5 the M3 property. And because the Farmers Union  
6 ditch was empty at that time and it was right  
7 there, we did a -- and because we had our test  
8 wells equipped with data loggers, we did this  
9 48-hour test.

10 Q. Which test wells did you equip with  
11 data loggers?

12 A. Well, we had our full -- I won't say  
13 "our full," but we had many of the monitoring  
14 wells that we have nowadays, with the exception of  
15 the test wells that we hadn't yet drilled,  
16 equipped with data loggers.

17 Q. What is the condition of the Kling  
18 irrigation well? How is it constructed, and how  
19 suitable a well was it for using in this test?

20 A. In the vernacular, it was a piece of  
21 crap. It was not a very good, well-constructed  
22 well. I think there were a lot of problems with  
23 its construction, is my interpretation. It has a  
24 very -- it was plugged. We did camera surveys of  
25 it. The screens were pretty well plugged off. It

1 had holes in the casing.

2 In fact, we had to actually put a  
3 liner in the casing to be able to pump it because  
4 we were worried about casing failure and infill of  
5 infilling sand while we were pumping.

6 Q. Do you think the condition of the  
7 Kling well affected the quality of your test?

8 A. I think it did. That's why we didn't  
9 put too much energy into it. And also another  
10 constraint on the test was that we were having to  
11 pay \$2,500 a day to dump the water in the Farmers  
12 Union ditch, so that, in conjunction with the fuel  
13 and everything else, it was a very expensive  
14 two-day test.

15 Q. Why did you have to pay -- did you say  
16 \$2,500 a day?

17 A. Yes.

18 Q. To put water into the Farmers Union  
19 ditch?

20 A. Yes.

21 Q. What was the reason for that? Do you  
22 know?

23 A. I think we were contributing to  
24 maintenance funds.

25 Q. Okay. How many wells were -- how many

1 observation wells were monitored in the Kling  
2 test, Mr. Squires?

3 A. I think, if memory serves, about 17  
4 wells that we had equipped.

5 Q. Why was the test done for only 48  
6 hours? Or have you already answered that, because  
7 of the cost?

8 A. I think I've already answered that,  
9 because of the cost and because of the nature or  
10 the condition of the pumping well.

11 Q. And so explain to us how much water  
12 was pumped and what was seen as a result of this  
13 test?

14 A. Well, it was about a  
15 thousand-gallon-a-minute discharge, as I recall,  
16 less than a thousand. And we obtained good  
17 information from the pumping well, both drawdown  
18 and recovery data, and we also obtained a drawdown  
19 response in our nearest test well. Test well  
20 No. 1 was about 900 feet away from the Kling well.

21 Q. Did you see response in any other  
22 wells?

23 A. Not -- no.

24 Q. Okay.

25 A. Not that we could determine without a

1 doubt.

2 Q. Did you find that to be unusual that  
3 you didn't see responses in other wells?

4 A. Unusual, no.

5 Q. How far away were those other wells?

6 A. Quite a distance.

7 Q. And by that, what do you mean?

8 A. Many hundreds if not thousands --  
9 thousands of feet. Probably from -- you know,  
10 just estimating without looking at the map, 10,000  
11 to 3,000 feet away.

12 Q. Could you refer to page 219, please,  
13 of Exhibit 12. That is a map that mentions the  
14 Kling irrigation --

15 A. Yes.

16 Q. -- well and shows the location of  
17 certain other wells.

18 Perhaps you could explain to the  
19 Hearing Officer some factors regarding the Kling  
20 test based on this map.

21 A. Sure. This is -- this -- this figure  
22 answers your question directly because it's a  
23 schematic showing the radial distance from the  
24 Kling well to the other monitoring wells that we  
25 monitored. Those include the existing M3 test

1 wells 1, 2, and 3, some small stock wells that  
2 were existing on the property, and two of the  
3 Spring Valley Ranch wells, 7 and 9. And I think  
4 it speaks for itself, the distance from the  
5 pumping well to each -- each well.

6 It looks like it ranges from  
7 1,050 feet to our nearest monitoring well No. 1,  
8 to a distance of 20,700 feet at Spring Valley 9.  
9 Other than the test well No. 1, most of the other  
10 wells were at a significant distance from the  
11 pumping well.

12 Q. With regard to the Flack Corral well,  
13 could you tell us something about its  
14 construction.

15 A. Well, we don't have good records of  
16 the Flack well. We -- I believe that we were not  
17 able to locate a driller's log for that well. So  
18 I can't answer you directly as to how it's  
19 constructed or what -- who constructed it or what.  
20 But it was a well that was on the property, so we  
21 equipped it.

22 Q. Okay. No drawdown was shown in the  
23 Flack Corral well from this 48-hour test; is that  
24 right?

25 A. Not that we could determine.

1 Q. How much drawdown was there in test  
2 well No. 1?

3 A. I'm going to have to refresh myself to  
4 that, but I can do that rather quickly, I think.

5 Q. You may want to refer to page 217 of  
6 Exhibit 12.

7 Are you referring to page 217? That  
8 would be table 1 --

9 A. Yes.

10 Q. -- of Exhibit 12.

11 A. Uh-huh. Looks like there was  
12 94.39 feet of drawdown in the pumping well.

13 Q. In the Kling well itself?

14 A. And I also recall now one of the  
15 reasons that the test was 48 hours is that the  
16 perforations in the Kling well are relatively  
17 shallow. So we didn't want to drawdown the well  
18 below the perforations. It seems to me that was  
19 another constraint on the test.

20 Q. When you say they were relatively  
21 shallow, they were into the aquifer just a short  
22 distance; is that what you mean?

23 A. I actually think some of the  
24 perforations in the Kling well were well above the  
25 aquifer. It's kind of a long story. I'm not sure

1 I need to take the time to explain that. So very  
2 poor well completion and poor well construction.

3 Q. Okay. So what do you conclude from  
4 the Kling aquifer test with regard to water  
5 availability or characteristics of the Pierce  
6 Gulch Sand Aquifer, Mr. Squires?

7 A. Well, I think it showed us that we  
8 could get large production from even a  
9 poorly-constructed well in the area. We also took  
10 advantage of that pump test. One of the driving  
11 forces of the Kling test was to be able to pump on  
12 the aquifer to stress the aquifer with a greater  
13 degree than our test wells were able to, so that  
14 we could get a reliable water chemistry,  
15 groundwater chemistry from the Pierce Gulch Sand  
16 Aquifer, because recall that most of our test  
17 wells are very small diameter, and we can't pump  
18 them at a very high rate.

19 So pumping the Kling well allowed us  
20 to pump a great deal of water from the aquifer  
21 prior to sampling. And that was also one of our  
22 main driving forces in doing this test.

23 Q. To retrieve an adequate quantity of  
24 water so that you could have an accurate  
25 geochemistry test?

1 A. Yes. Because the chemistry of  
2 groundwater makes a big, big difference in terms  
3 of treatment and regulatory limits when looking at  
4 an aquifer for a community such as this. It would  
5 make the difference -- could make the difference  
6 in millions and millions of dollars.

7 Q. Is the reason that you have to pump a  
8 significant amount of water out of well to get an  
9 accurate geochem test the fact that you'd want to  
10 clear water that might be stagnant in the well  
11 bore?

12 A. That, and also exchanges that happen  
13 by oxygenation in the aquifer around the well  
14 itself by oxygen diffusing down through the water  
15 column over time and moving out into the aquifer.

16 Q. Okay. Let's move on to the Spring  
17 Valley Ranch 7 well.

18 A. Yes.

19 Q. Or SVR-7, as it has been called --

20 A. Yes.

21 Q. -- and its aquifer test.

22 Can you give us the history of that  
23 test, why it was done, when it was done, and give  
24 us some other introductory information about it,  
25 please. And you may want to refer to Exhibit 44

1 which I believe is the SVR-7 aquifer test report.  
 2 A. Well, SVR-7 well was another well -- a  
 3 test well that was drilled by the SunCor Spring  
 4 Valley development. And it was also an existing  
 5 well.  
 6 Q. Is this well on M3 property?  
 7 A. It is. And it's in the central part  
 8 of M3 property.  
 9 Q. It was drilled by SunCor because  
 10 SunCor used to own that property; is that your  
 11 understanding?  
 12 A. I believe that's correct.  
 13 Q. Okay. And let's locate that SVR-7  
 14 well on a map, if you would. Could you refer to  
 15 Exhibit 44, page 71. Or perhaps even better,  
 16 page -- what would be page 73, in effect, figure 2  
 17 in Exhibit 44.  
 18 A. Yes.  
 19 Q. Both of these are maps; correct?  
 20 A. Yes.  
 21 Q. And they both show SVR-7?  
 22 A. Yes.  
 23 Q. Okay. Could you then explain to the  
 24 Hearing Officer the background to this SVR-7  
 25 aquifer test.

1 A. Well, we wanted to carry out a  
 2 better -- a better characterization of the  
 3 aquifer, a longer scale test, in the middle part  
 4 of the property and closer to the observation  
 5 wells that we had.  
 6 And we were in the process of  
 7 rehabilitating and evaluating all the wells, the  
 8 existing wells on the property. And the SVR-7  
 9 well was a well for which there was some limited  
 10 pump test data available from the completion test  
 11 by the SunCor researchers.  
 12 And so we -- we moved a well  
 13 development rig onto the well and we reconditioned  
 14 the well, redeveloped it, developed -- you know,  
 15 we used several development techniques to try and  
 16 make it as productive as it could be.  
 17 Q. Did you run a camera survey?  
 18 A. Yes. And geophysics. And we ran  
 19 camera surveys before and after development.  
 20 And then we put a test pump in there  
 21 and found that the well could produce -- it was a  
 22 high-specific-capacity well that could produce a  
 23 fair amount of water, so we decided that we would  
 24 use it as a -- as the pumping well for an aquifer  
 25 test.

1 Q. What's the diameter of SVR-7?  
 2 A. It's an 8-inch cased well.  
 3 Q. By the way, what's the diameter of the  
 4 Kling well?  
 5 A. It was a 16. After we placed the  
 6 liner in there for a pump chamber, it was 14.  
 7 Q. Okay. So back to SVR-7. It's an  
 8 8-inch well.  
 9 You placed a submersible pump in  
 10 there?  
 11 A. Yes. And we found the well to be  
 12 quite productive with very little drawdown. So we  
 13 then began to move toward the planning and  
 14 equipping of the test wells for a longer-term  
 15 aquifer test.  
 16 Q. Uh-huh. How was the test performed?  
 17 How long was it? What did you pump the well at,  
 18 and so forth?  
 19 A. Well, this map, figure 2, which is an  
 20 aerial photographic view showing the well and,  
 21 again, the radial distances to the various  
 22 observation wells used during the test, we -- some  
 23 of the things we did, we had to build a road up to  
 24 it because the road was -- it was the time of year  
 25 when things could be muddy, and we had to bring

1 fuel trucks in on a daily basis.  
 2 We had to equip all the wells that you  
 3 see here with data loggers and set up a monitoring  
 4 network. We began monitoring these wells in  
 5 advance of the test, prior to the testing.  
 6 And then we started the test. We ran  
 7 it for nine days. And the entirety of the test,  
 8 monitoring water levels by hand, as well as with  
 9 digital instruments and assessing how long to run  
 10 the test. And we had really no preconceived  
 11 notion how long to run it, but in our opinion, we  
 12 ran the test until it reached essentially a steady  
 13 state condition. And we --  
 14 Q. Okay. Can you explain to me what the  
 15 test involved physically. Did you have power to  
 16 the site? Did you have personnel on site? Was  
 17 the Department of Water Resources involved?  
 18 Questions like that might be appropriate for the  
 19 Hearing Officer to get some answers to.  
 20 A. It was a test that was announced in a  
 21 number of places, including the north Ada County  
 22 technical working group. It was a test that did  
 23 involve IDWR staff. In fact, Mr. Dennis Owsley  
 24 assisted in the measurements in one of the wells  
 25 for the test.

1 We did have staff on site 24 hours a  
2 day from the start of the test until the end of  
3 the test. We had a caretaker at the wellhead --  
4 at the pumping wellhead to make sure that the fuel  
5 and everything was -- and security was going  
6 correctly there. We did continuous rounds to all  
7 the wells during the course of the test.

8 Q. Was there power to the site, or did --  
9 A. No.

10 Q. -- you have to have a generator?

11 A. We had to have a generator. And we  
12 had to bring fuel in on a daily basis by tanker.  
13 There was no power at this site.

14 Q. What was the approximate cost of  
15 running this test? Do you know?

16 A. All in all, probably close to  
17 \$100,000.

18 Q. And the test lasted how long?

19 A. Nine days.

20 Q. How many wells were monitored, or are  
21 those all shown on figure 2?

22 A. Well, they're all shown, with the  
23 caveat that many of these wells, as you know and  
24 as already been pointed out, are multiple-level  
25 piezometers. And I think of those as if you have

1 four piezometers, you're measuring four wells. So  
2 somewhere in the neighborhood of 22 to 25 wells.  
3 I don't know precisely.

4 Q. Did you have a period before the test  
5 started and a period after the test started where  
6 you also conducted monitoring or measurement?

7 A. Yes. Both. A pretest monitoring, the  
8 drawdown, and a recovery period.

9 Q. How long were each of those periods on  
10 either end?

11 A. I'm going to have to refer to this  
12 because it's been awhile.

13 In a general sense, you know, we were  
14 monitoring all these wells continuously before the  
15 test. But in terms of moving that up to perhaps a  
16 one-minute interval for the test, if memory serves  
17 me, we did that somewhere about seven days in  
18 front of the test.

19 And then afterwards, we measured, you  
20 know, at the same -- with the same rigor at a  
21 minute recording interval where the length of the  
22 test -- actually, many days longer than the length  
23 of the test -- and then all the wells returned to  
24 their normal recording interval. So it's really  
25 just an episode in a continuous monitoring regime,

1 rather than take the time to find the exact days,  
2 if that answers your question.

3 Q. Okay. You testified that the test was  
4 ended at the end of nine days because a steady  
5 state had been reached.

6 Could you further elaborate on that?

7 A. Yes. As the test proceeded, we were  
8 able to notice and observe the drawdown in the  
9 observation wells. And if you go back again to  
10 figure 2, which is the aerial photo map showing  
11 the -- showing the wells, we documented what we --  
12 you know, it was difficult to tell because the  
13 well is so far from the pumping well that we  
14 ultimately decided that we had a couple of  
15 hundredths of a foot of drawdown in the Spring  
16 Valley 9 well.

17 Q. That's the one that's some 12,000 feet  
18 away; correct?

19 A. It's 11,600 feet away. But if you  
20 look at the Spring Valley 7 well itself at the  
21 center of the photograph, the center of these  
22 radial spokes. Big Gulch stock well was 845 feet  
23 away. We had approximately 1.7 feet of drawdown  
24 in that well after nine days. So I think you can  
25 envision that the cone of depression was very flat

1 and very shallow.

2 So the drawdown in these other wells  
3 where it was measurable was relatively, you know,  
4 minute.

5 But in the wells that we were able to  
6 monitor, like test well No. 4, the Big Gulch stock  
7 well, we observed that the rate of drawdown was  
8 slowing. I mean it wasn't -- it finally -- after  
9 nine days, the other noise in the -- in the  
10 water-level data, that includes fluctuations due  
11 to barometer, perhaps earth tides, was  
12 overpowering the amount of drawdown that we were  
13 seeing in the wells. So we felt that the test had  
14 gone on long enough, and we turned it off.

15 Q. Now, the fact that you observed only a  
16 small amount of drawdown -- I'll characterize it,  
17 at least, as a small amount of drawdown in Big  
18 Gulch stock, does that suggest to you high  
19 transmissivities in this aquifer?

20 A. Yes.

21 Q. And all of these monitoring wells,  
22 were they completed into the Pierce Gulch Sand  
23 Aquifer?

24 A. Not all of them, but many of them  
25 were. And I should add that in some of these

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1 tests, such as Spring Valley 9, the amount of  
2 drawdown was so miniscule that we couldn't even  
3 really tell until we got the information, took out  
4 the barometric effects, and applied various  
5 corrections for antecedent trends and post-test  
6 trends to where we could even show that there was  
7 an influence, because it was very, very -- in the  
8 pumping well itself, I think we had 23 feet of  
9 drawdown in the actual well, which most of that  
10 was well loss.

11 We calculated -- back-calculated that  
12 the drawdown at the pumping well was somewhere  
13 around 5 feet, minus well loss. So I think you  
14 could imagine in your mind's eye that this cone is  
15 very, very flat, and the gradient very flat.

16 Q. So when you say that you measured  
17 something like 2/100ths of a foot in Spring  
18 Valley 9, would it be accurate to say that you  
19 derived a number based on these corrections that  
20 you've described, rather than necessarily saw it  
21 be a tape or some other physical device?

22 A. Yeah, it would be very difficult to  
23 observe that level of drawdown. We feel like you  
24 could only measure to the accuracy of a hundredth  
25 of a foot. So...

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1 Q. Okay. So overall, what are your  
2 conclusions from the -- from the Spring Valley 7  
3 aquifer test? And I recognize that you've said  
4 others may want to testify to it as well. But  
5 what are your conclusions, Mr. Squires?

6 A. Well, in general, it tells us that we  
7 will be able to complete large-yield production  
8 wells on the site. I believe that it -- at this  
9 particular site, and just anywhere on the property  
10 that's into the Pierce Gulch Sand Aquifer, I  
11 believe we will be able to develop wells capable  
12 of at least 2,000 gallons a minute.

13 Q. This Exhibit 44 is the report that  
14 Hydro Logic produced based on the Spring Valley 7  
15 aquifer test; correct?

16 A. That's correct.

17 Q. Is it an accurate and complete report,  
18 in your view?

19 A. It is, yes.

20 Q. Let's turn now to geochemistry,  
21 Mr. Squires.

22 First of all, are you a geochemist?

23 A. No.

24 Q. Do you work with geochemists?

25 A. I do.

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1 Q. And among the geochemists you've  
2 worked with, who have you turned to in your career  
3 to give you advice about geochemistry and  
4 groundwater aquifers?

5 A. As a part of this project, we have  
6 obtained the services of Dick Glanzman, Richard  
7 Glanzman, of Glanzman Geochemical out of Lakewood,  
8 Colorado.

9 Q. Why do you use Mr. Glanzman?

10 A. I think he's one of the top  
11 geochemists in the world.

12 Q. In the world?

13 A. Yes.

14 Q. Why do you say that?

15 A. Because of his history of work and the  
16 number of projects that he's worked on, and his  
17 work, I think, speaks -- his careers with the U.S.  
18 Geological Survey, CH2M Hill, and now his own  
19 company.

20 Q. Okay. So did you work with  
21 Mr. Glanzman in this case?

22 A. Yes.

23 Q. Would you refer, please, to  
24 Exhibit 43, and describe what this is.

25 A. This is a January 20, 2009 report on

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1 the geochemistry of selected wells in the north  
2 Ada County area.

3 Q. Did you --

4 A. Authored by myself and Mr. Glanzman.

5 Q. Could you give us the background on  
6 this effort, Mr. Squires, why it was done and what  
7 its aims were?

8 A. Well, over the 15 to 18 years that  
9 I've known Mr. Glanzman, I've come to appreciate  
10 how -- what a powerful tool geochemistry is. And  
11 I asked for his help in this project as an  
12 additional line of evidence.

13 Q. Now, you say it's a powerful tool, but  
14 that powerful tool is, I take it, tempered by  
15 Glanzman's law, as you testified to the other day?

16 A. It's true that Mr. Glanzman feels that  
17 the physical hydrogeology is more important, that  
18 without an understanding of that, the geochemistry  
19 data is not as definitive. In other words, if the  
20 geochemistry data doesn't fit with the  
21 hydrogeologic conceptual model, more work is  
22 needed.

23 Q. So again, why was the -- what lines of  
24 evidence were you seeking with regard to a  
25 geochemistry report?

1 A. Well, number one, the first and  
 2 foremost reason for getting his input was we  
 3 wanted to find out about the geochemistry of the  
 4 aquifer that we planned to use for the community,  
 5 the drinking water for the community.  
 6 Q. Are you speaking now just of the  
 7 quality and character of the water itself for  
 8 human consumption?  
 9 A. Correct, and how it might be poised or  
 10 how it could change over time with pumping,  
 11 whether it would require treatment of any kind,  
 12 whether it met all national and state guidelines  
 13 for contaminants natural or anthropogenic.  
 14 Q. And what were the conclusions of  
 15 report with regard to that subject, its  
 16 suitability for human use?  
 17 A. Oh, we found the water, as elsewhere  
 18 in the Pierce Gulch Sand Aquifer, there was  
 19 excellent groundwater, appropriate for all  
 20 municipal uses, all culinary uses without  
 21 treatment.  
 22 Q. How was the study carried out in  
 23 producing the geochemical report?  
 24 A. Well, as with the other studies, we  
 25 developed water chemistry from existing wells that

1 we'd worked on, the wells that we had talked  
 2 about, completed perhaps years before. And we did  
 3 sampling of all of the test wells on the M3 site  
 4 that we drilled. We relied on water chemistry  
 5 from production wells in the area, including  
 6 United Water Idaho's wells and --  
 7 Q. Could you refer, please, to  
 8 Exhibit 43, figure 1. It's a map. I believe this  
 9 is where wells were sampled for geochemistry in  
 10 the Pierce Gulch Sand Aquifer. And if that's  
 11 correct, I'd like you to please say so.  
 12 A. Well, this is a map showing the  
 13 sampled wells for geochemistry study. They're not  
 14 all in the Pierce Gulch Sand Aquifer. There's a  
 15 cluster of wells on the right side, the Spring  
 16 Valley wells that were up on the front, well up  
 17 away from the Pierce Gulch Sand Aquifer.  
 18 Some of the wells were completed in  
 19 the Willow Creek Aquifer that we spoke of. But  
 20 the lion's share of these wells that we sampled  
 21 are in the Pierce Gulch sand.  
 22 Q. Would SVR No. 10 be an example of one  
 23 in the Willow Creek Aquifer?  
 24 A. Yes, it would.  
 25 Q. So what did you do once you had

1 located these wells? How did you sample?  
 2 A. Well, as a part of our construction of  
 3 the wells and the development of the piezometer  
 4 tubes -- we produce each of the tube wells for  
 5 some time until they clear, until the measured  
 6 fuel parameters stabilize and we feel like we're  
 7 getting good water chemistry.  
 8 So long before the water chemistry  
 9 project, the analysis by Mr. Glanzman, started, we  
 10 sampled these wells as a condition of completion  
 11 of the wells. And we began to accumulate that  
 12 data.  
 13 We also asked for and received data  
 14 from United Water Idaho. There were analyses  
 15 available from the Spring Valley Ranch wells. So  
 16 it was a collection of data from various sources  
 17 and our own information.  
 18 Q. With regard to the wells sampled that  
 19 were completed -- that are completed in the Pierce  
 20 Gulch Sand Aquifer, did you sample different  
 21 aquifer depths?  
 22 A. Yes, we did.  
 23 Q. And why was that?  
 24 A. Well, as you know, we -- again, we  
 25 have completed piezometers into various depths of

1 the aquifer. So when you are only able to sample,  
 2 say, 30 gallons a minute or less through these  
 3 small tube wells because of the restriction of  
 4 their diameter --  
 5 Q. They're 2-inch diameter?  
 6 A. They're 2-inch diameter.  
 7 Well, when you can only pull that much  
 8 water from an aquifer, you're not drawing from the  
 9 full thickness of the aquifer. So in many of the  
 10 test wells, we will have piezometers completed at  
 11 various depths of the aquifer so that we can  
 12 determine if there's any chemistry shifts within  
 13 the aquifer itself, which oftentimes we do find.  
 14 Q. Where were these water samples taken  
 15 for analysis?  
 16 A. We -- in most cases we use Analytical  
 17 Laboratories in Boise. But in many cases we use  
 18 two labs.  
 19 Did I say Analytical or Alchem?  
 20 Q. You said Analytical.  
 21 A. We use Alchem Laboratories. But in  
 22 many cases we'll take duplicate samples, and we'll  
 23 have a confirmational sample taken to Analytical  
 24 Laboratories, especially if they're critical  
 25 samples.

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1 Q. Were these samples taken  
2 professionally, to your knowledge?  
3 A. Yes. They were taken very carefully.  
4 Field parameters were measured. They were pumped  
5 until the field parameters stabilized without any  
6 changes. They were taken with all the  
7 chain-of-custody protocols, various preservatives  
8 that are necessary for each individual sample,  
9 field filtration, pH, DO, all sorts of site --  
10 parameters that are only available at the sampling  
11 on site.  
12 Q. So you're confident, are you, that  
13 this sampling effort was scientifically sound?  
14 A. For the wells that we sampled, yes.  
15 And I feel very comfortable with the wells that  
16 were sampled by United Water because they're also  
17 very careful, and I'm familiar with their  
18 chemists.  
19 Q. What did the geochemistry report,  
20 Exhibit 43, show?  
21 A. Well, in general, it showed many  
22 things. It showed that the Pierce Gulch Sand  
23 Aquifer has a -- has a water chemistry that is  
24 very predictable. It's -- it doesn't change very  
25 much from location to location. And indeed,

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1 the -- the major -- the major anions and cations  
2 plot in such a way that it's hard to  
3 differentiate. They plot so closely together on  
4 piper diagrams that it's hard to separate them  
5 out.  
6 And it just tells you that because we  
7 sampled these wells across a lateral distance of,  
8 you know, 15 or more miles, that the water  
9 chemistry doesn't change very rapidly along the  
10 flow path. And that tells us, perhaps, that we  
11 have a fairly nonreactive aquifer, that the travel  
12 times are probably relatively quick, and that  
13 there's not much doubt about their origin.  
14 Q. Would you refer to figure 5, please,  
15 of Exhibit 43. This shows a pyramid-shaped figure  
16 made up of a diamond shape and two triangles.  
17 Is this the trilinear or piper diagram  
18 that you've been referring to?  
19 A. Yes, it is.  
20 Q. And could you describe what you see on  
21 this and what this shows?  
22 A. Well, this is the major ion chemistry  
23 from groundwater wells completed in the Pierce  
24 Gulch Sand Aquifer. The way this was derived, if  
25 you turn back a couple of pages to figure 3 in

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1 that same report, this is piper diagram or a  
2 trilinear diagram of all the wells that we  
3 sampled. So it shows a scattering of wells across  
4 this diagram.  
5 And if -- I would prefer to let  
6 Mr. Glanzman discuss how these chemistry diagrams  
7 are derived and how are useful. But in a  
8 nutshell, there's basically seven anions and  
9 cations that make up the preponderance of the  
10 total dissolved solids in a groundwater.  
11 And they're plotted on these diagrams  
12 where the cations are plotted in the triangle on  
13 the lower left, and the anions are plotted in the  
14 triangle on the lower right, and then they project  
15 through to the diamond, but -- in the center.  
16 But what's important in these diagrams  
17 is in the diamond section -- and actually all of  
18 the sections -- you'll see that we've noted that  
19 there is an average water chemistry of the Boise  
20 River. That is a blue-colored triangle, and it's  
21 labeled there with an arrow that draws to it.  
22 And in the upper part of the diamond,  
23 there's an upside down triangle of a lighter blue  
24 shade that indicates the average chemistry of the  
25 precipitation in this area. And I think you

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1 could -- if we focus on the diamond part of the  
2 diagram, you'll see that most of the wells cluster  
3 pretty close to the Boise river, but that there's  
4 a rather large spread of other samples that go  
5 around the diamond.  
6 Now, if you go back over to the figure  
7 that you referred to, figure 5, this is just the  
8 wells that are completed in the Pierce Gulch Sand  
9 Aquifer. And I think now you can see that the --  
10 all the wells sampled, and without all these  
11 labels on there -- and in fact, we couldn't even  
12 label all of the zones because they plot over the  
13 top of one another because the chemistry is so  
14 close. And it's very close to the chemistry of  
15 the Boise River, what we've referred to as the  
16 ancestral Boise River.  
17 And with a few outliers such as M3  
18 Eagle test well No. 2, zone 1, and M3 Eagle SVR  
19 test well No. 9, those are the crosses there that  
20 are trending slightly toward the precipitation end  
21 member. Okay? They're a little bit away from the  
22 clot. And they're moving, oh, perhaps, let's say  
23 it's 15 percent of the way toward the  
24 precipitation end member. And for those, that  
25 indicates that there may be a slight influence

1 from precipitation in those ground waters.

2 Q. By the way, with regard to test well  
3 No. 2 and SVR-9, those are further to the  
4 northeast, are they, from --

5 A. That's correct.

6 Q. -- let's say the SVR-7 or -- they're  
7 on the other end of the property from the  
8 panhandle, let's say?

9 A. Well, if you recall, those are the  
10 wells that are on the cross-sectional diagrams  
11 that tend to come up toward the water table where  
12 the end of aquifer is. So it should be no  
13 surprise that those have a component of  
14 precipitation in them, because the aquifer is  
15 readily available for infiltration there, and the  
16 wells are relatively shallow.

17 Q. I see on this figure 5 that we also  
18 have Swift, United Water, HP, some other United  
19 Water wells and so forth are also depicted on  
20 there.

21 What does that show you with regard to  
22 shows?

23 A. Well, it shows me -- and I know from  
24 the analyses that those -- those water chemistries  
25 are very similar. In fact, they're remarkably

1 similar. And it also shows me, and Dick Glanzman  
2 has described to me, that when water chemistries  
3 plot that closely together that it shows that  
4 there's not much mixing going on, that it's  
5 derived predominantly from a single source.

6 And back to the question that  
7 Mr. Smith asked earlier, if these waters were  
8 percolating down through the soils in a recharge  
9 mode, I suggest that the plot would look quite a  
10 bit different than this. I suggested that it  
11 would be -- show more of a linear trend of mixing,  
12 and it doesn't. So it tells us that it's  
13 originating predominantly from a single source,  
14 which we've identified as the Boise River.

15 Q. Okay. So what conclusions do you  
16 reach, Mr. Squires, with regard to your effort  
17 here in the geochemistry study?

18 A. Well, we have -- we've looked at the  
19 geochemistry from a pre-irrigation irrigation --  
20 that's kind of what we're focusing on -- with  
21 respect to recharge of this aquifer.

22 Q. "Pre-irrigation," you mean before  
23 irrigation began in the Valley?

24 A. Correct. And that's what we would  
25 think of as -- that's how we would define in our

1 work the term "ancestral," at least  
2 pre-irrigation.

3 Q. Uh-huh.

4 A. And so just as if this water  
5 infiltrated through the soils into the aquifer, I  
6 suggested that we would see a trend, a mixing  
7 trend, instead of a clot of plots. If there was a  
8 component of irrigation water in this, water that  
9 was applied and moved through the soils and it  
10 mixed with this, we would also see a trend of some  
11 kind. And we don't see that.

12 Q. Okay.

13 A. And since it plots very close to the  
14 Boise River, that's where our basic assumptions  
15 come from. But I do defer, and I think we should  
16 listen to Dick Glanzman on this subject, because I  
17 am far from an expert on geochemistry. I supply  
18 the physical nature side of our relationship.

19 But I will say that it's very  
20 interesting because Dick lives in Denver and he  
21 only has the geochemical data to look at, but we  
22 were even able to further subdivide these. And  
23 when he sent me the analyses and asked me by  
24 phone, by the way, "Well, where do these plot?  
25 You know, this sample here, is it in the Pierce

1 Gulch?" because he had no idea. Okay. "Is this  
2 sample taken from the Willow Creek? Is this  
3 sample taken from the Pierce Gulch? How deep in  
4 the Pierce Gulch?"

5 And when we did that and we replotted  
6 them and he sent the diagrams down, it was quite  
7 gratifying and quite surprising that with just a  
8 few exceptions we were able to identify the  
9 individual aquifers based on that, where he just  
10 plotted them according to what we thought the  
11 completion interval was, and they fell perfectly  
12 into place.

13 And the exceptions that we had ended  
14 up being typographical errors in the database.  
15 And when we straightened those out, virtually  
16 every geochemistry analytical result fell right  
17 where we would expect it to do.

18 Q. Is it your conclusion that the water  
19 from separate aquifers has a different geochemical  
20 signature?

21 A. Yes. It's very clear that there's no  
22 mixing between the Pierce Gulch Sand Aquifer and  
23 the Willow Creek Aquifer. It's very clear that  
24 the recharge to the Pierce Gulch Sand Aquifer in  
25 the vicinity of M3 does not come from

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1 precipitation that falls on the foothills to the  
2 north of the town. That's very emphatically  
3 clear, according to Mr. Glanzman. And I'm sure he  
4 will testify to that.  
5 Q. Or at least would you say no  
6 significant amount of recharge?  
7 A. Well, as I indicated, where the  
8 aquifer daylight and where the sand is present at  
9 the surface, there appears to be some percentage  
10 of precipitation that's getting in there, but it's  
11 pretty minor. And that's only in the shallowest  
12 wells also.  
13 Q. Is --  
14 A. I think that tends to support the  
15 conceptual model, rather than refute it.  
16 Q. Does Exhibit 41 support the premise  
17 that the Pierce Gulch Sand Aquifer is a  
18 regionally-extensive aquifer, or does it tend to  
19 refute that, or is it neutral?  
20 A. Well, it tends to support that within  
21 the wells --  
22 Q. Excuse me. I think I said Exhibit 41.  
23 I meant Exhibit 43.  
24 A. Exhibit 43 --  
25 Q. The geochemical report.

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1 A. -- suggests that the Pierce Gulch Sand  
2 Aquifer is well connected across all the sampled  
3 wells that are within our sampling area, shown on  
4 the map.  
5 Q. Which would include the United Water  
6 wells; correct?  
7 A. Yes.  
8 Q. Okay. Mr. Squires, I'd like to turn  
9 now to the question of aquifer modeling. You  
10 testified earlier that one of the reasons for  
11 conducting the -- what appeared to be fairly  
12 laborious work of putting together the reanalysis  
13 of 16 aquifer tests, previous tests, was to  
14 establish information that would help you to model  
15 the aquifer; is that accurate?  
16 A. To provide input for the cells of the  
17 model, yes, and to show the aerial distribution of  
18 the aquifer coefficients of transmissivity and  
19 storitivity.  
20 Q. So what modeling, just as an  
21 introduction, has been done with regard to the M3  
22 Eagle project and modeling of the Pierce Gulch  
23 Sand Aquifer underneath it?  
24 A. Well, there's been two models  
25 developed that HLI contributed to. And as you get

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1 into this area of our research, you're going  
2 farther away from my expertisity because I'm not a  
3 groundwater modeler either. And my colleague,  
4 Mark Utting, who will testify on the modeling,  
5 along with our expert, Peter Schwartzman of  
6 Pacific Groundwater Group in Seattle.  
7 Mark was the project manager on both  
8 the modeling efforts for us. They can speak to it  
9 better. But I would be glad to describe in  
10 generalities what we did.  
11 One of the first things that happened  
12 early on in the project, in fact shortly after I  
13 met Mr. Brownlee, a local interest group, NACFA,  
14 the North Ada County Foothills Alliance, I believe  
15 the acronym is, had sent a letter to the director  
16 of the Department of Water Resources asking that  
17 an independent model be developed for the Eagle  
18 area.  
19 And when I met Mr. Brownlee, he  
20 brought that letter in, and he says, "Hey, what  
21 can we do to address this issue?"  
22 So I suggested that we could -- for  
23 the independent nature of the model, that we could  
24 go to the University of Idaho, find a researcher  
25 there, perhaps fund a master's thesis there to

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1 construct a numerical groundwater model of the  
2 area.  
3 Q. And what came of that suggestion?  
4 A. And that suggestion was acted upon.  
5 And M3 did fund a master's degree for a graduate  
6 student, Stacy Douglas. Mark Utting of my company  
7 supplied data on a regular basis, and I was pretty  
8 engaged myself supplying --  
9 Q. Did you supply that data upon request?  
10 A. We supplied the preponderance of data  
11 to U of I. But they did their own research as  
12 well on driller's data, the U of I students,  
13 including Stacy Douglas, took many of the  
14 water-level measurements in the monitoring  
15 episodes that we spoke of. And Jim Osiensky, her  
16 advisor, and other professors on her advisory  
17 committee from the University of Idaho contributed  
18 as well.  
19 And then a second -- but this model  
20 was started pretty early on, and we were  
21 developing groundwater data all along. And  
22 because the course of a graduate -- or a master's  
23 program is somewhat limited, measured in terms of  
24 a couple of years, we pretty much began to go past  
25 the U of I model because we were developing data

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1 that we were running out of time to get into the  
2 Stacy Douglas model. So we developed our own  
3 model with the help of Pacific Groundwater Group  
4 out of Seattle, Peter Schwartzman.  
5 Q. Now, with regard to the -- what I'll  
6 call the U of I model, Exhibit 41, was this made  
7 available to the Department of Water Resources --  
8 A. Yes, it was.  
9 Q. -- and the public?  
10 A. Yes, it was.  
11 Q. What did the model conclude, just in  
12 general?  
13 A. In general --  
14 Q. Or find.  
15 A. Yeah. In general, to the extent --  
16 and it ended up being a steady-state model, and  
17 not a transient model, that is it modeled a  
18 singular condition in the aquifer. It supported  
19 all of our conclusions. It supported the  
20 northwest flow. And I will -- one of our experts  
21 is Jim Osiensky. He's going to testify to this  
22 model. My colleague, Mark Utting, will testify to  
23 this model because he was the project manager on  
24 that. But in general, I would say it was  
25 supportive of our conceptual model. There was

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1 nothing in that model that refutes anything that  
2 we have concluded.  
3 Q. With regard to the steady-state nature  
4 of this model, did that involve a hypothetical  
5 pumping at some gpm or cfs rate at a pumping  
6 center on M3 for a term of years to come up with a  
7 steady-state condition after that had occurred?  
8 Is that a description of how you get to a  
9 steady-state model?  
10 A. No, not to my knowledge, that's not.  
11 Q. What did they do?  
12 A. Well, they calibrated to the  
13 groundwater gradient, and they used geologic  
14 information supplied by us and from them. They  
15 had a water budget based on land use, and I think  
16 it's best if you let my colleagues and Jim  
17 Osiensky speak to that model. I'm not --  
18 Q. Okay.  
19 A. -- not really qualified to comment on  
20 that.  
21 Q. Okay. What about the M3 modeling  
22 effort? You mentioned that you began your own  
23 modeling effort. When did that occur and why?  
24 A. I can't remember the exact date that  
25 that started. But it occurred because we felt

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1 that we wanted to develop a tool to test our  
2 theories as we moved along through this project.  
3 And we consider numerical models not  
4 an end product of an aquifer study, but of -- as a  
5 tool that we can use to refine and better  
6 understand the aquifer. And we have found that  
7 the model that Mark Utting and Peter Schwartzman  
8 and his staff have developed have served in that  
9 function. And we've been able to test several of  
10 our conclusions and -- using that model, and we  
11 will continue to use that model. It's been a very  
12 useful model.  
13 Q. I'd like you to refer, please, to  
14 Exhibit 16. And please identify that.  
15 A. This is the modeling report that was a  
16 result of the M3/PGG collaboration.  
17 Q. Do you know whether this was a  
18 steady-state model effort, a transient model  
19 effort, or did it involve elements of both?  
20 A. My understanding is that it's a --  
21 it's a calibrated, transient, finite difference,  
22 numerical model.  
23 Q. Do you know how this model differed in  
24 its construction from the U of I model?  
25 A. Yes. We have a very strong conviction

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1 when it comes to groundwater models that the  
2 models, to every extent possible, mimic the actual  
3 conditions within the aquifer. So we strive to  
4 put in actual -- the actual configuration and  
5 three-dimensional geometry of the aquifer.  
6 So this model is different from  
7 previous models because it does incorporate the  
8 dip, the dipping aquifer and the dipping layers  
9 within the aquifer. And it also incorporates the  
10 various -- you know, the new understanding, I'll  
11 say, the refined understanding of the  
12 transmissivity of the aquifer.  
13 And essentially all of our research is  
14 in one way or another incorporated into this  
15 model. And as we continue to develop information,  
16 the model was improved, and that's what makes the  
17 model a useful tool.  
18 Q. Was the model -- the M3 model used to  
19 run different scenarios, or just one scenario?  
20 A. No, it was used -- it was run to -- on  
21 a number of different scenarios. And it was used  
22 to model the longer-term aquifer test, such as the  
23 Lexington Hills 30-day test, the Eagle field -- I  
24 think that was a seven-day test, our Spring  
25 Valley 7 test. And we had favorable results with

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1 those.

2 But of course, those test results were

3 then incorporated into the model to refine the

4 model and make it a better tool. But we had very

5 good agreement, even from early on, just putting

6 the data in there.

7 Q. Very good agreement in the sense that

8 the model replicated what you had observed in

9 actual measured wells?

10 A. It replicated to a large degree the

11 water levels that we measured, yes.

12 Q. You mentioned that you like to include

13 in models the actual geologic profile, such as a

14 dipping aquifer in this case.

15 The previous models that you referred

16 to, did they include the dipping aquifer, or did

17 they have layers that were different from that?

18 A. They had layers that were flat lying.

19 Q. Flat lying?

20 A. Yes, flat lying. And my own

21 feeling -- or my own understanding is that they

22 were not really representative of the actual

23 geologic layering that we have. In fact, I felt

24 they were quite misleading.

25 Q. Well, what about the U of I model, did

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1 you feel it was misleading?

2 A. Well, I think the U of I model served

3 its purpose. It -- it was not a calibrated,

4 transient model. And as I said before, I'm just

5 not really the -- qualified to speak to that

6 model. I think I'll let the researchers who

7 developed it speak to it.

8 Q. What about the comparison between the

9 M3 model and the Treasure Valley Hydrologic

10 Project model, what differences could you describe

11 there?

12 A. Well, as part of this Exhibit 16, the

13 modeling report, those differences are discussed

14 for all the previous models by my colleague, Mark

15 Utting.

16 Q. Okay.

17 A. And I think since he is going to

18 testify later, he will be the most expeditious and

19 best authority to discuss those. But he did

20 research all of the preexisting models, and he

21 made a comparison of the attributes of this model

22 compared to those models and discussed the

23 shortcomings and the positive attributes of each

24 of the models.

25 But I think it's also fair to say that

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1 we learned a lot from those previous models. I

2 mean they obviously contributed to our

3 understanding, and that's how science is done. We

4 improve as we go along.

5 Q. Models are set up usually based on a

6 grid, either two-dimensional or three-dimensional;

7 correct?

8 A. Yes.

9 Q. And is it fair to say that the

10 coarseness or fineness of the grid can correspond

11 to the coarseness or the fineness of the output

12 from the model?

13 A. That's true.

14 Q. And with --

15 A. But the coarseness or fineness of the

16 model grid is often related to the density of the

17 data that you have too. It doesn't help to have a

18 very fine-grained model if you have coarse-grained

19 data.

20 Q. With regard to the M3 model in

21 comparison to the TVHP model, do you know whether

22 the grid size varied?

23 A. Yeah. Well, the grid size in the M3

24 model is much smaller. And I believe -- and

25 again, I'm getting out on an area that I'm not

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1 that sure of. But I believe we also had variable

2 spacing where we had denser, smaller cells toward

3 the center of the model, the key area of interest

4 for us for M3's project, then on the outskirts of

5 the model.

6 Q. Do you know whether the Treasure

7 Valley Hydrologic Project used horizontal layers

8 or did it use dipping layers to represent the

9 geologic section?

10 A. They used horizontal layers.

11 MR. FEREDAY: Okay. Mr. Hearing Officer,

12 we're at 2:30. Maybe it would be a good time for

13 a break. I'm able to go on if that's your

14 pleasure.

15 THE HEARING OFFICER: What's the feeling of

16 everyone here?

17 MR. THORNTON: I'm fine with that.

18 THE HEARING OFFICER: Do you want a break?

19 MR. THORNTON: That would be good.

20 THE HEARING OFFICER: Okay. Let's break

21 for ten, and then I assume we'll want to see

22 another one about 3:30, quarter to 4:00, depending

23 on how late we want to go. Okay. So ten minutes.

24 (Recess.)

25 THE HEARING OFFICER: Now we're recording.

1 Q. (BY MR. FEREDAY): Mr. Squires, in the  
2 course of this hearing there have been several  
3 questions about recharge to the Pierce Gulch Sand  
4 Aquifer.

5 What can you tell us about that  
6 subject, from your experience and your studies?

7 A. I would say that the recharge to the  
8 aquifer is robust and very dynamic. I would say  
9 that -- I would say that it's from a variety of  
10 areas, not just one -- not just one thing.

11 Q. Originating from the Boise River or --

12 A. Almost all from the Boise -- well,  
13 from the Boise River and its tributaries, yes. I  
14 think there's also recharge from modern sources,  
15 too, but I don't think that those effects have  
16 been felt within the aquifer at anywhere near the  
17 site of M3, at least the chemistry effects.

18 Q. There have been comments and questions  
19 about the age of the water in the Pierce Gulch  
20 Sand Aquifer.

21 What do you have to say about that?

22 A. I don't think we have a very good  
23 handle on how old the water in the PGSA is.

24 Q. Why do you say that?

25 A. Because the dating methods that we're

1 using are not that useful. Although my colleague,  
2 Mr. Glanzman, suggests that Mr. Hutchins, the  
3 gentleman who did the geochemistry study for the  
4 TVHP, his conclusion was that he did a pretty darn  
5 good job of that geochemistry study.

6 But the carbon series of age dating,  
7 the age dating technique, my understanding is --  
8 and you can explore this further with  
9 Mr. Glanzman, but my understanding from talking to  
10 him is that there's about six or seven different  
11 methods for using the carbon series for dating,  
12 and none of them are very conclusive until you get  
13 somewhere in the date -- the age range of, you  
14 know, somewhere around the halflife of carbon,  
15 which is 5,000 years.

16 So if you read the TVHP geochemistry  
17 conclusions pretty closely -- and as we've heard  
18 in these proceedings, people tend to jump to the  
19 conclusion that when Mr. Hutchins said that the  
20 water was 3,000 years or 4,000 years or 2,000  
21 years, that really isn't what he said.

22 What he said was it's less than. He  
23 said it's less than 4,000, less than 2,000. Those  
24 were his best estimates. But there's a pretty  
25 large gap in there between the next dating method,

1 which is tritium, which has now been reduced down  
2 to, I think, 45 years, and the carbon dates, which  
3 aren't that useful, dates in the low thousands.  
4 So I don't think that we're going to get much  
5 closer to that by repeating those experiments.

6 Q. So --

7 A. But I guess I would add to that that,  
8 you know, I've stated that I think the recharge  
9 comes from the Boise River, particularly the reach  
10 above Capitol Bridge. That's long been known to  
11 be a losing reach from underflow from the  
12 tributary streams like Cottonwood Creek and Crane  
13 Creek, Stewart Creek.

14 There's leakage -- from through  
15 various units. And there are obviously modern  
16 driving forces, too, like the head that we spoke  
17 about that adds, you know, from 2- to 400 feet of  
18 water, driving head, to portions of the Valley.

19 And so I think it's a variety of -- it's not just  
20 a single point where the recharge is happening.

21 Q. Okay. What about your reports and  
22 various maps that have been discussed at several  
23 points throughout this hearing by several  
24 witnesses with regard to flow gradient toward the  
25 Payette River as you've testified, what's your

1 conclusion as to that issue, the gradient or  
2 direction of flow in the vicinity of M3 and the  
3 Pierce Gulch Sand Aquifer, and is that important  
4 to us?

5 A. I think I agree with the testimony of  
6 Mr. Vincent, if I heard him correctly, is that I'm  
7 kind of confounded as to why this has become such  
8 a big issue. There's no question in my mind  
9 there's a flow gradient toward the Payette. And  
10 that's obvious.

11 We believe that there's also  
12 continuity through permeable materials that allow  
13 flows to the Payette. Everything that we've seen  
14 suggests that. Subsurface, surface, contour maps,  
15 water-level measurements, everything points to  
16 that. Nothing precludes it.

17 So I -- but, again, I think I stated  
18 earlier, that there's flow toward the Payette,  
19 there's flow toward the Snake, and there's flow  
20 toward the Boise.

21 Q. And why is it a red herring?

22 A. I don't know. In my mind, it has no  
23 bearing on the adequacy of water for this project.

24 Q. Okay. Let's focus on the wells that  
25 you would propose that M3 Eagle develop for this

1 water right.  
 2 A. Yes.  
 3 Q. Have you evaluated what types of  
 4 wells, how big, and where they might be located on  
 5 the project?  
 6 A. I have. In fact, we've already  
 7 obtained some site approvals, well site approvals  
 8 from the DEQ. We -- at this juncture we intend to  
 9 place the wells, starting with well No. 1, at the  
 10 central part of the property in the area of the  
 11 Spring Valley 7 well, and perhaps a little bit  
 12 down gulch from there, the two initial wells.  
 13 Keep in mind that these wells will be  
 14 developed over a very long time period. And how  
 15 the other wells are positioned will depend upon  
 16 the performance of the wells that we -- that we  
 17 drill, develop, and test, and put into service.  
 18 Q. How many wells do you see as the  
 19 backbone system at full build-out of the M3  
 20 project?  
 21 A. Well, given the discharge rates that  
 22 are required to meet regulatory requirements of  
 23 the DEQ and to meet the peak demands of our water  
 24 right application, I'm envisioning five to six,  
 25 perhaps seven wells. It also depends on the

1 ultimate configuration of the water distribution  
 2 system and any changes to phasing that happen.  
 3 I mean we could end up with  
 4 centrally-located large bore wells, or we could  
 5 end up with a few more wells of smaller capacity  
 6 at various location. It kind of -- it's not  
 7 entirely decided yet.  
 8 But I would submit that we will start  
 9 with wells at the central part of the property,  
 10 the furthest located from the property boundaries,  
 11 and see how things go.  
 12 Q. Do you see any concern with regard to  
 13 well location based on the subsurface geology on  
 14 the site?  
 15 A. Well, yes. As has been previously  
 16 stated, the Pierce Gulch Sand Aquifer is not  
 17 everywhere present underneath the site. So  
 18 certainly the wells will be positioned over the  
 19 Pierce Gulch Sand Aquifer, and they will be  
 20 positioned sufficiently far away from the edge of  
 21 aquifer boundary to allow a reasonable depth of  
 22 the well and the available drawdown to the well.  
 23 Q. What did the Kling test -- pump test  
 24 tell you, if anything, with regard to the  
 25 potential location of production wells on the

1 property, Mr. Squires?  
 2 A. Well, I think that -- I think that the  
 3 two aquifer tests we did, the Kling test and the  
 4 Spring Valley Aquifer test, tell us that we can,  
 5 within the constraints of what I just mentioned,  
 6 the position and presence of the Pierce Gulch Sand  
 7 Aquifer, I think we can have wells pretty much  
 8 anywhere within that -- within the M3 property in  
 9 those locations.  
 10 Q. Okay.  
 11 A. I think you could have productive  
 12 wells to the end of panhandle, for example, and  
 13 all the way up through Spring Valley 7, and even  
 14 farther to the northwest. I think you could have  
 15 a productive well at the test well No. 3 site.  
 16 Q. Okay. Mr. Squires, do you know what  
 17 the cost of the studies that have been done so far  
 18 has been to M3 to -- in preparation of this water  
 19 right application, the hydrogeological and related  
 20 studies?  
 21 A. I think it has been not -- do you mean  
 22 including contractor costs for drilling wells,  
 23 et cetera?  
 24 Q. Correct.  
 25 A. Yeah. I would say it's somewhere very

1 close to \$2 million.  
 2 Q. Okay. Mr. Squires, what do you  
 3 conclude about the source of water for the  
 4 proposed M3 project? Is it sufficient to satisfy  
 5 the needs of this project, in your opinion?  
 6 A. I think the groundwater picture that's  
 7 emerging for this area of Eagle, Star, the M3  
 8 area, is a very positive picture. I think that  
 9 it -- that if you are the community of Eagle,  
 10 you're very pleased about the results of this  
 11 study.  
 12 I think that it shows that there's a  
 13 large regional aquifer that is robustly recharged,  
 14 that there's very little evidence of water-level  
 15 declines in response to increases in pumping. The  
 16 water chemistry is very good. The water pressures  
 17 are high. The aquifer is thicker than we  
 18 previously thought. It's more transmissive than  
 19 we previously thought. It's not dependent upon a  
 20 paltry bit of recharge in the foothills above  
 21 down, but rather connected to a large system.  
 22 And so I -- I feel very good about the  
 23 availability of groundwater available for this  
 24 project and for the community in the foreseeable  
 25 future, beyond the M3 property -- beyond the M3

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1 project and its proposed population.  
2 Q. So in your opinion, Mr. Squires, is  
3 there a sufficient water supply to support this  
4 project?  
5 A. I think there is water availability  
6 far in excess of the water required by the M3  
7 property. And there's been a lot of discussion  
8 during this hearing about the -- and during the  
9 whole process, really, about the quantity of water  
10 that M3 seeks. And while I agree, it's certainly  
11 not an insignificant amount of water. It's also  
12 not a gigantic amount of water in comparison to  
13 the water that's just getting developed, in  
14 general, across our community and across the  
15 Valley.  
16 Q. Mr. Squires, based on the studies that  
17 you have conducted or have participated in in this  
18 matter, what is your opinion about the adverse  
19 effects, if any, of the M3 project development on  
20 other water rights or aquifer levels?  
21 A. I believe that myself and my  
22 colleagues and our experts have painted a very  
23 conservative picture. I think we have tried to  
24 overestimate drawdowns, and I think we have tried  
25 to portray pretty much a worst-case scenario in

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1 all of our evaluations.  
2 I think that the impacts will be less  
3 than we have predicted and shown because we have  
4 been conservative. But I think that we are very  
5 solidly connected to the same kind of groundwater  
6 regime that was testified to by Mr. Dittus and his  
7 own wells in the area and the same aquifer.  
8 And I -- I think that the impacts that  
9 we've shown are certainly acceptable. I don't  
10 think that there will be any damages, any  
11 unreasonable damages, to anyone. And I think that  
12 we have put in place a rather extensive  
13 groundwater network that will absolutely show that  
14 up. One thing that --  
15 Q. Do you mean a groundwater monitoring  
16 network?  
17 A. Yes.  
18 And I think one thing that has not  
19 really been talked about is the fact that  
20 groundwater declines and the build-out of this  
21 community do not happen quickly.  
22 I mean if you take the southeast Boise  
23 groundwater management area as an example, the  
24 monitoring out there showed in advance that  
25 declines were happening. And that area was

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1 ultimately shown to be an area that was  
2 approaching an overdraft situation, and  
3 administration occurred, and now there has been no  
4 problems out there in recent times, and we don't  
5 anticipate any. But that is an area that has a --  
6 a recognized constraint to recharge, unlike this  
7 area, which does not appear to have one.  
8 MR. FEREDAY: Thank you. No further  
9 questions.  
10 THE HEARING OFFICER: Okay, Mr. Fereday.  
11 Mr. Thornton, cross-examination?  
12 MR. THORNTON: Yeah. Okay. Where to  
13 begin.  
14 THE HEARING OFFICER: Do you want a moment  
15 to collect your thoughts?  
16 MR. THORNTON: Yeah, if we could. We got a  
17 lot of --  
18 THE HEARING OFFICER: Let's go off the  
19 record.  
20 (Recess.)  
21 THE HEARING OFFICER: We're recording.  
22 You may cross-examine.  
23 Thanks for tracking the microphone.  
24 ///  
25 ///

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1 CROSS-EXAMINATION  
2 BY MR. THORNTON:  
3 Q. Mr. Squires, you obviously have given  
4 a lot of testimony the last day and a half. And  
5 just up front, I'm sure all of my questions aren't  
6 going to follow some logical flow path. I  
7 apologize for that ahead of time.  
8 A. That's fine.  
9 Q. If you would go to Exhibit 16, which  
10 we've been talking about a lot. I think it is  
11 identified as the M3 model, if that's okay if I --  
12 A. Yes.  
13 Q. And if you go to page 14, and then the  
14 paragraph just before where it says "The M3 model  
15 is an ongoing process."  
16 A. Yes.  
17 Q. That paragraph, if you could look that  
18 over, and in particular, the last maybe four  
19 sentences identifies that -- and I'll read -- I'd  
20 like to have your take on the meaning of that --  
21 "The predictions made by the model are unlikely to  
22 be 100 percent accurate. Rather, we believe that  
23 they give a reasonable range of likely impacts at  
24 various points within a few miles of the M3  
25 property. Further away where there was less

1 emphasis on data collection and analysis,  
 2 predictions are likely to be less accurate."  
 3 Do you agree with those statements?  
 4 A. Yes, I do.  
 5 Q. Okay. I believe you are also one of  
 6 the primary authors and signatories to this  
 7 document.  
 8 A. Well, my company performed it. But as  
 9 I indicated before, this -- this work on the model  
 10 was carried out by my project manager, Mark  
 11 Utting, and by the Pacific Groundwater Group out  
 12 of Seattle.  
 13 Q. Okay.  
 14 A. And I am not an expert modeler by any  
 15 means.  
 16 Q. Okay.  
 17 A. I don't know that much about modeling,  
 18 quite frankly.  
 19 Q. Is your registered professional  
 20 geologist stamp on this report?  
 21 A. Yes.  
 22 Q. So could you give me some information  
 23 on how accurate is your model within -- it's less  
 24 than 100 percent, and I think everybody would  
 25 agree 100 percent is unreachable, how accurate is

1 it within a few miles of the M3 property?  
 2 A. Well, in terms of the aquifer tests  
 3 that we simulated, pretty darn accurate. Within a  
 4 few feet.  
 5 Q. Does that represent where you're  
 6 within 90 percent accuracy?  
 7 A. Oh, I don't think --  
 8 Q. 85?  
 9 A. -- there's any way that you could  
 10 guarantee that. There's always uncertainty in  
 11 scientific research, especially subsurface  
 12 research. And this model is no exception.  
 13 Q. And have you identified what that  
 14 uncertainty is in some form of standard deviation  
 15 or R squared values or levels of uncertainty?  
 16 A. As I previously stated, we're fairly  
 17 certain that the water is sufficient for the  
 18 proposed use.  
 19 Q. Okay. And as far as farther away  
 20 where it states, "Further away where there was  
 21 less emphasis on data collection and analysis,  
 22 predictions are likely to be less accurate."  
 23 What is considered further away? I  
 24 don't know if that's 2 miles, 5 miles, 10 miles,  
 25 20 miles.

1 A. Well, I think that our study -- the  
 2 focus area of our study was in the vicinity of M3  
 3 and down into west Boise, and within, I would just  
 4 say, 5 miles of the site was a fine-tooth focal  
 5 area. But we used information from a very wide  
 6 area and all of my previous experience in the  
 7 Valley.  
 8 Q. Okay. And I believe you stated that  
 9 you feel with high certainty that the predictions  
 10 of the model are accurate to within a few feet?  
 11 A. I do.  
 12 Q. Okay. Based on that certainty, do you  
 13 see where the use of your data could be used in a  
 14 monitoring program to identify potential  
 15 water-level declines and then mitigation or  
 16 something used to say, okay, we've passed -- we've  
 17 gone father down, therefore we'll look for  
 18 different sources of water because our model is  
 19 inaccurate? Do you feel that comfortable in the  
 20 use of your model?  
 21 A. I feel comfortable that we have  
 22 already established a pretty comprehensive  
 23 groundwater monitoring network to help us gauge  
 24 the effects and the impacts of the proposed  
 25 development and the development -- additional

1 groundwater development that will occur around the  
 2 M3 property.  
 3 As to the administration of the  
 4 resource, based on water levels, that's not our  
 5 bailiwick. That's the bailiwick of the Department  
 6 of Water Resources. And I can't speak to that.  
 7 Q. Do you feel that your data is accurate  
 8 enough that you would support the use of that data  
 9 for M3 to use in some target amount of drawdown  
 10 for some water right agreement?  
 11 MR. FEREDAY: Objection. To the extent  
 12 that this asks for an opinion about  
 13 administration, we object. It would be a legal  
 14 opinion. Furthermore, there is no testimony or  
 15 facts in evidence about any agreement about  
 16 drawdowns.  
 17 THE HEARING OFFICER: Okay. Mr. Thornton,  
 18 sustained.  
 19 But, Mr. Fereday, I will add that at  
 20 the end of Squires' testimony he made statements  
 21 about the ongoing network and how long it will  
 22 take to build it out and the possibility of  
 23 finding the impacts and the limitations of it.  
 24 And by doing so, it seems to me that Mr. Squires  
 25 at least alluded to the fact that the applicants

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1 would be receptive to some discussion about some  
2 limitation. And I don't think that's his place or  
3 his -- the nature of his testimony.  
4 But nonetheless, you know, the  
5 statements were made as part of direct  
6 examination. I'll sustain it, but that particular  
7 evidence I'll ignore from my perspective because  
8 he doesn't have the ability to speak to what M3  
9 would accept as part of what happens during  
10 monitoring in the future, in my opinion. So I  
11 guess there's the bright line for me.  
12 Okay, Mr. Thornton. Sustained.  
13 MR. THORNTON: Okay.  
14 Q. On -- if you could go again to the M3  
15 model. And I believe on page -- I may have the  
16 wrong page here. It's actually on figure 7-7.  
17 It's quite far into the back of the document in  
18 Exhibit No. 16.  
19 Did you have a chance to get there?  
20 A. Yes.  
21 THE HEARING OFFICER: Okay. It's Exhibit  
22 what?  
23 MR. THORNTON: It's Exhibit --  
24 THE HEARING OFFICER: 16, figure 7?  
25 MR. THORNTON: Yeah, 7-7.

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1 THE HEARING OFFICER: Well, I have found  
2 figure 7, and I found a figure 8.  
3 MR. THORNTON: It's, I think, quite a ways  
4 past -- behind figure 7.  
5 THE HEARING OFFICER: I see a figure 14,  
6 13.  
7 MR. FEREDAY: It's in the appendix, the PGG  
8 appendix portion. It's in Appendix A.  
9 THE WITNESS: There's 7-4 and 7-7.  
10 THE HEARING OFFICER: Okay. Well, I'm on  
11 the right page, I think. Anyways, there's  
12 conflicting numbering.  
13 Let's change the tape.  
14 Okay. Mr. Thornton, we are recording  
15 again.  
16 MR. THORNTON: Okay.  
17 Q. And, Mr. Squires, if you could --  
18 figure 7-7 in Exhibit 16 -- 7-10, excuse me --  
19 A. Yes.  
20 Q. -- figure 16, "A simulated drawdown in  
21 the middle aquifer after 26 years, the T-match  
22 model."  
23 In this figure 7-7, could you describe  
24 to me -- excuse me. I don't know why I'm hung up  
25 on 7-7 -- 7-10, could you describe to me what is

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1 meant by the "middle aquifer"?  
2 A. Well, again, I think your questions  
3 are going to be best served to my colleague, Mark  
4 Utting, and to our expert, Peter Schwartzman, who  
5 developed this model.  
6 Q. Okay.  
7 A. But I think I can say that we're, of  
8 course, concerned mostly with the aquifer, the  
9 Pierce Gulch Sand Aquifer that we're going to be  
10 drawing from, and that aquifer will have the most  
11 drawdown. We have suggested that there will be  
12 drawdowns in areas above the Pierce Gulch Sand  
13 Aquifer that are in hydraulic connection over the  
14 course of this water development period, and that  
15 those water levels will be attenuated.  
16 And I think what this figure shows is  
17 that there's less drawdown in an overlying aquifer  
18 than there is in the Pierce Gulch Sand Aquifer.  
19 Q. Okay. And I think you answered the  
20 question for me, is that -- this middle aquifer is  
21 above the Pierce Gulch Sand Aquifer; is that  
22 correct?  
23 A. That's correct.  
24 Q. Okay. And in the earlier testimony of  
25 Dr. Spence Woods -- I believe you were here to

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1 listen to that.  
2 A. Yes, I was.  
3 Q. I believe the Dr. Spence Woods  
4 testified that we have very little data and  
5 information on the shallower aquifers.  
6 A. I didn't actually hear him say that.  
7 MR. FEREDAY: Objection. I don't think  
8 Mr. Squires testified about that. But --  
9 MR. THORNTON: Is there a way we could play  
10 the tape back? I believe he did.  
11 THE HEARING OFFICER: No. I think you can  
12 ask the question, and have Mr. Squires respond as  
13 to what he heard or didn't hear.  
14 MR. THORNTON: Okay.  
15 THE HEARING OFFICER: Overruled.  
16 MR. THORNTON: Okay.  
17 Q. Did you hear Mr. -- excuse me,  
18 Dr. Woods testify as to the knowledge level of the  
19 shallower aquifers?  
20 A. Perhaps he did. Perhaps he testified  
21 to his own knowledge level of the shallow aquifer.  
22 I happen to believe that we have quite a bit of  
23 information about all of the aquifers. Our  
24 piercings have gone through all the aquifers. Our  
25 research has gone through all the aquifers.

1 Q. Okay.

2 A. I'm familiar with all the aquifers.

3 Q. Okay. And then I believe in your

4 testimony that you just gave you stated that for

5 the recharge to the Pierce Gulch that it is very

6 robust -- and I may be using this word

7 incorrectly, but a large portion from the Boise

8 River?

9 A. Well, I believe that all of the

10 groundwater that we have in the Boise Basin is

11 derived from the Boise River.

12 Q. Okay.

13 A. The Boise River and its tributaries

14 and the precipitation that falls in this basin.

15 Q. And do you know what segments of the

16 Boise River are likely to recharge the Pierce

17 Gulch Sand Aquifer?

18 A. I know some of them.

19 Q. And those would be?

20 A. Well, it's long been known that the

21 area between Barber Dam and Capitol Bridge area

22 have been a losing reach of the Boise River, and

23 wells drilled into that area show a decreasing

24 potential with depth, indicating downward ground

25 water flow.

1 And I believe that that area enlarges

2 during certain times of the year when the aquifer

3 is drawn upon. I believe the recharge area

4 extends at certain times of the year down below

5 Capitol Bridge. I also believe that there's

6 recharge that happens along the ephemeral streams

7 along the Boise front.

8 Q. And for the Pierce Gulch Sand Aquifer,

9 as I've heard them described, it appears to be a

10 layer, sometimes of great thickness, deposited

11 sands that have been worked down through the

12 process of reworking with the river and, you know,

13 fluvial action; is that true?

14 A. Yes, generally.

15 Q. In a general sense. At what point --

16 as I believe your testimony yesterday you

17 identified that Pierce Gulch Sand Aquifer was

18 confined.

19 So at what point does the Pierce Gulch

20 Aquifer become confined? Or maybe help me

21 understand what you mean by "confined."

22 A. Well, I would say that most of the

23 Pierce Gulch Sand Aquifer is under some degree of

24 confining conditions, because almost all of -- all

25 of the wells show water levels above the zone of

1 completion. It's less confined on the eastern

2 side, and it's a progression, a continuum, if you

3 will, of increasing confinement as you move to the

4 west.

5 So for example, in the wells that

6 we've talked about, the City of Star well, that's

7 pretty confined over there because it has

8 aboveground flowing conditions with heads in

9 40 feet aboveground where the water -- the well

10 flows without a pump in it at 1200 gallons a

11 minute. So it's clearly confined.

12 The State and Linder test well, it's

13 confined. It's less confined over on the east

14 side of Eagle in the vicinity of Lexington Hills,

15 where the Lexington Hills test showed that there

16 was positive boundaries that were present in the

17 drawdown data that would tell you it's less

18 confined.

19 Q. And so when you're saying "confined,"

20 that's not only at the basement of the aquifer,

21 but at the upper -- the top part of the aquifer;

22 is that correct?

23 A. Well, for example, if we refer back to

24 the green line, the proverbial green line, which

25 is a descriptor that I don't care for too much,

1 but we've shown through our cross-sections that

2 the Pierce Gulch Sand Aquifer becomes unconfined

3 at the upper reaches of the M3 property. It's

4 under atmospheric conditions. It's a water table

5 aquifer at that location.

6 And that's very analogous to the

7 Pierce Gulch Sand Aquifer in the east part of

8 Eagle. It's the same kind of condition. So I

9 believe that it comes up and it does -- it is

10 unconfined in its upper part.

11 Q. And so is there a point or a reach of

12 the Boise River when it flows out westward that

13 would likely not contribute to the Pierce Gulch

14 Sand Aquifer?

15 A. Well, I think there's various levels

16 of contribution. We know that underneath all of

17 Eagle there's an upward groundwater gradient.

18 That means that there's -- that the river is

19 getting water, even from below, everywhere along

20 its reach at some level.

21 There is also an area of the Pierce

22 Gulch sand, and it's -- one thing that hasn't been

23 pointed out is that we tend, when we look at the

24 green line, to say, "Okay. This thing is a

25 straight line."

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1 But I think Dr. Wood testified that  
2 this is a depositional dip that represents the  
3 base of a lake, and it represents a shoreline of a  
4 lake. And that shoreline is irregular. And so  
5 it's not a straight line. It wanders around. On  
6 the south side of the plain, the dip is toward the  
7 basin. And I believe that we can show that the  
8 Pierce Gulch Sand Aquifer extends and is -- the  
9 same signatures are present over there that shows  
10 that the dip from the Owyhees is toward the center  
11 of the plain.  
12 So where the Pierce Gulch Sand Aquifer  
13 comes up dip, at some point it does come up and  
14 does encounter the river. It does encounter at  
15 least the gravels of the river at some location.  
16 Where that exactly is, I don't know.  
17 Q. Did I hear you say earlier that you  
18 believe a large source is somewhere above the  
19 Capitol Bridge, though?  
20 A. I think that's certainly an identified  
21 losing reach of the Boise River. But I did not  
22 say that that is recharging into the Pierce Gulch  
23 Sand Aquifer, because it's not.  
24 Q. So that portion isn't -- above the  
25 Capitol Bridge or that area isn't going into the

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1 Pierce Gulch Sand Aquifer?  
2 A. Not directly, in my opinion.  
3 Q. Okay. And I -- that's what I thought  
4 I heard.  
5 So where in the reach of the Boise  
6 River do you believe recharges the Pierce Gulch  
7 Sand Aquifer?  
8 A. Well, I said I don't have that  
9 identified. I think I said previously in my  
10 testimony that if you use -- if you project the  
11 base of the lake, the top of the mudstone, as we  
12 did on the M3 property, it might be somewhere in  
13 the -- specifically in the vicinity of the  
14 take-out of the Farmers Union Canal, perhaps, or a  
15 few miles above the Swift well, United Water Idaho  
16 Swift well.  
17 Q. Okay.  
18 A. But I don't know that with certainty.  
19 Q. Okay. And where does the Farmers  
20 Union -- I'm not actually sure where the Farmers  
21 Union comes out.  
22 A. It's near Veterans' Park on the Boise  
23 River.  
24 Q. Near Veterans' Park. Okay. And if  
25 you could, again, in Exhibit 16, turn to page 50.

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1 And it would be identified as figure 6, "Domain of  
2 the M3 model."  
3 A. Yes.  
4 MR. THORNTON: Okay. We'll wait until  
5 Mr. Spackman is able to get to that.  
6 THE HEARING OFFICER: You're in 16?  
7 MR. THORNTON: Yeah.  
8 THE HEARING OFFICER: Page --  
9 MR. THORNTON: Exhibit 16, page --  
10 MR. FEREDAY: 50.  
11 MR. THORNTON: -- 50.  
12 THE HEARING OFFICER: Apparently,  
13 there's --  
14 MR. THORNTON: Figure 6. I have page 50.  
15 THE HEARING OFFICER: Okay. I think I'm  
16 there. Again, I'm looking at two separate  
17 paginations within the same. I have another  
18 portion of this that just says "M3 Eagle  
19 groundwater flow model and analysis of pumping  
20 effects, first year progress report." About  
21 midway through it starts repaginating again, so  
22 this is the first portion of that report, page 50.  
23 MR. THORNTON: Okay.  
24 THE WITNESS: That's correct, Mr. Hearing  
25 Officer. The report is in two parts. One is the

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1 actual model construction in PGG portion, the  
2 numerical portion, and then HLI has an overview  
3 report that is over the top of it that discusses  
4 the other models.  
5 THE HEARING OFFICER: Okay.  
6 Q. (BY MR. THORNTON): Then, Mr. Squires,  
7 on figure 6 on page 50, in your opinion, this  
8 accurately reflects the domain of the M3 model?  
9 A. Yes.  
10 Q. Okay. And the Pierce Gulch sands,  
11 as -- I guess I'll ask you. The Pierce Gulch  
12 sands, did you hear Dr. Wood describe the location  
13 of the Pierce Gulch sands, kind of spatially where  
14 they could be?  
15 A. Yes.  
16 Q. Okay. And is that not -- would you  
17 agree that that's partially on the Boise front, at  
18 least, I think it was the west portion of the  
19 Boise front?  
20 A. Well, I think he described that they  
21 were on the foothills, in the western Boise  
22 foothills, and that they were present in the south  
23 and across the Snake River over to the Payette  
24 Valley, and all the way across the Treasure  
25 Valley.

1 Q. Okay. All right. And then on this  
2 domain in the model, I believe I also heard you  
3 say that -- in your testimony just provided a  
4 little while ago that, in your opinion, water is  
5 flowing from the -- in the Pierce Gulch Sand  
6 Aquifer towards the Payette River?  
7 A. In part, yes.  
8 Q. In part. And I think I also heard you  
9 say that some is likely to flow towards the Boise  
10 River as well as the Snake River?  
11 A. That's correct.  
12 Q. Okay. All right. And do you have  
13 information or data to show how much is going to  
14 the Boise, to the Snake, to the Payette?  
15 A. No, I haven't done that.  
16 Q. Okay. And on this model domain here,  
17 could you describe why it is -- why the -- why it  
18 is chosen the eastern boundary, which roughly  
19 appears to be Cole Road? I could be incorrect  
20 there, but Cole Road.  
21 A. Why that --  
22 Q. Why the eastern extent of that was  
23 chosen.  
24 A. Well, because we -- and again, I --  
25 you know you're asking me questions about

1 something that I don't consider myself an expert  
2 on. I may not be the most qualified person to  
3 discuss why the modelers chose that.  
4 Q. Okay.  
5 A. But I think it's because we had good  
6 data coverage over that far. And I do know that  
7 the Pierce Gulch -- or that the Cole Road area is  
8 significant in our research because that is one  
9 area where we change from a decreasing potential  
10 with depth to an increasing potential with depth.  
11 There's actually no change in potential in that  
12 area. So that may have something to do with it.  
13 It's certainly far enough away from  
14 our area of interest that the effects that the  
15 model simulated -- I believe the way the modelers  
16 came up with this thing is they simulated various  
17 distances in a sensitivity analysis that  
18 determined if moving it any farther away or any  
19 closer would make any difference to the model.  
20 And I think that's how the boundary was chosen.  
21 At this location, moving it any  
22 farther away made no difference to the model. And  
23 hydrogeologically, it makes sense to me.  
24 Q. And I guess, what are your thoughts in  
25 terms of developing a model where I believe I

1 heard you say you're not sure of where the  
2 recharge is or the discharge is in terms of  
3 building a model.  
4 Doesn't that imply there's a fair  
5 amount of uncertainty, when you don't know where  
6 it's coming in or going out?  
7 A. I don't believe that it's M3's job --  
8 or I haven't been hired by M3 to try and determine  
9 where the precise recharge is to a regional  
10 aquifer, or the discharge from the regional  
11 aquifer.  
12 I think that our research shows that  
13 recharge does exist, and that it's a very strong  
14 and robust recharge that appears not to be  
15 changing -- or not to be causing any water-level  
16 declines after an increased pumping over many  
17 decades.  
18 So I'm concerned with the fact that it  
19 is recharged, and I have not studied for M3 the  
20 precise mechanisms of recharge beyond what I've  
21 told you about that in my --  
22 Q. Okay. Are you aware of anyone else  
23 that has more specific data on location or amounts  
24 of recharge and discharge? Is that data  
25 available, to your knowledge?

1 A. Not to my knowledge. I think the  
2 Treasure Valley Hydrologic Project made some  
3 estimates, and to a certain extent we used -- we  
4 used many of their estimates and figures because  
5 it was acceptable at the Department.  
6 Q. Okay. Earlier today did you hear  
7 Dr. Woods provide testimony in terms of the  
8 communication between the shallower aquifer and  
9 the deeper regional or Pierce Gulch Aquifer?  
10 A. I was here for his testimony, yes.  
11 Q. Okay. Did you hear Dr. Woods talk to  
12 that, in fact, those recharge in his professional  
13 opinion is a mixture of sources from Boise River  
14 to irrigation canals to irrigation and the side  
15 tributaries coming off the various places?  
16 A. I believe he did, and I believe I just  
17 did as well.  
18 Q. Okay. So could you help me understand  
19 where yesterday in your testimony I believe you  
20 said it was a confined aquifer, so as not to  
21 confine all the way.  
22 Is it true that the two aquifers  
23 communicate?  
24 MR. FEREDAY: Objection. I don't think the  
25 question made clear what two aquifers are being

1 referred to. But if that can be clarified.  
 2 THE HEARING OFFICER: Mr. Thornton?  
 3 MR. THORNTON: I will clarify that.  
 4 THE HEARING OFFICER: Okay.  
 5 Q. (BY MR. THORNTON): Is there a  
 6 communication between the shallower aquifers and  
 7 the deeper regional Pierce Gulch Aquifer?  
 8 A. Well, as I indicated, I think that the  
 9 level of communication increases as you move  
 10 toward the mountain front to the east where the  
 11 aquifer rises to the surface and to where it  
 12 becomes more unconfined. I would say yeah, in  
 13 those areas the communication is more, is greater,  
 14 and in other areas where the aquifer is deeper, it  
 15 has overlying and more low permeability sediments  
 16 overlying it, it's less hydraulically connected.  
 17 Q. Less but still connected?  
 18 A. In some degree, yes.  
 19 Q. Okay. In your earlier testimony I  
 20 believe you stated that you believe that it is a  
 21 misnomer that wells have gone dry in the Treasure  
 22 Valley?  
 23 A. Generally speaking, I believe that's  
 24 true.  
 25 Q. Okay. And what do you mean by

1 "generally speaking"?  
 2 A. Well, you know, I can think of one or  
 3 two wells in my career, especially in the  
 4 southeast Boise, the Boise Fan Aquifer, where the  
 5 water level in the well actually did lower below a  
 6 reach of a well.  
 7 But in this area I can't conceive of  
 8 that happening. I don't believe it has happened.  
 9 And I don't believe there's any evidence in  
 10 existence that would prove that it has happened.  
 11 Q. Okay. And have you ever yourself made  
 12 a concerted effort to look at the Department of  
 13 Water Resources' website where you can look at  
 14 requests to -- and the data for redrilling wells  
 15 either deeper -- have you ever made an effort to  
 16 look at that and investigate that rather robust  
 17 data set?  
 18 A. I have investigated the entire data  
 19 set thoroughly.  
 20 Q. And have you followed up, and at those  
 21 wells have you gone out and investigated any of  
 22 those wells to determine, did they go dry or was  
 23 it a pump problem, was it a well problem?  
 24 A. I have.  
 25 Q. And could you tell me which wells

1 those were?  
 2 A. I can think of a few. The Fiorino  
 3 wells near the M3 property. The Keulman wells  
 4 near the M3 property. Both of those individuals  
 5 have had to drill a second well because their  
 6 first well supposedly went through, and it didn't  
 7 go well. There was still water in the well. It  
 8 was just a poorly constructed well that wouldn't  
 9 allow water to come in.  
 10 Q. And then for those two or three wells,  
 11 or four, maybe there's five wells you mentioned  
 12 there --  
 13 A. I think there's a lot more that have  
 14 supposedly gone dry that did not go dry.  
 15 Q. And have you investigated any of those  
 16 others, other than the ones you just mentioned?  
 17 A. I think there have been some others.  
 18 But generally what happens is those wells when  
 19 they get replaced, the existing wells are supposed  
 20 to be abandoned. In most cases they get  
 21 abandoned. In fact, they're required to be  
 22 abandoned before the driller leaves the site so  
 23 that those wells are not available for  
 24 measurement.  
 25 Q. If we could go to -- and I've got to

1 find it myself -- the IDWR staff memorandum  
 2 report, which is Exhibit --  
 3 THE HEARING OFFICER: I think it's No. 50,  
 4 as I recall.  
 5 MR. THORNTON: 50?  
 6 THE HEARING OFFICER: Is that correct?  
 7 THE WITNESS: Are these yours?  
 8 THE HEARING OFFICER: No. Well, maybe they  
 9 are.  
 10 THE WITNESS: 50. I've got it.  
 11 Q. (BY MR. THORNTON): Do you have  
 12 Exhibit 50 in front of you, Mr. Squires?  
 13 A. I do.  
 14 Q. And are you familiar with the  
 15 Department of Water Resources staff memorandum  
 16 review of all the data?  
 17 A. I am, yes.  
 18 Q. Okay. Could you tell me what your  
 19 professional opinion is on overall water-level  
 20 stability, both at the deeper aquifers and the  
 21 shallower aquifers in the Treasure Valley area,  
 22 particularly north of Eagle -- or excuse me, north  
 23 of the river in the Eagle vicinity.  
 24 A. Well, I would be glad to comment on  
 25 the measurements in the Pierce Gulch Sand Aquifer

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1 with respect to this proceeding and proposed water  
2 right application. I find that the water levels  
3 are stable --  
4 Q. Okay.  
5 A. -- if not increasing in recent years.  
6 Q. Okay. And could you help me  
7 understand why you believe -- what would be the  
8 cause of them increasing?  
9 A. I'm not sure.  
10 Q. Is there more irrigation going on to  
11 supplement the source of that water?  
12 A. I'm not sure.  
13 Q. Is it a -- do you believe that the  
14 irrigation in the Valley is declining, spatial  
15 amount?  
16 A. I do, yes.  
17 Q. What about for the shallower aquifer  
18 system, do you believe that that is steady as  
19 well, increasing, declining?  
20 A. I don't know.  
21 Q. Okay. And then if you could turn to  
22 Appendix A on Exhibit 50.  
23 And, Mr. Hearing Officer, I'm not sure  
24 of the process to make sure a document is --  
25 exhibit is -- well, I guess this has been

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1 stipulated that it is as part of an exhibit.  
2 THE HEARING OFFICER: It's in.  
3 Q. (BY MR. THORNTON): So on Appendix A,  
4 the memo from Mike McVay, have you looked over the  
5 information that he's provided?  
6 A. I have.  
7 Q. And could you give me information --  
8 are you in agreement with his findings, that the  
9 water levels are declining I think in all but  
10 maybe one of these wells that they investigated?  
11 A. I think his graphs indicate that water  
12 levels are declining.  
13 Q. So do you believe that they are  
14 declining?  
15 A. No.  
16 Q. Or are these graphs depicted  
17 correctly, in your opinion?  
18 A. No.  
19 Q. Could you help me understand why that  
20 is not the case?  
21 A. Well, I presume that you're speaking  
22 of the Pierce Gulch Sand Aquifer that's the  
23 discussion of this?  
24 Q. No, just in any water table. These, I  
25 think, are in a variety of depths, some, probably

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1 not many, in the Pierce Gulch. And I'm kind of  
2 testifying. I apologize to that.  
3 But I would say that -- and I think it  
4 is. Let me -- actually, let me hold on. I do  
5 believe they've identified what depth they were  
6 at. And maybe not.  
7 Yeah, I do believe on page 2 in  
8 Appendix A, on table 1 that it, I believe,  
9 attempts to identify underneath the column  
10 "Geology," "Identification, undifferentiated,  
11 Pierce Gulch, Terteling, shallow, unknown, or  
12 Pierce Gulch."  
13 Can you see what I'm talking about?  
14 A. Yes.  
15 Q. Okay. So if we can just as an example  
16 go to -- and unfortunately, there's not a page  
17 number, but it's well number -- I guess it's  
18 about -- from table 1, you probably have to go  
19 about five pages or so back.  
20 And as an example -- and this is a  
21 well, the last numonics (sic) on it are 32DBD1, 32  
22 delta bravo delta 1.  
23 A. I see that graph.  
24 Q. Okay.  
25 THE HEARING OFFICER: Let me find it.

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1 Okay. Probably what you're referring to is a  
2 descriptor convention that I think is followed by  
3 the U.S. Geological Survey, and it's a mixture of  
4 letters and alpha characters and Arabic numbers.  
5 MR. THORNTON: Yeah. Okay.  
6 THE HEARING OFFICER: Okay. And what are  
7 the last?  
8 MR. THORNTON: The last numatics (sic) are  
9 32 delta bravo delta 1, DBD1.  
10 MR. JASON SMITH: On our deal, it's right  
11 before Appendix B.  
12 MR. THORNTON: That would have been much  
13 easier for me to say that. Thank you.  
14 THE HEARING OFFICER: It's the last of the  
15 graphs.  
16 MR. THORNTON: The last one. I'm sorry.  
17 THE HEARING OFFICER: I found it.  
18 MR. THORNTON: So do we all have that in  
19 front of us, I believe?  
20 THE HEARING OFFICER: I have it.  
21 MR. THORNTON: Do you have it?  
22 THE HEARING OFFICER: Yeah.  
23 Q. (BY MR. THORNTON): Mr. Squires, do  
24 you have that in front of you too?  
25 A. I do.

1 Q. Okay. And for that graph, do you  
2 see -- would you agree that the line -- you may  
3 not agree with the line that's drawn, but the line  
4 that's depicted there, the linear equation for  
5 that line shows a decline in water table from 1996  
6 to 2008?

7 A. And the question is, sir?

8 Q. Do you see that as a declining --  
9 representing a decline in the water table?

10 A. Based on the plotted data points, yes.

11 Q. Okay. And if you go back to page 2, I  
12 believe that is a well that's identified as  
13 being -- at least in this report identifies it as  
14 being in the Pierce Gulch Aquifer where it says  
15 "PG" in the geology?

16 A. That's what the table says, yes.

17 Q. Okay. So could you help me understand  
18 why this -- or so do you agree that there's a  
19 declining water table represented in this graph?

20 A. I believe that there's one represented  
21 in this graph.

22 Q. Okay. And so do you agree with the  
23 findings of IDWR for this particular well, that it  
24 is a declining trend?

25 A. Well, I can't see the supporting data

1 for this -- that this graph is based upon. It's  
2 not included in this memorandum, so I can't really  
3 comment on that, although we did look at this well  
4 in our own analysis. And I could refer to that in  
5 this documentation. And I could answer it better,  
6 if you'd like me to.

7 Q. Oh, yeah. That would be great, if you  
8 can.

9 A. What exhibit is the response to the  
10 staff technical memorandum?

11 MR. FEREDAY: I believe that's Exhibit 45.

12 MR. JASON SMITH: 45.

13 THE HEARING OFFICER: 45.

14 THE WITNESS: Okay.

15 Q. (BY MR. THORNTON): And the exhibit  
16 you're referring to, Mr. Squires? I'm not --

17 A. It's Exhibit 45.

18 Q. Okay.

19 A. Just bear with me a second, please.

20 Q. No, I appreciate doing it.

21 MR. THORNTON: I think, Mr. Smith, he's  
22 looking for the figure right now.

23 THE WITNESS: Yeah, the figure that I'm  
24 going to refer to in our analysis is Exhibit 45,  
25 and I believe it's figure 23, 36ABB1, which is the

1 equivalent -- yeah, that's the equivalent figure.

2 Q. (BY MR. THORNTON): Okay. We're just  
3 looking, getting that.

4 A. Yeah.

5 Q. And I'm sorry. I didn't get all that.

6 Is that roughly where in the document?

7 Is it way in the back or --

8 A. It is toward the back. It's  
9 figure 23.

10 Q. Figure 23. So it's maybe way, way  
11 back.

12 MR. FEREDAY: Mr. Hearing Officer, if I  
13 might interpose an objection here in aid of  
14 helping move this along.

15 THE HEARING OFFICER: Okay.

16 MR. FEREDAY: Maybe a question in aid of an  
17 objection.

18 THE HEARING OFFICER: Okay.

19

20 VOIR DIRE EXAMINATION

21 BY MR. FEREDAY:

22 Q. Mr. Squires, if you could refer to  
23 table 1 in Exhibit 45.

24 A. Yes.

25 MR. THORNTON: Table 1, 45?

1 Q. (BY MR. FEREDAY): And nearly halfway  
2 down or about halfway down through the list is  
3 32DBD1 --

4 A. Yes.

5 Q. -- named Killerman?

6 A. Yes.

7 Q. Perhaps referring to that will help  
8 you respond to Mr. Thornton.

9 MR. THORNTON: I'm sorry. Is that a page  
10 number or -- I'm just trying to catch up with it.

11 We've got it here. Okay.

12 THE HEARING OFFICER: So this is a table  
13 within the text of the exhibit?

14 MR. FEREDAY: It's a table after the  
15 divider --

16 THE HEARING OFFICER: Okay.

17 MR. FEREDAY: -- after page 42.

18 THE HEARING OFFICER: And what table is it?

19 MR. FEREDAY: Table 1.

20 THE HEARING OFFICER: 1. All right. I  
21 have that. And you say it's a question in aid of  
22 objection, Mr. Fereday?

23 MR. FEREDAY: Yes. My objection is based  
24 on the fact that Mr. Thornton has not identified  
25 the subject matter of his question with enough

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1 particularity for Mr. Squires to respond. And  
2 that's why I'm interposing my objection at this  
3 point, and also suggesting maybe a solution.  
4 THE WITNESS: Could --  
5 THE HEARING OFFICER: Okay. Well, let me  
6 respond to the objection. Mr. Thornton asked  
7 Mr. Squires about a particular graph, referred to  
8 data and that was plotted for an identified well.  
9 Mr. Squires said, as I recall, that he  
10 could not comment on the -- on the accuracy or  
11 veracity of what was there because he didn't have  
12 the data, but there was a place that he could find  
13 that information.  
14 Mr. Thornton (sic) asked if he could  
15 go there. Mr. Thornton said fine, and that's what  
16 Mr. Squires is attempting to do in response to  
17 Mr. Thornton's acquiescence to allow him to do it.  
18 So I think there is a question  
19 pending. And whatever source of information  
20 Mr. Squires wants to go to is fine with me. So  
21 overruled.  
22 THE WITNESS: Okay.  
23 THE HEARING OFFICER: I mean if this is  
24 helpful, that's fine.  
25 THE WITNESS: Okay. Well, thank you,

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1 Hearing Officer.  
2 I would refer to -- I think I could  
3 answer your question --  
4  
5 FURTHER CROSS-EXAMINATION  
6 BY MR. THORNTON:  
7 Q. Okay. Good.  
8 A. -- very well in Exhibit 45, figure 8.  
9 Q. Okay. Just a second.  
10 THE HEARING OFFICER: Figure 8.  
11 Q. (BY MR. THORNTON): Is that near the  
12 back or front?  
13 A. That's -- looks like maybe about  
14 midway.  
15 Q. Midway.  
16 MR. JASON SMITH: Is that supposed to be  
17 the same one?  
18 THE WITNESS: Well, it's just one of the  
19 wells. And I think there's enough data here that  
20 I can respond to Mr. Thornton's question about the  
21 adequacy of the data and the wells.  
22 Q. (BY MR. THORNTON): And this is  
23 figure 8; correct?  
24 A. This is figure 8 for well No. 3DAD1.  
25 Q. So this is a different well than the

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1 graph, is that right, that I --  
2 A. Well, it's one of the graphs in  
3 Appendix A, one of many.  
4 Q. Okay. Do you have the one for the  
5 well that I had brought up, by chance, perhaps  
6 another graph of the well that I had identified?  
7 A. Well, you asked me about my  
8 observations from my analysis compared to the  
9 McVay analysis. And this is a better example.  
10 THE HEARING OFFICER: Well, I thought the  
11 question was specific to this particular depicted  
12 graph, Mr. Squires.  
13 THE WITNESS: Okay.  
14 THE HEARING OFFICER: You were unable to  
15 respond because you didn't have the underlying  
16 data for this graph, but you had data that you  
17 could refer to for this graph. Now we're going to  
18 a different well.  
19 THE WITNESS: Well --  
20 THE HEARING OFFICER: I think that's a  
21 different -- I think that's a different question.  
22 THE WITNESS: Okay. Well -- okay.  
23 THE HEARING OFFICER: So, Mr. Thornton, if  
24 you want him to expound based on some other  
25 information he has, that's fine. You're in

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1 control of your cross-examination.  
2 MR. THORNTON: Thank you. I got more  
3 control here than I do of my four teenage boys,  
4 but -- and I'm fine with an explanation on this  
5 one.  
6  
7 Q. I'd like an explanation on the other  
8 one. And one of the main reasons I've selected  
9 that one, that one is -- we believe is very close  
10 to a lot of protestants' wells.  
11 A. Oh, okay.  
12 Q. So you can sure expound on this one,  
13 but I'd like you, if you have data, to talk about  
14 the first one.  
15 A. Perhaps I could start out with an  
16 explanation, and then at that time if you could  
17 remind me, I'm mixed up in the numbers now.  
18 Q. Well, I am too. Okay.  
19 A. But I'll come back to your specific  
20 question.  
21 Is that all right with the Hearing  
22 Officer?  
23 THE HEARING OFFICER: It's his  
24 cross-examination.  
25 MR. THORNTON: I'm fine. I'm fine with

1 that.  
 2 THE HEARING OFFICER: Okay.  
 3 THE WITNESS: So if you would go to  
 4 figure 8 of Exhibit 45. And this is a well that  
 5 is not actually in the Pierce Gulch Sand Aquifer,  
 6 and I'm not exactly sure if --  
 7 THE HEARING OFFICER: I'll tell you what.  
 8 Let's take another ten-minute break here, and  
 9 let's resolve where we're headed with this  
 10 question --  
 11 MR. THORNTON: Okay.  
 12 THE HEARING OFFICER: -- because I think  
 13 Mr. Squires is trying to find what he's looking  
 14 for. Maybe you can reconcile that together.  
 15 MR. THORNTON: Okay.  
 16 THE HEARING OFFICER: Let's take ten  
 17 minutes.  
 18 (Recess.)  
 19 THE HEARING OFFICER: Okay. We are  
 20 recording.  
 21 How late do we want to go tonight?  
 22 MR. FEREDAY: 5:00.  
 23 THE WITNESS: 5:00.  
 24 THE HEARING OFFICER: Do you want to shoot  
 25 for 5:00?

1 MR. THORNTON: No later than 5:00 would be  
 2 great for the weekend.  
 3 MR. JASON SMITH: 4:00.  
 4 THE HEARING OFFICER: You know, if we went  
 5 until 7:00 or 8:00, we might be able to cut a day  
 6 off.  
 7 MR. FEREDAY: Yeah.  
 8 THE WITNESS: I agree.  
 9 MR. JASON SMITH: Slave driver. Slave  
 10 driver.  
 11 MR. ALAN SMITH: Three days is too much,  
 12 besides they don't pay you enough.  
 13 THE HEARING OFFICER: I was just trying to  
 14 see how much constitution there was in this room.  
 15 MR. THORNTON: Not on Friday. Monday is a  
 16 better chance.  
 17 MR. JASON SMITH: We can't agree on much,  
 18 but I think we're going to agree on that.  
 19 THE HEARING OFFICER: All right. Okay.  
 20 Let's go at it again.  
 21 Mr. Thornton.  
 22 Q. (BY MR. THORNTON): Mr. Squires, I had  
 23 previously asked a question for you to describe  
 24 what is depicted on a well log in Exhibit 50 in  
 25 the Appendix A, the last well log graph that ends

1 in 32DBD1.  
 2 And if you can do that with -- I think  
 3 you did -- M3 did an assessment of IDWR's report;  
 4 is that correct?  
 5 A. That is correct.  
 6 Q. And if you could describe what your  
 7 thoughts are in terms of that accurately  
 8 portraying a drawdown. And if you would like to  
 9 describe another well, that would be fine with me.  
 10 A. Okay. Thank you.  
 11 Well, I'm oriented now.  
 12 Q. Okay.  
 13 A. I got lost in the DBABCDs.  
 14 Q. I didn't have my GPS either.  
 15 A. But with your permission, I will start  
 16 with some wells that I'm quite familiar with --  
 17 Q. Okay.  
 18 A. -- that I think will help describe,  
 19 and then I will go over and speak directly to the  
 20 well that you've asked about, because I understand  
 21 that's a well that's very near the protestants'  
 22 wells.  
 23 Q. Yeah, we believe it to be.  
 24 A. Yeah. And we did analyze all --  
 25 reanalyze all the wells in Exhibit A of the staff

1 memo.  
 2 Pardon my voice. I'll try to speak a  
 3 little louder.  
 4 And we find that probably only one, if  
 5 any, of those wells is actually in the PGSA. And  
 6 indeed, we find that many of those wells are in --  
 7 wells that are distinctly separate from the PGSA,  
 8 in geothermal -- low temperature geothermal wells  
 9 and other aquifers that are not related to the  
 10 PGSA.  
 11 But to answer your question, I would  
 12 draw your attention again to Exhibit 45, figure 8,  
 13 which is HLI's response to the staff memo.  
 14 Q. If I could ask a clarifying question.  
 15 For this well on figure 8, is that one of the  
 16 wells -- it appears to be the first well in  
 17 table 1 of Exhibit 50 that's located on page 2?  
 18 A. That's correct.  
 19 Q. Okay.  
 20 A. That's correct.  
 21 Q. Okay. Thank you.  
 22 A. And this -- in the lower part of this  
 23 diagram is the graph from the staff memo, in the  
 24 lower -- there's two graphs on this page, and both  
 25 of them are graphs from the Department.

1 The lower -- the lower graph is the  
2 graph from Appendix A of the staff memo. And the  
3 overlying hydrograph is from the Department's  
4 water-level monitoring database for the same well.  
5 Okay? And I happen to be familiar with this well.  
6 I've worked on this well, so I'm familiar with it,  
7 so it will help me to answer your question.

8 Q. Okay.

9 A. And in the lower graph, the graph of  
10 the Appendix A, it's -- as you pointed out in the  
11 previous graph, there appears to be shown a  
12 decline in this well.

13 And I submit that in the last -- well,  
14 since 2001, or perhaps even somewhat before that,  
15 the water levels in this well are actually  
16 increasing. And I think that the methods that  
17 were used to analyze this data were incorrectly  
18 selected, and I think that they portray a  
19 situation that's not really happening.

20 I think what you could say looking --  
21 because this lower graph is made from 12 data --  
22 12 selected data points. The graph that is over  
23 the top of it is a graph of 582 water levels.  
24 Okay? And I think looking at the -- what we  
25 typically do when we analyze a hydrograph is the

1 first thing we do is we look at all of the data.  
2 We don't select individual points off of a data  
3 set without first looking at all of the data.

4 And as I look at the overlying graph,  
5 the Department's water-level monitoring network  
6 graph, I see several things in that graph. I see  
7 a period before approximately 1993 that looked to  
8 me as though it had a declining trend, a  
9 predictable declining trend, steady. Okay?

10 Q. And then did you --

11 A. That's from 1989, approximately, until  
12 1992.

13 Q. Okay.

14 A. Do you see that annual fluctuation  
15 that we spoke about earlier?

16 And then in 1992, or somewhere  
17 thereabouts, all of a sudden there's an  
18 approximate 4-foot downward shift, an immediate  
19 and abrupt downward shift in the data somewhere in  
20 the vicinity of 1992. And I suggest that that's  
21 some kind of measurement error or data -- you  
22 know, data -- datum shift.

23 Q. Anomaly or --

24 A. Yeah. But then after that shift, the  
25 annual fluctuation and the downward declining

1 trend continued arguably up until about 1996. And  
2 it looks like -- just looking at it, and that's  
3 all I'm asking you to do, because that's what we  
4 would do, is I'm willing to concede that maybe  
5 from 1989 to 1996, perhaps, that that well -- the  
6 water level and the annual fluctuation, both the  
7 recovery level and the drawdown level in that well  
8 was declining at a similar rate. Okay?

9 Then in 1996 it looks like the rate  
10 attenuated, and it's now drawing down from 1996 to  
11 perhaps 2002 at a lesser rate. Now the tops and  
12 the bottoms are still declining, but they're  
13 declining at a lesser rate than they were in the  
14 previous ten years. Okay?

15 Then beginning in about 2001 and  
16 continuing up to approximately 2008 -- no, perhaps  
17 the last seven years -- one, two, three, four,  
18 five, six, seven. For the last seven years by  
19 just looking at the data and looking at the tops,  
20 the full recovery and the drawdown, I would say  
21 that the water level on visual inspection is  
22 increasing.

23 And so the first thing I would do is I  
24 would look at all the data. And I think the  
25 conclusions that you could make from this graph

1 are that since 1989 to 2009, the water level in  
2 this well is lower than it was in 1989 by  
3 approximately -- well, let's just call it 7 feet,  
4 approximately.

5 I think that you could say that the  
6 water level in the well was declining steadily  
7 from 1989 to approximately the year 2000. And I  
8 think that you could say since 2001 the water  
9 level's been increasing.

10 So I suggest that there are different  
11 periods in this well, an early -- an early  
12 declining trend, a middle declining trend, and a  
13 later recovery trend. So the object apparently of  
14 this exercise in Exhibit A was to determine  
15 whether or not the wells in the PGSA or the water  
16 levels in the PGSA were in permanent decline,  
17 i.e., a mining situation where it was suggested  
18 that recharge rates were lagging behind -- or  
19 discharge rates for the aquifer.

20 So what we would do with this data is  
21 we would visually look at it and separate out  
22 various intervals that we would draw regression  
23 curves through to try and determine what was going  
24 on, or at the very least we would do a regression  
25 curve of all the availability data, because that's

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1 going to be the most accurate portrayal as a first  
2 cut.  
3 But then if you're really interested  
4 in what's happening in the aquifer in the last  
5 seven years, and it appears to be on an  
6 inclining -- an increasing trend, we would do a  
7 regression analysis of the last seven years,  
8 definitely. And we did that.  
9 And that would be later on in that  
10 same document, looking for --  
11 Q. And this is going to the same well  
12 that we've been describing?  
13 A. Yes, DAD1. Just bear with me a  
14 second --  
15 Q. Okay.  
16 A. -- because I've got a lot of markers  
17 here. And anyone that can help me race to it  
18 faster than I can't --  
19 MR. LAWRENCE: I believe that's figure 14.  
20 THE WITNESS: Figure 14. Yes.  
21 So here is the HLI analysis of those  
22 periods that I just singled out.  
23 Is that apparent on figure 14, well  
24 3DAD1?  
25 Q. (BY MR. THORNTON): Yes.

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1 A. And so there's the regression analysis  
2 of the various periods, periodicity of the  
3 measurements, of the 582 measurements in this  
4 well. And I think you'll see notated here that  
5 since 2001 to 2008 the regression line clearly  
6 shows a positive slope and a positive increase in  
7 water levels. Okay?  
8 Now, another thing that we would do as  
9 a course of our analysis is that we would look at  
10 the well. Now, this well is a well that is not --  
11 definitely not completed in the Pierce Gulch Sand  
12 Aquifer.  
13 Q. And could you -- excuse me for  
14 interrupting. Could you let me know the general  
15 location of the well?  
16 A. Yes. This well is located at the  
17 mouth of Seaman's Gulch near the Seaman's Gulch  
18 Landfill. And it belongs to my client, the  
19 Terteling Company. And I've worked on this well.  
20 I've pumped this well. I've taken water levels on  
21 this well.  
22 And to me it's a well that's  
23 completely unsuitable for monitoring. It should  
24 not be used for monitoring. I don't really think  
25 it tells a story about anything. It's a well that

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1 was drilled in the past, if memory serves me,  
2 maybe it's even written here somewhere, but I  
3 think the well is quite old.  
4 But it was drilled for development  
5 purposes. And it was a failed well because it  
6 failed to produce any water. But it was never  
7 abandoned and it was left here, and I suggest that  
8 that's really why it was monitored because it was  
9 a vacant well that was available for monitoring.  
10 But it's completed in the mudstone of  
11 the Terteling Springs formation, although there is  
12 an overlying 3-foot saturated level of gravel that  
13 overlies the mudstone that is fed by a nearby  
14 spring that's probably a couple hundred feet away.  
15 And so I don't think that it is a good  
16 representation of something that would help  
17 determine whether the water level is declining or  
18 falling in the Pierce Gulch Sand Aquifer. And I  
19 wouldn't even find that it would be a good  
20 representation of a well to measure the Terteling  
21 Springs formation, quite frankly.  
22 Q. And do you know the approximate depth  
23 of that well?  
24 A. I do. And we can find that on table 1  
25 that you pointed out, the DAD1. The well opening

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1 depth is 100 to 140. It's completed in the  
2 Terteling Springs formation. We used 549 data  
3 points for the analysis.  
4 Q. And this is, I'm sorry, table 1 of --  
5 A. Of figure -- of Appendix 40 -- of --  
6 MR. FEREDAY: Exhibit.  
7 THE WITNESS: -- Exhibit 45.  
8 Is that correct?  
9 MR. FEREDAY: Yes.  
10 THE WITNESS: Yeah, Terteling No. 2.  
11 Q. (BY MR. THORNTON): And table 1  
12 generally is located front, back of that document?  
13 We're just trying to find it.  
14 A. It is. Well, the tables immediately  
15 follow the text approximately halfway through.  
16 Q. Okay. I think we've just -- okay.  
17 Thank you. All right.  
18 A. So we find that this well is not in  
19 the PGSA, that it's not a suitable well for  
20 monitoring, and the water levels are not declining  
21 based on our experience and analysis of all the  
22 available data in the IDWR database. Okay?  
23 Now, if we could go a step farther and  
24 turn back to figure 21 of Exhibit 45, it's -- oh,  
25 it's seven or eight pages beyond the previous

1 plot.  
 2 Q. Okay. And I'm sorry, this one is  
 3 depicting a different well; correct?  
 4 A. Yes. This is 35ACA1.  
 5 Q. Okay.  
 6 A. And that is the same graph that is in  
 7 the staff memorandum -- and you just have to flip  
 8 through and find 35ACA1. It's one, two, three,  
 9 four -- one, two, three, four, five, six, seven --  
 10 MR. LAWRENCE: It's two pages prior to  
 11 32DBD1.  
 12 THE WITNESS: If you'd just go to the staff  
 13 memorandum, which is Exhibit 50.  
 14 Q. (BY MR. THORNTON): I do see that.  
 15 A. 35ACA1. And that also shows a  
 16 declining water level in Appendix A; is that  
 17 correct?  
 18 And our figure, figure 21 of our  
 19 analysis, you will see that we again looked at all  
 20 the available data. And there's 53 data points  
 21 available for this well in the IDWR database. And  
 22 we again looked at -- visually looked at the trend  
 23 data, and we saw that there were two trends in  
 24 there. And we graphed both of them separately,  
 25 but they both show rising water levels in this

1 well. And therefore, even if you graphed all 53  
 2 points with a regression line and a regression  
 3 analysis, it would show a steeper rising trend.  
 4 But most significant, I think, to this  
 5 well is that these -- if you look over at the  
 6 axis, the Y-axis on the left, these are  
 7 aboveground water levels. And not only are they  
 8 aboveground water levels, but they're water levels  
 9 of a well that I'm also familiar with that I've  
 10 also worked on that I've measured, that I've run  
 11 geophysical logs in, and this is a low temperature  
 12 geothermal well on the old Jeker property in Dry  
 13 Creek. So it's very removed from the Pierce Gulch  
 14 Sand Aquifer, both spatially and depthwise and  
 15 aquiferwise.  
 16 In our analysis using all of the  
 17 available data points, there's a rising trend. I  
 18 worked on the well with Wayne Stevens when it  
 19 failed and it ceased to flow above ground level.  
 20 And I think there's a great deal of leakage in  
 21 this old 4-inch well. And I judge that it's not a  
 22 suitable well for monitoring.  
 23 So as we went through the Appendix A,  
 24 we found that -- and you can read in table 1 -- I  
 25 guess we could refer back to there -- that of the

1 wells analyzed by the Department for Appendix A,  
 2 we judged that possibly one of them is actually  
 3 completed in the Pierce Gulch sand, in our  
 4 analysis, and most of the wells, we feel, are  
 5 unsuitable as good, quality monitoring wells.  
 6 And our position is that we prefer to  
 7 use wells that are specially constructed of known  
 8 construction that are sealed into -- and  
 9 designated for the long term. And in those types  
 10 of wells, which we included in our analysis, which  
 11 I will refer you now to two graphs, and then I  
 12 will come back to the question that you asked.  
 13 Q. And this is in what exhibit?  
 14 A. This is going to be in Exhibit 45, and  
 15 it's going to be figure 17 and figure 18 of that  
 16 Exhibit 45.  
 17 Q. Figure 17 and --  
 18 A. 17 and 18.  
 19 Q. Okay.  
 20 A. And figure 18 -- I'll a move ahead a  
 21 little bit -- that's a figure that we've already  
 22 discussed on several occasions. That's the State  
 23 and Linder test well constructed by United Water  
 24 Idaho and my staff when I was the -- when I was at  
 25 United Water Idaho. I'm very familiar with this

1 well, the construction of it, the design of it,  
 2 and the measuring of it.  
 3 And our -- and we believe that this is  
 4 a well that is -- that meets the criteria of a  
 5 quality monitoring well that's sealed, of known  
 6 construction, developed, that is secure, and has  
 7 been measured for quite a number of years.  
 8 And our regression analysis of the  
 9 data available from this well shows a rising trend  
 10 in the portion of the monitoring well that's  
 11 completed within the Pierce Gulch Sand Aquifer in  
 12 an area where there has been increasing production  
 13 from the aquifer by United Water Idaho's  
 14 production wells and the City of Eagle's  
 15 production wells and the Eagle Water Company's  
 16 wells.  
 17 Now, on the previous page, figure 17,  
 18 that is another specially constructed well that I  
 19 also designed and constructed. And it was -- when  
 20 we constructed it, it was the United Water Idaho  
 21 State Street well, but we arranged to have that  
 22 well go over into the IDWR monitoring network as  
 23 part of the TH -- TVHP project, the Treasure  
 24 Valley Hydrologic Project, and that well has been  
 25 getting monitored since about 1998 when we

1 constructed it.  
 2 It is also a sealed well. It's  
 3 constructed into the Pierce Gulch Sand Aquifer,  
 4 and it's been receiving good measurements since  
 5 that time. And if you -- if you do a regression  
 6 analysis of the 54 data points taken in that well  
 7 over that period, you see that there's a definite  
 8 rise in water levels within the Pierce Gulch Sand  
 9 Aquifer.  
 10 You couple that with the other wells  
 11 that have been presented as a part of this  
 12 hearing, including the testimony of Mr. Dittus in  
 13 his own production wells and the graphs that were  
 14 associated from his own measurements in these  
 15 production wells that also show increasing levels,  
 16 and I conclude that there's no evidence to show  
 17 that the Pierce Gulch Sand Aquifer is in a  
 18 declining trend such that mining, if you will, of  
 19 the aquifer is going on.  
 20 And I further contend that if you  
 21 don't see declines in the underlying aquifer, that  
 22 is the Pierce Gulch Sand Aquifer, that you cannot  
 23 attribute any declines in the overlying aquifers  
 24 to pumping from the Pierce Gulch Sand Aquifer. I  
 25 contend that doesn't happen.

1 Now, let's go back to the well that  
 2 you asked me about originally.  
 3 Q. And may I ask a couple questions --  
 4 A. Yes, please.  
 5 Q. -- before we jump to that one, before  
 6 we leave these wells?  
 7 If you were to go and look at your  
 8 figure 18 --  
 9 A. In Exhibit 45?  
 10 Q. In Exhibit 45.  
 11 I forgot how many data points there  
 12 were. 52 or I guess maybe 23 or something, 23  
 13 data points.  
 14 A. Yes.  
 15 Q. And you drew the line of regression  
 16 through those data points from roughly 1999, I  
 17 guess, to 2009; is that correct?  
 18 A. Yes.  
 19 Q. So I guess earlier you were looking at  
 20 the -- you were looking at well number I believe  
 21 it was 03DAD1, the one that was in -- let me back  
 22 up, because I don't -- let me start my question  
 23 over again.  
 24 Is --  
 25 A. Yeah, 3DAD1.

1 Q. I don't think it was that one. It was  
 2 one where we were looking at -- it was a  
 3 decline -- your regression analysis showed a  
 4 decline a little steeper in the first four or five  
 5 years, and then a little less -- I mean from like  
 6 1998 -- just a second. I got to find it instead  
 7 of?  
 8 MR. ALAN SMITH: Figure 8.  
 9 MR. THORNTON: Is it figure 8?  
 10 If we could go off the record for just  
 11 a second so we can find that.  
 12 THE HEARING OFFICER: Okay.  
 13 (Recess.)  
 14 THE HEARING OFFICER: Now we're recording.  
 15 Mr. Thornton.  
 16 Q. (BY MR. THORNTON): Okay. Clarifying  
 17 question, we began by discussing the well-log  
 18 information. That was 03DAD1.  
 19 It was figure 8 in your Exhibit 45?  
 20 A. Correct.  
 21 Q. And then I believe we went to  
 22 figure 14 where you did your regression  
 23 analysis --  
 24 A. Of that well.  
 25 Q. -- of that well.

1 A. Okay.  
 2 Q. And then you looked at the last -- it  
 3 showed a decline from 1990, maybe even a little  
 4 steeper, sometime around 1993 to about '96, and  
 5 then a little less of a decline from '97 until  
 6 maybe 2000 or 2001 perhaps. And then somewhat of  
 7 a rise from 2001 until about 2008; correct?  
 8 A. Correct.  
 9 Q. So if you were to take that same  
 10 regression line and break it up on your data  
 11 points, if you would go to figure 21 in the same  
 12 Exhibit 45, for well 35AC-- 35ACA1.  
 13 A. Yes.  
 14 Q. If you were to look at the last two to  
 15 three years there, would you not also find a steep  
 16 regression line of decline?  
 17 A. Visually looking at it, it looks to me  
 18 if you drew a line from 2006 to late 2008, it  
 19 looks like you would draw a regression line  
 20 declining downwards.  
 21 Q. So I guess my point is, is it not true  
 22 that you could -- and I believe you stated earlier  
 23 that monitoring is important over a long time?  
 24 A. That's correct.  
 25 Q. And yet what I've seen you do, at

1 least on one representation of the first well  
2 identified in figure 8 was not looking at a  
3 regression line over the full data point -- data  
4 set, it was just over those -- you're emphasizing  
5 the last four or five years.

6 A. Okay.

7 Q. And did I not hear you say it's  
8 important to look at what's happening over a  
9 longer term?

10 A. I did say that I think the long-term  
11 data is the better data.

12 Q. Okay.

13 A. I think this definitely qualifies as  
14 long-term data. And let me address your point  
15 that I believe you're going to.

16 Q. Okay.

17 A. If you look at well 35ACA1 -- that's  
18 the one that you just referred to.

19 Q. Correct.

20 A. Figure 21 in Exhibit 45. I think what  
21 I said was the very first thing we would do is  
22 visually look at the data. The second thing we  
23 would do is do a regression line through all of  
24 the data. And then if there's a reason for us to  
25 look at a smaller segment of it, we would draw

1 regression lines in a thorough analysis on the  
2 basis of all of those criteria.

3 In this well, what I would point out  
4 to you -- and I think I started to originally, and  
5 perhaps did before -- is that we chose two  
6 segments of this line. There's the period from  
7 late 19- -- well, from 1991 to approximately 1998  
8 that shows a more steep recovery trend.

9 And then there's another period that  
10 we broke out from 1997 to 2008 that shows a  
11 slight, if almost stable, trend. And the reason  
12 that we broke those out -- but I did also say if  
13 you drew a regression line through all these  
14 points, it would be a rising line through --  
15 that's between the slopes of these two lines.

16 The reason we broke those out is if  
17 you look below on the graph, we were trying to  
18 determine if there might -- in all of these  
19 graphs, we provided a representation of the yearly  
20 annual precipitation that fell in this area, just  
21 as a guide, if for no other reason. And it's  
22 feared that there was -- you know, and I'm not  
23 saying there is, because, remember, this was the  
24 geothermal aboveground head Jeker well.

25 But there was a break in the

1 precipitation data there. It was rising and  
2 precipitation was increasing at the point where  
3 this point of the -- this part of the water level  
4 in the well was on an increasing trend. And since  
5 the precipitation has gradually been decreasing,  
6 it's on the -- you could say that it is similar or  
7 there's a similarity there to the break in slope  
8 on this other part of the graph.

9 Q. And in your opinion, does annual  
10 precipitation play a role in aquifers that are a  
11 hundred feet, 200 feet, a thousand feet down? Can  
12 you discern that that same year or a year later?

13 A. I think it's more visible in the  
14 shallow wells selected for the IDWR memo. It's a  
15 very clear relationship in those wells.

16 But I also say that if -- we've also  
17 drawn a regression line through all the  
18 precipitation data. And if you do that, that's on  
19 a general decline. Okay?

20 Did I answer your question, sir?

21 Q. Yes.

22 A. So now the well that you wanted us to  
23 look at.

24 Q. Correct. That was at 32 --

25 A. Your original question --

1 Q. Yes.

2 A. -- I believe was 36ABB1. Was that it?

3 Q. No. It's 32DBD1.

4 A. DBD1. Got it.

5 Q. Correct.

6 A. Okay. And now if you refer to table 1  
7 of Exhibit 45.

8 And thank you, Mr. Fereday. I think  
9 this was the well that you tried to direct my  
10 attention to earlier when I was confused.

11 On table 1, Exhibit 45, 32DBD1, under  
12 the local name of Killerman, completed to a depth  
13 of 120 to 125. Data points used in the analysis,  
14 13. We believe it's completed in the alluvial  
15 aquifer overlying the PGSA.

16 Our comment is that it's too shallow  
17 to be in the PGSA. It was designated as being in  
18 the PGSA by the IDWR staff. And if you'll just  
19 bear with me one second. DBD1.

20 It doesn't appear that we have an  
21 analysis of that one. And since the data is not  
22 available for that well in the graph, I can't  
23 really address it, other than to say I don't  
24 believe it's in the PGSA. But wait just one  
25 second. Table 2 --

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1 Q. Same report, just the page behind?  
2 A. Yeah, next page. DBD1. Yes.  
3 Killerman.  
4 Okay. We felt that the seal in that  
5 well was poor. It was listed on the driller's log  
6 as 18 feet of drill cuttings, 18 feet of alluvial  
7 drill cuttings, or what is often referred to as  
8 "puddlin" clay. It was a cable tool,  
9 drill-and-drive well, 17 years old with --  
10 constructed of quarter inch thin wall steel  
11 casing. And we judged it nonsuitable as a good  
12 monitoring well.  
13 MR. JASON SMITH: Which one are you talking  
14 about?  
15 THE WITNESS: We're talking about the  
16 Killerman.  
17 MR. THORNTON: On table 2.  
18 MR. JASON SMITH: Oh, okay.  
19 THE WITNESS: On table 2 as the assessment  
20 of well suitability for monitoring trend in the  
21 Pierce Gulch Sand Aquifer.  
22 Q. (BY MR. THORNTON): What about its  
23 monitoring trend of the shallower aquifers?  
24 A. Well, I don't -- if I was you and I  
25 wanted to monitor the trends in the overlying

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1 aquifer, I would want to have a sealed well,  
2 because something that has a "puddlin" clay  
3 surface seal to 18 feet, if there's any surface  
4 water available, it's probably going to impact  
5 your water levels to a positive extent, or it  
6 would be very closely associated with  
7 precipitation.  
8 Q. And are you seeing that expressed in  
9 the graph of the IDWR staff memo, that if it was  
10 opened to the surface and surface water  
11 infiltration, do you see anything that shows that  
12 that's been an increase there?  
13 A. Well, as we showed in our graphs, that  
14 there's an overall decrease in precipitation. And  
15 I can't speak to that because I don't -- I didn't  
16 get a chance to see the data from the -- that  
17 support where these data points were picked.  
18 Q. Right.  
19 A. Because we reviewed the data points  
20 that were picked. I could refer you to another  
21 document. In fact, I can refer you to a figure in  
22 this same document. And that would be figure 5.  
23 THE HEARING OFFICER: When you say "the  
24 same document" --  
25 THE WITNESS: Exhibit 45, excuse me,

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1 figure 5. It's an 11-by-17 hydrograph. And the  
2 orange-colored line is the water level fluctuation  
3 in the M3 Eagle test well No. 1.  
4 Q. (BY MR. THORNTON): Excuse me. Could  
5 you refresh my memory.  
6 Whereabouts is that?  
7 A. That's right down in the panhandle,  
8 near Highway 16.  
9 Q. Okay.  
10 A. And this shows -- pardon me -- the  
11 annual fluctuation that we keep referring to where  
12 the water level is high in January and February,  
13 at its highest in that interval, and it's in its  
14 lowest somewhere around August, September,  
15 October. Okay? Those are the low points of this  
16 graph, the low and high points.  
17 And in our conviction on monitoring,  
18 we believe that the best time to monitor water  
19 levels is all the time. But if you can only  
20 monitor levels in a period, then you concentrate  
21 on the periods of the graph that are at the high  
22 and that are at the low, because as you can see  
23 from visualization of this -- this fluctuating  
24 water level that, say, in the interval from  
25 mid-March to July, the water levels are changing

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1 quite abruptly. In fact, almost all the  
2 water-level change in the graph occurs within that  
3 short time period, in the drawdown in response to  
4 a collective pumping cone of depression in the  
5 aquifer, the Pierce Gulch Sand Aquifer. Okay?  
6 Similarly, after you get past the  
7 bottom of the graph, the most stable water levels  
8 at the bottom between -- in the first -- in the  
9 2000 year here, I would say between the middle of  
10 July and the middle of August, you have a similar  
11 high changing period from the middle of August up  
12 until the end of November where you've almost got  
13 the entirety of the 15-foot change in that short  
14 time interval. Okay?  
15 So if you're only going to be able to  
16 measure in a periodicity in a few data points  
17 during the course of a year, we would concentrate  
18 on those points, especially the recovery level.  
19 And we -- from our analysis of  
20 Appendix A of the staff memo, Exhibit --  
21 Q. 50.  
22 A. -- 50, we think that a lot of those  
23 measurements taken for those analysis, those  
24 culled 13 points or 12 points taken out of a much  
25 larger database, we think that they were mostly

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1 taken during that period when there was high  
2 fluctuations in the water level.  
3 Q. Okay. And then are you aware that in  
4 the -- I think it's the staff memorandum, IDWR  
5 staff memorandum, Exhibit 50, Appendix A, where --  
6 on page 1 where it identifies IDWR review. If you  
7 can get to that.  
8 A. I'm at Exhibit 50, page 1.  
9 Q. On Appendix A.  
10 A. Oh.  
11 Q. So go back to the memo from Mike  
12 McVay.  
13 A. Yes.  
14 Q. And on No. 2 underneath the IDWR, the  
15 way I read this -- and I can't speak, I did not  
16 work on the data -- it appeared that the data was  
17 filtered for -- at least attempted to be filtered  
18 for yearly spring measurements in each well, and  
19 they were defined as between March to May.  
20 So would not that help take away some  
21 of the variation in the data you could get over  
22 the year?  
23 A. Well, I think you're just remaking my  
24 point, that that period of selection is within the  
25 highly-variable part of the drawdown curve of the

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1 known annual fluctuation cycle in this part of the  
2 world, within the PGSA.  
3 If you look at the interval from  
4 mid-March down through May, that -- we almost have  
5 half or close to half of the annual fluctuation in  
6 the water level occurs during that period. So not  
7 only are we using just a very few data points,  
8 we're taking them from a period of high  
9 changeability.  
10 Q. Okay?  
11 A. And I would submit that a better way  
12 to determine what's going on in the aquifer is to  
13 select water levels from the periods that are  
14 known to be relatively stable. As you can see in  
15 that same year, January 2007, the water levels  
16 have reached what you might say is a pretty stable  
17 recovery level, all the way from December 2006 to  
18 mid-March 2007. That's a period of one, two --  
19 three-and-a-half months.  
20 Q. Okay. And then going back to come to  
21 closure on this point, going back to the staff  
22 memorandum, Appendix A, the last graph of Mike  
23 McVay's well 32DBD1. I don't believe I heard --  
24 and maybe there was a reason for that steep  
25 decline. And it appears, based on the depth, it

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1 may not be in the Pierce Gulch. That, I don't  
2 know.  
3 Can you describe that declining trend?  
4 A. I said that I can't describe that  
5 because I don't know the data set and I don't --  
6 we judged that the well's not in the Pierce Gulch.  
7 We judged that the well was not suitable for  
8 monitoring. It was an unsealed well, so we don't  
9 think it's a suitable well for depicting what's  
10 going on in the Pierce Gulch Sand Aquifer.  
11 Q. And over in Lexington Hills, are you  
12 familiar with the well there? It sounds like you  
13 were.  
14 A. I'm very familiar with it, yes.  
15 Q. And what is the depth of the well for  
16 the Pierce Gulch Sand Aquifer there,  
17 approximately?  
18 A. Nine-day aquifer test exhibit again?  
19 MR. FEREDAY: 44.  
20 THE WITNESS: 34?  
21 MR. FEREDAY: 44.  
22 THE WITNESS: Exhibit 44. Or no. Sorry.  
23 16. Reanalysis of 16.  
24 MR. FEREDAY: 12. Exhibit 12.  
25 THE WITNESS: Towards the back of the

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1 Exhibit 12, reanalysis of 16 aquifer tests, we  
2 included an appendix -- and I'll get that appendix  
3 number for you -- of the wells that we analyzed as  
4 part of that.  
5 And I believe the Lexington Hills  
6 well, which was the pumping well for the 30-day  
7 Lexington Hills test, we have the data, the  
8 geophysical data for the Lexington Hills No. 1  
9 well, formerly known as the Floating Feather well  
10 or the Homco well.  
11 Q. (BY MR. THORNTON): And that is  
12 Lexington Hills.  
13 Is that located Floating Feather and  
14 about -- I think I know where it is, but --  
15 A. It's over fairly close to Highway 55.  
16 Q. Okay.  
17 A. It's one of the easternmost wells.  
18 Q. Okay.  
19 A. Just bear with me one second here.  
20 Yes.  
21 Q. And do you have a range of what the  
22 Pierce Gulch sand is there?  
23 A. Yes. Just one second.  
24 Q. Okay.  
25 A. Let me direct you to the -- okay. So

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1 this is Exhibit 12, Appendix A -- no, that's  
2 table -- yeah, Appendix A, table of well and  
3 aquifer support information. It's toward the back  
4 of the report, about a quarter way from the end,  
5 because there's a lot of support information.  
6 Follows a blue page, Appendix A, well information.  
7 And if you go eight solid pages, that  
8 would be 16 double sided, backwards, you'll come  
9 to a cross-sectional schematic, a drawing of the  
10 Lexington Hills No. 1 well by CH2M Hill, by Chuck  
11 Feast of CH2M Hill, who carried out that test.  
12 Q. It's a schematic; right?  
13 A. It's a cross-sectional diagram of the  
14 well construction.  
15 Q. Okay. I believe we're there now.  
16 A. And looking at the well construction  
17 diagram, you'll see that there's a screen interval  
18 from 215 to 265.  
19 Q. Yes.  
20 A. And I believe that that screen  
21 interval is in the up-dip portion of the Pierce  
22 Gulch Sand Aquifer. And then you'll see there's  
23 another screened interval from 375 to 385.  
24 Q. Correct.  
25 A. And I believe that screen is completed

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1 into the Terteling Springs formation, which is the  
2 thin aquifer underlying the Pierce Gulch sand.  
3 Q. Okay.  
4 A. Now, if you go to the next page, which  
5 says "Homco Eagle, March 5th, 1991, BSU  
6 geophysics."  
7 Q. Right.  
8 A. This is the normal resistivity logs  
9 run in that well by the geophysical unit that I  
10 operated and built at BSU back in those years.  
11 And this first page starts out at  
12 ground level and goes approximately down to  
13 175 feet.  
14 Q. Uh-huh.  
15 A. And then you turn to the next page,  
16 and you'll see that the geophysical logs end just  
17 slightly below 400 feet.  
18 Q. Yes.  
19 A. And if -- and if you -- these logs are  
20 perhaps not as clear at this scale, because this  
21 was a strip chart back then and not a digital one.  
22 But if you look at the second page where the  
23 geophysical traces go from 200 feet down to about  
24 275 feet --  
25 Q. Uh-huh.

Page 1201

1 A. -- which recall the screen on the  
2 other page was 265 base; right?  
3 Q. Okay.  
4 A. I believe that that is the signal of  
5 the prograding delta that we've spoken about  
6 defining downwards. That's the base of the Pierce  
7 Gulch Sand Aquifer, then there's a period of  
8 mudstone in there, and the large spike centering  
9 on about 380 feet in the bottom of the well is the  
10 Terteling Springs.  
11 So the answer to your question is  
12 probably somewhere right around 275 is the base of  
13 it.  
14 Q. Okay. Thanks.  
15 On the -- again, referring to  
16 Appendix A of the IDWR staff memorandum, which is  
17 Exhibit 50, it was not my understanding that  
18 the -- in reading this that this was an attempt to  
19 look at only the PGSA, but of aquifers or wells in  
20 the Eagle vicinity.  
21 Was your understanding that this was  
22 trying to describe the aquifer over -- the  
23 aquifer -- the PGSA aquifer over time,  
24 specifically only that?  
25 A. Well, the wells that were identified,

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1 not all of them were in the PGSA, but our interest  
2 in this case is the PGSA.  
3 Q. Right.  
4 A. And that's what I'm responding to.  
5 Q. Do you believe that it was IDWR's  
6 intent to look at just the PGSA based on this  
7 Appendix A by Mike McVay? Do you see anywhere in  
8 the introduction or -- that describes that that  
9 was the intent of this?  
10 A. Well, I think back to the over- -- the  
11 overarching memo referred to as the staff memo and  
12 the conclusions of that memo that determined,  
13 based on those hydrographs and those analyses,  
14 that the recharge in the PGSA is lagging behind  
15 the discharge. And those were based on those  
16 graphs. And I don't think that's appropriate to  
17 make that decision.  
18 Q. Okay.  
19 A. I don't -- I don't agree.  
20 Q. Okay. Do you believe that the IDWR  
21 had an interest in terms of -- especially from the  
22 protestants' viewpoints, of knowing what was going  
23 on in the shallower aquifers in light of what I  
24 believe you yourself have said and Dr. Spence  
25 Woods, that there is some communication between

1 the two?

2 A. Well, I think as I stated --  
3 previously stated, that this application and this  
4 hearing and this administrative proceeding is  
5 based upon M3's desire to exploit the Pierce Gulch  
6 Sand Aquifer for a potable water supply for  
7 their -- and I then followed that by saying that  
8 if water levels in the PGSA are not declining,  
9 which I see no evidence of them declining, then  
10 whatever is going on in the shallow aquifer is not  
11 a function of what's going on in the PGSA.

12 If the PGSA is increasing, then  
13 pumping in the PGSA, if there are declines in the  
14 shallow aquifer, are not caused by pumping in the  
15 PGSA.

16 Q. Okay.

17 A. They may be caused by other reasons.  
18 They may be caused by a decline in precipitation.  
19 They may decline for any variety of reasons that I  
20 don't know about, if indeed they are in decline.

21 But I submit that through our analysis  
22 that the well -- the selected wells are probably  
23 not suitable -- they're not suitable for the PGSA.  
24 But they may not -- they're probably not, many of  
25 them, suitable for monitoring any zone of the

1 aquifer. That would be my position.

2 Q. Uh-huh.

3 A. And I think, rather, we should depend  
4 on good, quality monitoring wells of known  
5 construction with seals to base our decisions on.

6 MR. THORNTON: Okay. All right.  
7 Mr. Hearing Officer, I've still got lots of  
8 questions, and we can continue, if you'd like, or  
9 I don't know if this is -- we'll be shifting a  
10 little bit to some other types of questions for  
11 Mr. Squires.

12 THE HEARING OFFICER: I don't expect to  
13 finish with Mr. Squires. And if you're going  
14 somewhere else, this may be a logical place to  
15 break. We're just shy of five o'clock.

16 MR. THORNTON: Okay.

17 THE HEARING OFFICER: Fine with everybody?

18 Okay. Let's go off the record.

19 (Proceedings concluded at 4:55 p.m.)

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REPORTER'S CERTIFICATE

I, JEFF LaMAR, CSR No. 640, Certified  
Shorthand Reporter, certify:

That the foregoing proceedings were taken  
before me at the time and place therein set forth,  
at which time the witness was put under oath by  
me.

That the testimony and all objections made  
were recorded stenographically by me and  
transcribed by me or under my direction.

That the foregoing is a true and correct  
record of all testimony given, to the best of my  
ability.

I further certify that I am not a relative  
or employee of any attorney or party, nor am I  
financially interested in the action.

IN WITNESS WHEREOF, I set my hand and seal  
this 5<sup>th</sup> day of May, 2009.



A handwritten signature in black ink, appearing to read "Jeff Lamar", written over a horizontal line.

JEFF LaMAR, CSR NO. 640  
Notary Public  
Eagle, Idaho 83616

My commission expires December 30, 2011

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