

Exhibit 1

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

SUPERIOR COURT OF THE STATE OF CALIFORNIA
FOR THE COUNTY OF LOS ANGELES - CENTRAL DISTRICT

)
 Coordination Proceeding)
 Special Title (Rule 1550(b)))
)
)
 ANTELOPE VALLEY GROUNDWATER)No. Judicial Council
 CASES)Coordination
)Proceeding No. 4408
)
)
)

Deposition of THOMAS HARDER, P.G., C.HG.,
Volume I, taken on behalf of Defendant and
Cross-Complainant Palmdale Water District, at
301 North Lake Avenue, 10th Floor, Pasadena,
California, beginning at 10:05 A.M. and ending at
12:10 P.M. on Monday, October 20, 2014, before
LORI SCINTA, RPR, Certified Shorthand Reporter No. 4811.

1 Q Okay. Number 3.

2 A "The Buttes Subunit of the Antelope
3 Valley Groundwater Basin, in which
4 Phelan's Well 14 is located, is
5 hydrogeologically distinct from other
6 subunits in the Antelope Valley
7 Groundwater Basin."

8 Q Let's spend some time on this one.

9 A Sounds good.

10 Q What do you mean by, "hydrogeologically
11 distinct"?

12 A Okay. I'm going to direct you to -- I think
13 that exhibit that you had out the first time is probably
14 a good one to start with.

15 Q So that's the one that says, "Production Wells
16 Within the Buttes and Pearlands Subunits"?

17 A That's right.

18 Q Okay. Go ahead.

19 A So when we evaluated these subunits, these
20 lines were developed based on faults, and particularly
21 this line here on the northwest boundary of Buttes,
22 southeast boundary of Lancaster Subunit (indicating),
23 also was originally developed based on a fault.

24 Q You're saying that when you reviewed -- well,
25 let me back up.

1 time period.

2 And, similarly, if you look at 11N1, which is
3 up --

4 Do you see that?

5 Q Yes, I see that.

6 A Same thing. Groundwater level differences are
7 not as acute as they are in the Lancaster Subunit.

8 Q And what do you conclude from that?

9 A Well, I conclude from that that -- this goes
10 back to hydrogeologically distinct. They have different
11 responses to pumping stresses in the area, and I believe
12 part of the reason for that is the groundwater flow
13 barrier that exists between these two areas.

14 It limits the connectivity between the two
15 subunits.

16 Q Okay. I want to focus on what you mean by,
17 "hydrogeologically distinct."

18 And I heard you say two things.

19 A Uh-huh.

20 Q One is that they respond differently to pumping
21 stresses. Correct?

22 A The -- let me back up.

23 The hydrograph signature may have not -- may
24 have not seen the extreme changes in groundwater levels
25 that were observed in the Lancaster Subunit.

1 Q Okay. And the other was that -- and this may
2 be a conclusion from the first one -- that there is
3 limited connectivity between the subareas?

4 A Uh-huh, yes.

5 Q And are those two things what you mean by,
6 "hydrogeologically distinct"?

7 A Yes. There is more in addition to that, but
8 that is part of it.

9 Q Now, there is connectivity across this boundary
10 on the northwest boundary of the Buttes subarea,
11 correct?

12 A There is connectivity from the -- I don't
13 understand your question.

14 Q Is there hydraulic connectivity between those
15 two things?

16 A There is. It's just limited.

17 Q So it's a matter of degree?

18 A Yes.

19 Q Okay. So with that, have you finished your
20 answer to my question about what you meant by
21 hydrogeologic -- I'm sorry -- "hydrogeologically
22 distinct"?

23 A I think the only thing I would add --

24 Q Uh-huh.

25 A -- this is another figure from the summary

1 expert report. This is Figure E2-16, and it's labeled,
2 "Total Subsidence 1930 to 1992."

3 Q Uh-huh.

4 A And you can barely see it, but the dashed line
5 to the southeast of the subsidence area, there is a
6 dashed line that outlines the Buttes Subunit. I know
7 it's hard to see. I didn't want to write over it.

8 Q Okay.

9 A And in the table -- or the explanation, you can
10 see that those are the location of faults concealed,
11 over on the right-hand side.

12 Q Yes, I see it.

13 A And you can see in the Lancaster Subunit, these
14 are color floods of subsidence with the darker areas
15 being the larger areas of subsidence.

16 And you can see that the subsidence area does
17 not extend into the Buttes Subunit.

18 Q And what do you conclude from that?

19 A Subsidence is caused by areas where there are
20 thick sequences of clay and where the groundwater level
21 has been drawn down for -- there's significant drawdown
22 of the groundwater table over long periods of time that
23 caused this subsidence. And those conditions do not
24 exist in the Buttes Subunit.

25 So when I say that they are hydrogeologically

1 distinct, that is the distinction between the two.

2 Q So are both those conditions -- let me rephrase
3 that.

4 Neither one of those conditions exists in the
5 Buttes Subunit; is that correct? There's not clay and
6 there's not a significant groundwater decline?

7 MR. MILIBAND: Objection to the extent it's
8 vague.

9 THE WITNESS: With regard to the clay, we have
10 very little information in the Buttes Subunit in terms
11 of the hydrogeological characteristics.

12 The other thing is that the groundwater
13 table -- going back to the hydrographs has not -- the
14 groundwater hydrographs have not shown a lot of
15 variation. So we have not seen the groundwater level
16 drops that were observed in the Lancaster Subunit.

17 So I can't answer your -- can you rephrase your
18 question? I'm sorry.

19 BY MR. BUNN:

20 Q I think you did answer --

21 A Did I answer it? Okay.

22 Q -- that neither one of those two conditions is
23 known to exist in the Buttes --

24 A That's -- that's correct.

25 Q Okay. So I was getting to the question of what

1 you based this opinion No. 3 on, but I think you mostly
2 answered it.

3 Is there anything else that you based your
4 opinion on?

5 A No.

6 Q Okay. Let's go on to No. 4 then.

7 A Number 4 is, "The unnamed fault that
8 separates the Buttes Subunit from the
9 Lancaster Subunit is a groundwater
10 flow barrier that limits the
11 hydrologic connectivity between the
12 two subunits and results in different
13 hydrogeologic conditions in the Buttes
14 Subunit."

15 Q And what do you base that on?

16 A Well, this is -- this is basically what I just
17 said in terms of what separates them and makes them
18 distinct hydrogeologically, and I base the connectivity
19 issue based on Bloyd, the work that he did.

20 Q And by that, do you mean that you accepted his
21 conclusion --

22 A Uh-huh.

23 Q -- or that you looked at the information that
24 he looked at?

25 A I accepted his conclusion.

1 MR. MILIBAND: Mr. Bunn, that's Exhibit 4-1; is
2 that correct?

3 MR. BUNN: It is showing on 4-1, yes.

4 Q And my question for you is: Is there
5 groundwater flowing across that boundary?

6 A Yes, there is most likely groundwater flowing
7 across it.

8 Q Okay. And how do you know that?

9 A Well, the groundwater contour maps that have
10 been generated from this area show groundwater being a
11 higher elevation on this side than on this side
12 (indicating).

13 Q Okay. So --

14 A I think there is no -- there is no -- they call
15 them barriers, but they're not true barriers. Water
16 will flow through lower-permeability material. This is
17 like we talked about, a matter of scale.

18 So they're relatively low-permeability, and
19 they typically form along faults.

20 Q And, in this case, which direction does the
21 groundwater flow?

22 MR. MILIBAND: Objection. Vague as to
23 location.

24 THE WITNESS: Are you talking about in the
25 vicinity of the --

1 BY MR. BUNN:

2 Q Which direction across the boundary? Does it
3 flow from Buttes to Lancaster or the other way?

4 A My understanding is it flows from Buttes to
5 Lancaster, across that boundary, in a westerly
6 direction.

7 Q Do you know how much groundwater flows across
8 that boundary?

9 MR. MILIBAND: Objection. Vague.

10 THE WITNESS: I haven't done an analysis to
11 quantify the amount of water that goes across there.

12 BY MR. BUNN:

13 Q Is it possible to do such an analysis?

14 A Yes.

15 Q But you haven't?

16 A No.

17 Q If the groundwater levels in the Buttes Subunit
18 were lowered from pumping, would that affect the amount
19 of groundwater that flows across that boundary?

20 MR. MILIBAND: Objection to the extent it's an
21 incomplete hypothetical.

22 THE WITNESS: I'm sorry. Can you repeat the
23 question?

24 MR. BUNN: Sure.

25 Q If the groundwater levels in the Buttes

1 Subunit --

2 A Yes.

3 Q -- were lowered from pumping --

4 A Yes.

5 Q -- would that affect the amount of groundwater
6 that flows across that boundary?

7 A It could. Depends.

8 Q Depends on what?

9 A Depends on the amount of groundwater pumping.
10 In order for -- to reverse the gradient, you would have
11 to lower the hydraulic head in the Buttes Subunit so
12 that it was lower than the hydraulic head in the
13 Lancaster.

14 Q I'm not talking about reversing the flow. I
15 was talking about affecting the amount that recharges
16 the Lancaster area.

17 A So your question is: Can pumping in the Buttes
18 Subunit affect the amount of flow that flows across the
19 boundary?

20 Q Yes. That's my question.

21 A Yes, it can do that.

22 MR. BUNN: Okay. All right.

23 That's all I have.

24 Does anyone else in the room want to ask any
25 questions?