SUPERIOR COURT OF CALIFORNIA

COUNTY OF RIVERSIDE

DIAMOND FARMING COMPANY, a California corporation; and WM. BOLTHOUSE FARMS, INC., a Michigan corporation, Plaintiffs, vs. CITY OF LANCASTER; ANTELOPE VALLEY WATER COMPANY; PALMDALE WATER DISTRICT; PALM RANCH IRRIGATION DISTRICT; QUARTZ HILL WATER DISTRICT; ROSAMOND COMMUNITY SERVICE DISTRICT; MOJAVE PUBLIC UTILITY DISTRICT; DOES 1 through 200, Inclusive; and All Persons Unknown, Claiming any Legal or Equitable Right, Title, Estate, Lien, or Interest in the Property Described in the Complaint Adverse to the Plaintiff's Title, or any Cloud Upon Plaintiff's Title Thereto, Defendants. AND OTHER RELATED ACTIONS.	Case No. 353840 (c/w Case No. 344668 and 353840) Volume 3 of 3 Pages 415 - 516

REPORTER'S TRANSCRIPT OF ORAL PROCEEDINGS

BEFORE THE HONORABLE JOAN F. ETTINGER, COMMISSIONER PRESIDING
DEPARTMENT 10
Friday, August 9, 2002

APPEARANCES:

For Plaintiff Diamond Farming:
LeBEAU THELEN
BY: BOB H. JOYCE
Attorney at Law
500 East Commercenter, Suite 300
Bakersfield, CA 93309

For Plaintiff Wm. Bolthouse Farms:
CLIFFORD & BROWN
BY: RICHARD ZIMMER
Attorney at Law
1430 Truxtun, #900
Bakersfield, CA 93301

(Appearances continued to the following page.)

Reported by:
TRINA N. FEHLMAN, CSR 10684
Certified Shorthand Reporter
Official Court Reporter
Riverside County Superior Court

(Appearances continued from the previous page.)

FOR DEFENDANT ROSAMOND COMMUNITY SERVICES DISTRICT:	BEST, BEST & KRIEGER BY: JEFFREY V. DUNN Attorney at Law 5 Park Plaza, Suite 1440 Irvine, CA 92614 - and - BY: THERESA E. FUENTES Attorney at Law 3750 University Avenue P.O. Box 1028 Riverside, CA 92502
FOR DEFENDANTS PALMDALE AND QUARTZ HILL WATER DISTRICTS:	LAGERLOF, SENECAL, BRADLEY, GOSNEY & KRUSE, LLP BY: THOMAS S. BUNN, III Attorney at Law 301 North Lake Avenue, 10th Floor Pasadena, CA 91101-4108
FOR DEFENDANTS LA COUNTY WATERWORKS DISTRICTS 37 AND 40:	REDWINE AND SHERRILL BY: STEVEN B. ABBOTT Attorney at Law 1950 Market Street Riverside, CA 92501
FOR DEFENDANT ANTELOPE VALLEY WATER COMPANY:	CALIFORNIA WATER SERVICE COMPANY BY: JOHN TOOTLE Attorney at Law 3625 Del Amo Boulevard, Suite 350 Torrance, CA 90503

RIVERSIDE, CALIFORNIA - FRIDAY, AUGUST 9, 2002

(Discussion - Not Reported.)

THE COURT: Our witness has been sworn in. I think we've ruled on the motion in limine. We don't need any additional voir dire.

So Mr. Zimmer.

MR. ZIMMER: Thank you, your Honor.

MR. JOYCE: Thank you, your Honor.

DIRECT EXAMINATION (Resumed)

BY MR. ZIMMER:

Q. Mr. Sheahan, one of the things that we did not talk about yesterday is that you are licensed and status as an attorney; is that correct?

A. That's correct.

Q. It's my understanding you are not an acting, practicing attorney.

A. That's right. I don't practice law, have not.

Q. And it's my understanding that the report that you generated and the opinions that you intend to give in this case are from your expertise as a geophysicist, hydrogeologist, engineering geologist, registered geologist, and a Certified Professional Geologist, among other qualifications; is that correct?

A. Yes, that is correct.

Q. One of the things that you did in this case I'm not sure that we mentioned is that you generated a report which is 27 pages of text, and including an Exhibit B, a large map; is that correct?

A. Yes.

MR. ZIMMER: Your Honor, I would offer to stipulate to allow the Court to have both the report prepared by Mr. Scalmanini and the report prepared by Mr. Sheahan for the Court's complete review.

MR. JOYCE: On behalf -- I'm sorry. On behalf --

MR. ZIMMER: To the extent I believe that would also help on this issue that we've been talking about in terms of the stipulation.

MR. JOYCE: And on behalf of my client, I would join in that stipulation.

THE COURT: Any objections?

MR. BUNN: Yes. We would object to that. We have no opposition -- or I don't have any opposition to having the map come in. But I don't think that the -- either report is admissible.

THE COURT: All right. Well, absent a stipulation, the reports are not admissible because they would be hearsay. Although you might just rethink that again. I'm not sure anyone would be prejudiced by the Court considering the reports. And we've heard all of the testimony.

MR. BUNN: Okay. Can we revisit that later?

THE COURT: You can revisit it.

Q. (BY MR. ZIMMER:) Yesterday, Mr. Sheahan, you advised us that your general opinion was that the area defined by Mr. Scalmanini in his report did not meet the requirements of Phase 1, the Phase 1 stipulation, because it did not include the areas depicted on Exhibit B which, in your opinion, needed to be

included for evaluation of the scientific significance of groundwater production during Phase 2; is that correct?

A. Yes, that is correct.

Q. Can you give us some examples of why generally examples of why Mr. Scalmanini's line does not include in the line appropriate areas for consideration in this lawsuit.

A. Yes. May I refer to Mr. Scalmanini's map?

THE COURT: You may.

MR. JOYCE: Your Honor, that would be Exhibit 126.

THE COURT: Yes.

Q. (BY MR. ZIMMER:) If we can tilt that slightly so I can see too.

Can the Court still see that?

THE COURT: Yes.

Q. (BY MR. ZIMMER:) That's good.

A. Well, your Honor, there are several areas. And as an example of areas of significance, let me first point to the area north of the line that is referred to here as both the Rosamond Fault and the Willow Springs Fault, Carlson 1998, which Mr. Scalmanini has used as the northern boundary of his area.

By -- by drawing this line and limiting his area to only that portion of the Antelope Valley to the south, he's eliminating a large area that overlies aquifer materials that are in hydraulic communication with the aquifer materials to the south. And so that's one example.

Q. Just -- let me interrupt you for a second.

Does hydraulic communication mean hydraulically connected?

A. That's right. Water can flow both ways between those two areas. And Mr. Scalmanini testified, I believe, that he knows of at least one instance where water is flowing from the Fremont Valley area to the north southward into the area that he's designated, and the quantity, I think he mentioned, was up to 700-acre feet per year.

This is an area that -- that collects water from the drainage basin and collects of -- significant quantity of water which can be made available through pumping and through other means through the overall users in this area.

To ignore that area by selecting a boundary of a Phase 1 area that doesn't include it would make it impossible for me as a hydrogeologist to adequately deal with those groundwater resources and other surface water resources in that area as part of Phase 2.

A secondary is an area that is south of Mr. Scalmanini's line and between this line that he's identified on this Exhibit 126 as the Unnamed Fault Associated with the San Andreas Fault Line. I'll address that issue in a moment, but south of that line between there and the San Gabriel mountains is an area with no groundwater resources. There are wells pumping in that area, there's groundwater down there. And that's also an area that receives recharge from surface water and surface water infiltration. And in dealing with the issues in this matter in Phase 2, it will be very important, as a hydrogeologist, for me to be able to -- to incorporate that area into an analysis of the overall water supply.

The third area is out to the east, east of Saddleback

Buttes, and this general area, which is to the east of the red line shown on Mr. Scalmanini's map. In fact, there are wells in that area, groundwater is being produced in that area, we have contours on water tables and so forth. And that's an area that also should be included because there are water resources there. It cannot be ignored.

And last but not necessarily least is this area further south of the south line of Mr. Scalmanini's boundary line that we refer to as the Leona Valley. Now, Leona Valley is hydrologically connected to the main area of the Antelope and Fremont Valleys both by surface water draining in and by groundwater draining in from fractured bedrock and alluvial deposits in that valley. So Mr. Scalmanini's line doesn't include those areas. All of those areas are going to be important for us in Phase 2. And that's why we need to include them.

Incidentally, the area that I have defined with the boundary line on what I'll refer to as Exhibit B because it's Exhibit B to my report, it does include those areas.

Q. Mr. Sheahan -- were you finished?

A. Yes.

Q. Mr. Sheahan, you had drawn a simple diagram for me that helped me understand in the context of this case for the stipulation we have or with the issues that are involved in this case why it's important to consider this -- this entire piece of ground.

Can you show us that.

A. Yes. If I can find a blank piece of paper here.

MR. JOYCE: If we're here long enough, you may not be able to.

Q. (BY MR. ZIMMER:) Do you have a marker up there?

A. I do.

There are several concerns that I have with defining a boundary for the Phase 1 purposes, if you will. What I've heard in court so far suggests that, for example, the defendants would like to draw a boundary line -- and I'll do it like this -- that would include the nonoverlying landowner pumpers and some of the landowners and overlying landowner pumpers. And that they would like to define this arrow -- area very narrowly. By picking an area where there's considerable amount of pumping now, the smaller the area, the easier it is to show in Phase 2 that there is excessive pumping in this area that may be construed as overdraft.

The second aspect, though, is -- and they have, I believe, mentioned that as part of the trial that they would be willing to -- to offer with regard to properties that are outside that area, that they would not assert claims of water rights against those properties.

What they failed to mention, though, that -- at least, that I did not hear -- is that in determining whether this pumping from the -- I don't know -- the black dot pumping. How should I refer to these?

Q. Defendants' pumping.

A. Appropriators. The effects of their pumping on this property will be an important issue in Phase 2. Trying to determine whether or not this pumping has affected this property.

If we draw a line around this and eliminate the possibility of looking at other pumping outside the area, it becomes fairly easy to say we're the only pumpers. There is an effect. We caused the effect.

In fact, these other properties are also pumpers. And if there are other properties out in this area that have the same overlying landowner characteristics and this property owner is not able to look at those to see whether their pumping has caused the effect instead of this pumping, then this property owner, I think, is seriously constrained. So one reason is that we need to include other areas so that we can see who, in fact, is causing the effects.

The other factor that I mentioned earlier, if we look at a small area where there is heavy pumping, perhaps it will look like there is overdraft. If we include a larger area where there's all contiguous aquifer systems, we may find that there are areas where groundwater levels are not going down, but they're going up.

In fact, there are some data shown in some of the Carlson reports that indicate that although the water level is going down in the central area, water levels are coming up elsewhere. And so in order to properly assess all of those things as well as to take into account all of the water resources in the area, it's necessary to have an area large enough to include all of those properties, all of those water resources. And that's what I've attempted to do with my Exhibit B.

THE COURT: All right. You used a term, "hydraulically connected." It's been used before.

Can you give me your definition of that term.

THE WITNESS: Yes, I can.

Even though there are some restrictions, perhaps, by postulated faults or other means between two different portions of an aquifer, there can be water flowing across those restrictions. So in that case, I would consider those to be hydraulically connected. Water can get from one to the other through some flow system.

For example, Mr. Scalmanini described that there was a flow across from the Fremont Valley area down into the Antelope Valley area. That's a hydraulic connection. Groundwater can flow from one area to another.

THE COURT: All right. Thank you.

MR. BUNN: Your Honor, I would move to strike the portions of the prior answer that dealt with the effects of defendants' pumping on the plaintiffs' property. That's not an issue in this case and never will be.

The issue will be whether defendants have acquired prescriptive rights by open and notorious and so forth production from a basin in 5 years of continuous overdraft. And the defendants' pump- -- the effects of defendants' pumping on plaintiffs' property has nothing to do with it.

THE COURT: Overruled.

MR. ZIMMER: Thank you, your Honor.

Q. (BY MR. ZIMMER:) Yesterday, Mr. Sheahan, Mr. Scalmanini drew a diagram that dealt with Cottonwood Creek.

You may recall that.

A. Yes.

Q. He had this little creek on top of the surface and a water table lower down.

Does anyone remember what number that was? It is 127.

Mr. Sheahan, you had some thoughts about this particular diagram and the concept of whether water in this kind of configuration described by Mr. Scalmanini, Number 1, is what we really are dealing with in the Antelope Valley, and Number 2, whether this is the only way it appears and whether it's a correct characterization of groundwater flow.

A. Yes.

Q. Could you give us your comments, sir.

A. Certainly. May I --

THE COURT: You may.

THE WITNESS: May I draw a diagram?

Your Honor, my concern with this diagram is that it showed one scenario but it did not show the scenarios that we see in other places. I'm sorry.

THE COURT: First we're going to mark yours, the one that you're drawing.

MR. TOOTLE: What about the previous one?

THE COURT: The previous one is --

MR. BUNN: 127.

THE COURT: -- 127. That was marked.

MR. ZIMMER: 127 was the defendants'.

THE COURT: Oh, the one he just drew. We need to mark the one he just drew. That one, let's mark 11.

MR. ZIMMER: We'll call this Exhibit 11?

Thank you, Mr. Tootle.

THE COURT: And then the next one you're going to draw, just write a 12 on the next page.

MR. JOYCE: For the purposes of the record, can we title 11 as Sheahan's Illustration, 11?

THE COURT: That's fine.

MR. JOYCE: Thank you.

THE COURT: All right. Go ahead.

THE WITNESS: Yes. I was commenting that Mr. Scalmanini's diagram showed one situation but it did not show the kinds of situations that we do have existing in a number of areas in the desert environment that the Antelope Valley represents. And specifically, in the area that we are concerned about, I think, as part of Phase 1. If I may, let me draw a diagram, again, that includes some of the other facets to that.

MR. DUNN: Your Honor, could I ask that a proper foundation be laid inasmuch as the witness is now attempting to portray actual well scenarios within the Antelope Valley? In other words, I'd like to know how he knows this is true.

MR. ZIMMER: I think he's doing it representatively and not to scale. It's no different than Mr. Scalmanini's diagram that he drew.

MR. TOOTLE: Then I would move to strike his previous comment that this is the situation that we're talking about.

THE COURT: Well, why don't we get his explanation as he draws, and then if you think -- if you think there still needs to be a foundation before we move on, I'll let you make that objection.

Q. (BY MR. ZIMMER:) Go ahead, sir.

THE COURT: Go ahead.

MR. DUNN: For clarification, is this as to Cottonwood Creek specifically? Or is this as another portion in the Antelope Valley? That's the nature of my objection.

Mr. Scalmanini's diagram that he's attempting to criticize was specific as to the Cottonwood Creek cross section only.

THE COURT: All right.

MR. DUNN: So if he's trying to criticize that representation by Mr. Scalmanini, then his testimony needs to be limited to that Cottonwood Creek.

What I suspect he's trying to do is give us some area within the basin --

THE COURT: Let's find out.

What are you attempting to depict in your diagram?

THE WITNESS: Well, I believe Mr. Scalmanini's diagram is fine with regard to a specific focus, but I think it gives the Court the impression that's the way streams interact with groundwater everywhere in the area.

MR. DUNN: Objection. That calls for speculation on the part of this witness.

THE COURT: Well, I'll -- I'll disregard what he thinks the Court might be thinking. But I -- to the extent --

MR. DUNN: Well, let me --

THE COURT: Why don't you tell me, though, what is it your diagram is going to depict?

THE WITNESS: It's going to depict how surface water in a stream and groundwater interact in our area such that pumping

of groundwater does cause a change in the flow of surface water in the streams.

MR. DUNN: And how is that related to Mr. Scalmanini's cross section for Cottonwood Creek?

MR. ZIMMER: Your Honor, this is not cross-examination.

MR. DUNN: I'm sorry. May I voir dire this witness then?

THE COURT: I'm going to allow it just to the foundation part, so you may answer that.

MR. DUNN: What does this have to do with a cross-section illustration by Mr. Scalmanini for the specific area of Cottonwood Creek? Are you attempting to show us something different in Cottonwood Creek?

MR. ZIMMER: There are three different questions.

MR. DUNN: Okay. I'll break them up.

Are you trying to show by this illustration, Plaintiffs' Exhibit Number 12, something different in the Cottonwood Creek illustration or illustrated area that Mr. Scalmanini shows?

THE WITNESS: Not --

MR. DUNN: Yes or no?

THE WITNESS: No, with regard to Cottonwood Creek.

MR. DUNN: Okay.

THE COURT: All right.

MR. DUNN: Then, in fact, what you're attempting to testify is something that Mr. Scalmanini did not address; isn't that correct?

THE COURT: Well, at this point, I think we're past the point of foundation. I'm going to let him make the diagram and

then you can cross on it.

MR. DUNN: Well, I would like to have a standing objection throughout Mr. Sheahan's testimony that it exceeds the designation that was done in the mutual exchange early on. And that specifically his testimony is to be to critique the testimony of Mr. Scalmanini. And now we're doing something beyond that.

THE COURT: I've already ruled on that motion in limine.

MR. DUNN: If I can have a standing objection to that.

THE COURT: I think the ruling on the motion in limine turns it into that, so --

MR. DUNN: All right. Thank you.

THE COURT: All right. Go ahead, sir.

THE WITNESS: Again, my concern was that the diagram showed one aspect and did not show other aspects of the surface water/groundwater interaction. And what I'd like to do is to present a diagram. It's not intended to be a scaled drawing, but a diagram that would explain how, in other instances that I believe are important, surface water and groundwater do interact.

So what I'd like to do is to start with a ground surface line, which I'll do in black. And a hill on the left, if you will. And ground surface may be further out in the valley, I've put in a V-notch in that to represent a stream or a creek. And similar to Mr. Scalmanini's drawing, I'll draw in a line under that that I believe he referred to as the bed of the creek.

Now, in our area, we have high ground or mountains on the sides of our valley. And so this mound to the left can be considered to represent the mountains, and I'm going to put a

vertical line at the top to represent the watershed boundary, just for clarity, and I'll mark that "WB," or watershed boundary.

What that means is that rainfall in this area that comes down to the right of my watershed boundary line would enter this area and would flow perhaps into the ground through the -- or into the creek, but would also infiltrate into the ground. And so surface water in this area is an important aspect of it.

MR. DUNN: Objection. Vague as to "creek." Move to strike.

Where are we talking about?

THE COURT: It's just a generality, is it not?

THE WITNESS: This is a diagram.

THE COURT: You're not showing any specific area.

THE WITNESS: That's correct.

MR. DUNN: Objection. Lack of foundation.

THE COURT: Overruled.

THE WITNESS: Again, just to -- to bring out all of the groundwater and surface water flow aspects, let me draw another line running more or less vertically downward to the left that would represent the contact between the bedrock areas and the -- what we're calling the aquifer areas. It could be unconsolidated. It could be on kinds of aquifers. We'll call this the aquifer areas.

Now, in fact, the bedrock in this area is fractured. And there -- the rainfall that occurs in the mountains enters and forms a water table in the fractured bedrock. So there is water. And I should do this in a different color. There is water that fills up the fractures, fills up all these fractures. Fractures

are interconnected so, essentially, we have a water body in the mountains. That water flows into the aquifer material from these areas as well as surface water. So we have -- I'll use blue for this -- we have groundwater flowing into this area. And that groundwater can fill up the aquifer material in the -- in the area underlying the stream. And so I would draw a water table for diagramatic purposes that looks like this.

In this situation, we have water in the stream that is at a level that is consistent with the water in the bed material. This is saturated with water, and this is saturated with water so, essentially, we have water in this general area.

Now, let me use black for -- for this example for arrows. I'm going to draw black arrows showing groundwater flowing into the area, black arrows for groundwater flowing through the area. In this instance, we have water in the stream and we have groundwater. The water in the stream is not draining out of the stream through the bed into the groundwater because the water table is at the level of the stream.

Now, if we put a well in -- I believe Mr. Scalmanini described the conditions of pumping at a well very well. If we put a well in and we extract groundwater, if we pull the water level down from this nonpumping level to a pumping level, and if we pull the water level down like this, now we've lowered the water level in the vicinity of the stream, and by pumping then we've created a situation where water from the bed wants to drain down to the water table and water from the stream wants to drain down into the bed.

So in this situation, this pumping not only can pull

water that is flowing from the bedrock and would otherwise flow through this zone, but it can also cause surface water to enter the groundwater body that would not have otherwise entered the groundwater.

MR. DUNN: Objection. Move to strike. Lack of foundation. It calls for speculation.

THE COURT: Overruled.

THE WITNESS: I believe that's --

Q. (BY MR. ZIMMER:) Now, just for example, even if we had -- or strike that.

What would be the effect if we had the water table level down here as Mr. Scalmanini had drawn it on any given creek or body of water?

A. I'm not sure I follow you.

Q. Let me ask you this --

MR. DUNN: I'm sorry, your Honor. Before another question is pending, may I voir dire this witness for foundational purposes? I would just like to know how it is he's able to stand here in court and testify about water flow analysis in this phase. I understand what he's testified. How on earth do we know whether this is true or not?

THE COURT: I'm not sure I'm following you.

MR. DUNN: I'd like to know what he has done to come into court and say this is the way it is. He won't tell us where it is specifically. He just says this is the way it's done. I would like for him to explain that.

THE COURT: I'll give you a few minutes on voir dire to go into that.

MR. DUNN: May I have that now?

THE COURT: Yeah.

VOIR DIRE EXAMINATION

BY MR. DUNN:

Q. Mr. Sheahan, I'll make this easy for you. You've stepped here into court and you've given us this water flow analysis, which supposedly is not even at issue in this case. But can you lay a foundation -- you're an attorney. Can you lay the proper foundation to explain to us how you can do it?

A. I believe so.

Q. Okay.

A. One example of this situation --

Q. No. No. No. Not the foundation. I want to know your study, your fieldwork, your testing. I want to know the monitoring you did of test wells and, you know, out in the field and the bore samples and the hydrology studies that you've done.

THE COURT: If you need that, versus whether this is just some generally accepted principle in hydrology --

MR. TOOTLE: Show us someplace else.

THE COURT: He's not saying that he's not giving any specifics in any certain area.

MR. DUNN: Let's make the record clear. He's saying this is occurring. He won't tell us where. He said it's occurring in the Antelope Valley.

THE COURT: I'm taking it that when you have these mountain areas with bedrocks and you have streams and you have the aquifer-type material, this is, in general, the way the water flows; is that what you're saying?

THE WITNESS: Yes, ma'am.

MR. DUNN: Are you saying that's also in the Antelope Valley?

THE WITNESS: Yes.

MR. DUNN: Okay. That's why I'm asking for the Court to require this witness to testify what he has done scientifically to come up with this conclusion. I have his opinion. I want to know why he has it.

MR. ZIMMER: Your Honor, first of all --

THE COURT: Have you done anything scientifically to support this in this case?

THE WITNESS: Yes, I have. I've -- I reviewed the geology and hydrogeology of the area. I have not specifically drilled wells, pumped them, and tested this, but as a hydrogeologist, I don't need to do that in order to understand the concept of what is happening in the groundwater.

Further, I've studied similar situations in the Mojave Desert very close to our area where this is happening today.

MR. DUNN: I'm not going to drop this issue.

I need to know where in the Antelope Valley this happens.

MR. ZIMMER: Your Honor --

MR. DUNN: And I need to know why you know that's true, and then I'll sit down.

MR. ZIMMER: Can I be heard on this?

THE COURT: I'm going to at this point let you go into that on cross-examination.

MR. DUNN: Okay.

THE COURT: Because I think there's a sufficient foundational basis for him to give this opinion. I think your objection is better raised in cross-examination.

So Mr. Zimmer, your next question.

MR. ZIMMER: Thank you, your Honor.

DIRECT EXAMINATION (Resumed)

BY MR. ZIMMER:

Q. Mr. Sheahan, even in the diagram that Mr. Scalmanini drew with the water table low on his diagram --

A. Yes.

Q. -- way below the riverbed, even under those circumstances, that does not cut out groundwater flow at whatever the water table level is through the fully saturated fractured material in the mountains and across into the aquifer material.

MR. DUNN: Objection. Assumes facts not in evidence. The more he ties it into Mr. Scalmanini's specific area in the Antelope basin, the more this is objectionable.

MR. ABBOTT: And objection. Leading.

THE COURT: Just ask the question without referencing Mr. Scalmanini's in a nonleading fashion.

Q. (BY MR. ZIMMER:) Let's assume for the moment, Mr. Sheahan, that the water table level, instead of being here, was down here, at the bottom of your diagram.

A. All right.

Q. Would there still be groundwater flow from the fully saturated fractured bedrock into the water table?

A. Yes, there would.

Q. Sir, you mentioned that you believe there are

hydrogeologic structures in the Antelope Valley which are -- strike that.

You indicated that the hydrogeologic structures in the Antelope Valley in terms of creeks and riverbeds, in your professional opinion, are not simply what was drawn by Mr. Scalmanini on his diagram.

A. That's correct.

Q. Can you give us some examples of other areas where there are, in fact, conditions that differ from that and are what you're indicating.

THE COURT: All right. And you -- unless you need to diagram some more, you can be seated.

THE WITNESS: I would just like to draw one other thing on the diagram as I explain.

THE COURT: You may.

THE WITNESS: The one that comes to mind is the Leona Valley. The Leona Valley is -- is underlain by alluvium in the center. And the aquifer in that area is a fractured bedrock aquifer. It's highly fractured. There are wells that are producing water from the fractured bedrock. So if I may on this diagram, just to -- just to distinguish it from what I was talking about before, let me put some vertical lines in the central portion of this and refer to that as still the aquifer, but it's not an unconsolidated rock aquifer, it's a fractured bedrock aquifer.

We have specifically in that area wells that penetrate the fractured bedrock. If those wells are not pumping, rainfall comes in, fills up the creek, which is Amaragosa Creek in this

instance, and that creek, if the groundwater body is full as a result of flows from the bedrock to the side, that creek enters on out into the Antelope Valley and would recharge that valley.

However, if we put in wells in the fractured bedrock and extract the water from those wells for other uses, we lower the water table. When we lower the water table, we cause the surface water that would otherwise go out through Amaragosa Creek to infiltrate down into that fractured rock to fill up the portion that has been dewatered. That reduces the amount of water that goes out into the main valley and affects the recharge in the main valley.

And, again, this is why that area is an important area to include within the area that we investigate in Phase 2. So this is a specific instance within the Antelope Valley of that occurring. The same kind of thing occurs in the Mojave River just to the east of our area and in other areas in the desert.

Q. (BY MR. ZIMMER:) Okay. Thank you, sir. Go ahead and retake the stand.

A. (The witness complied.)

Q. So the bottom line is that whether or not this is a creek or a river that is at the level of -- of the water table, or it's the Leona Valley that's at the level of the water table, if you draw down that water table level, water that would otherwise be runoff is now infiltrating the ground and is not making its way into the Antelope Valley.

MR. DUNN: Objection.

MR. ABBOTT: Objection. Leading.

MR. DUNN: Objection. Assumes facts not in evidence.

THE COURT: Well, I'm going to sustain it on leading because I really don't like experts, when it comes to their opinions, to give -- to answer leading questions.

And I'll just have you rephrase it first.

Q. (BY MR. ZIMMER:) Would it be the case, sir, under this analysis hydrogeologically, that whether or not it's a creek or river wherein the water table is roughly equivalent to the bottom of that creek or whether it's a situation like in the Leona Valley where you have fractured bedrock and wells, if the water level is drained down sufficiently by pumping activity, that surface water which would otherwise make it into the Antelope Valley is diverted?

A. That is correct.

And if I may, just more specifically, the aquifer in the Leona Valley area is a fractured bedrock aquifer, which would normally have water levels at or above the bottom of the creek, which is the Amaragosa Creek.

If the aquifer is pumped, the fractured rock aquifer is pumped, and the water levels in that fractured aquifer are drawn down, then it allows the surface water from the creek to infiltrate into the ground instead of running out into the main part of the valley. That's the whole head of this diagram.

Q. Is there a concept in hydrogeology known as differential head?

A. Yes.

Q. Can you tell the Court what that is.

A. Differential head is the term that we use to refer to situations such as where we have a restricting layer separating

two portions of an otherwise contiguous groundwater body. If we have water levels on one side that are higher, we call that a higher head. Water levels on the other side that are lower, that would be a lower head. The difference in those two elevations is what we would refer to as a differential head.

Q. So in a state of nature without pumping, you could have differential head, for example, in the Leona Valley being higher than in the Antelope Valley.

A. Yes.

MR. BUNN: Objection. Leading -- I'm sorry. Objection. Leading.

THE COURT: Well, I'm going to allow it on this question, but I'm going to ask you to refrain from leading questions.

Q. (BY MR. ZIMMER:) Go ahead and answer and I'll try to remember that.

THE COURT: I think we got a "yes" answer, did we not?

THE WITNESS: Yes.

Q. (BY MR. ZIMMER:) If pumping in an area which is hydraulically connected to another area and in an area where there is generally higher differential head in the other area -- in other words, an area other than the Antelope Valley -- and you draw down in that other area the head, is it also possible that by draining that down because the differential head is changed from being higher here to lower that water can actually flow out of your Antelope Valley into that other area?

A. Let me see if I can answer in this way: If we have a situation where we have a higher water level elevation and a

lower water level elevation, normally the tendency would be for groundwater to flow from the higher elevation to the lower elevation. If we pump the water where the water level is higher and cause that water level to go down and go down to below the level on the other side, then we can reverse that flow and cause water to flow the other direction.

Does that answer your question?

Q. Yes, sir.

And is that another reason why we need to include these hydraulically connected areas you've discussed into the Phase 1 area?

A. Yes, it is.

Q. Let us talk, sir, about the L & S Memorandum, also known as the Luhdorff & Scalmanini Memorandum.

You did review that as a part of your work in this case and it is a part of your opinions in this case.

A. That is correct.

Q. Can you tell us what you did in terms of reviewing that and what your conclusions are.

A. Yes. May I -- may I put up some slides to assist in this?

Q. Sure.

THE COURT: You may.

THE WITNESS: May I have Slide 2?

Q. (BY MR. ZIMMER:) Now, do we have hard copies of this, also, so that we can provide -- I know that counsel has copies already. I think the Court got some also.

THE COURT: I have things that said slides. And we

probably need to mark them.

MR. JOYCE: Your Honor, I will be marking them for evidentiary purposes and I will provide them to the clerk.

THE COURT: Let's call Slide 2 Plaintiffs' 13.

THE WITNESS: Your Honor, can you see the screen?

THE COURT: I have a copy too.

THE WITNESS: I'd like to point to the screen as well, if I may.

THE COURT: You can do that.

THE WITNESS: What I'm showing here is a base map that I have created by combining several published U.S. Geological Survey topographic maps. The reason I'd like to talk about this momentarily is I use this base map as the base map for a number of other lines and figures. And I think it's important to understand what's shown on the base map, because it will be consistent throughout the presentation. And I think it helps to have a perspective of the ground surface and the area that we're looking at.

On this base map, this triangular area here is generally referred to as the Antelope/Fremont area. In some reports, it's the Antelope Valley/Kern area and so forth.

By way of orienting us, this vertical line through here is Highway 14. The city of Lancaster is this area that I'm referring to with the highlighter. Palmdale is just to the south of that area. The Leona Valley is just to the south of that, and I'll show that in a little greater detail.

The Fremont Valley is this upper lobe portion of the area. The San Gabriel mountains are to the south. The Tehachapi

mountains are to the west. And the Sierra Nevada and other named mountain ranges are to the northwest and so forth.

I mentioned the Mojave River. The Mojave River is within the area of my base map, and is more or less along this curved line to the east side.

Just to get a little more perspective, could I have Slide 19.

Q. (BY MR. ZIMMER:) On all of these slides, north -- is north to the top of the diagram?

A. Yes, north is the top of the diagram.

Very briefly, this is a slide that shows an aerial photograph of the area.

What is of some interest here is that you can clearly see Rosamond dry lake, and these little squares represent areas that the color is not good but they're green in this photo and represent agricultural development in the area.

Q. Hold on one second, sir.

We're going to mark as Exhibit 14 Slide Number 19, the aerial photo vertical.

Was there anything else on this slide, Exhibit Number 14, sir, that you wanted to point out to us in addition to what you have shown us?

A. Yes. Just, again, a couple of things for correlation. This is the city of Lancaster, this area that's a more or less gray area. Palmdale is to the south. And you can see a trace of Leona Valley in here. This photograph doesn't cover as much of the area that the base map covers, but it's just to give you a picture.

And similarly, if I could have Slide 20, please.

Q. Slide 20, we can mark as Exhibit 15.

THE COURT: Thank you.

THE WITNESS: I think this helps, also, to -- to put a perspective on what we are looking at in terms of the topography and the ground surface in the area. This is, we'll call it, a perspective view or an oblique view that is looking to the northwest. Again, we can see the Tehachapi mountains to the west, a portion of San Gabriel mountains to the southeast, and Leona Valley shows up here. We can see Rosamond dry lake, Rogers dry lake. We can see the sprawl of the city of Lancaster. And just off the bottom would be where Palmdale is.

Q. (BY MR. ZIMMER:) Leona Valley, again, was where?

A. Leona Valley is this area to the south. The line going diagonally upwards just at the edge of the mountains there.

MR. TOOTLE: Your Honor, I have an objection to the last two photographs. First off, I -- he's entering these as photographs, and I believe that they're digitally enhanced photographs.

I'd like to know where he got the photographs. I would like to know whether or not they have been digitally enhanced, and if they truly reflect what he's purporting them to.

I don't have a problem as to showing locations, but I do have a problem with actual -- showing anything else with regard to precipitation or anything like that in this area.

MR. DUNN: Objection. Lack --

THE COURT: Were they showing precipitation?

MR. TOOTLE: Well, colors. And purporting to what it

looked like a photograph, your Honor.

THE COURT: Why don't you state first, on Slide 19, where did this come from?

THE WITNESS: Well, Slide 19 is a photograph that I downloaded from a U.S. Geological Survey Web page. I believe my assistant can give me the -- exact Web site information. We have that. We have that somewhere.

What the Slide 19 figure shows at the bottom is Globe Explorer, Digital Globe. That's the logo, if you will, of the -- of the group that manages this. But this is put on the Web page for general use.

I don't believe this is digitally enhanced. I believe this is the best quality that they were able to produce from a photographic plate into a digital photograph that can be transmitted by the Internet. So that's all this surface is.

MR. DUNN: I still have foundational objections. We don't know who took it or when.

THE COURT: All right. Well, at this time, we're just using it, I'll say, for illustrative purposes. When we get to needing to admit it into evidence, you might need to lay a different foundation if you wish to do that.

But let's just try to expedite this. Just tell us briefly on Number 20 where that came from.

THE WITNESS: Okay. Slide Number 20 is a photograph, again, that I downloaded. I believe the caption is on the document that you have. At the bottom, it shows the Web site location. It's -- specifically, it says HTTP://PHOTOJOURNAL.JPL.NASA.GOV/TIFF/PIA02775.TIF.

THE COURT: All right. That's the Web site.

THE WITNESS: Yes. That's the Web site.

This is from JPL representing the Jet Propulsion Laboratory in Pasadena. NASA is the National Aeronautics and Space Administration, I believe. And so this is a photo that they had available for anyone to bring up.

Now, I would like to say I'm not sure that this is a photo. They present it as a photo. It may be digitally enhanced. I can't -- you know, I can't say on that. My only intent is to say that this helps us to understand what the area looks like.

THE COURT: All right. I'll allow you to go forward.

But we are now at a point where we need to break for the lunch recess.

MR. ZIMMER: Can I ask a question before I forget it? Two questions.

THE COURT: You may.

Q. (BY MR. ZIMMER:) Do these photographs that we just discussed generally depict the area in terms of what you're trying to describe in terms of geographically based on your observations being in the field in the area of Antelope Valley and based upon all of the other data that you have reviewed in preparation for this case or otherwise?

MR. DUNN: Objection. Vague as to the term "generally."

THE COURT: Overruled.

THE WITNESS: Generally speaking, yes. I -- from this photo, I can't determine whether the -- the elevations and the relative elevations are correct. But I can say from my own

personal observations in the area that this -- this diagram helps to understand the area that we're talking about.

MR. DUNN: Your Honor, move to strike all this witness's testimony about this particular exhibit shown as Slide 20, I believe it's Plaintiff's Exhibit 14, on the ground is -- the witness's testimony is he doesn't know. He believes it's probably digitally enhanced. He's not sure it shows the accurate levels.

THE COURT: Isn't his testimony -- is you can show the lake beds, it shows the city area, you can generally see the depiction of the area. It may have an admissibility later on. But as far as -- I'm going to deny the motion to strike. But you can raise it again if they ask it to be admitted into evidence.

Anything further on this, or is this a good breaking point?

MR. ZIMMER: It's good enough. We can bring it up later.

THE COURT: Let's start up at 1:30. We'll see everyone back then. Thank you.

(Lunch Recess.)

THE COURT: Good afternoon.

We are ready to continue.

MR. ZIMMER: Yes, your Honor.

THE COURT: Mr. Zimmer?

MR. ZIMMER: Yes, your Honor.

Q. (BY MR. ZIMMER:) Just before the break, Mr. Sheahan, we were discussing Exhibits 14 and 15, the slides.

Sir, did you digitally enhance any of those slides?

A. No. Not any of them.

Q. Are they accurate in terms of what you are using them for?

A. Yes. My intent was just to use them to show the general geography in the area and to identify some of the obvious elements on it and for no other purpose.

Q. In terms of our examination of the valley geographically, what's our next slide or portion to your evaluation?

A. I was in the process, I believe, of talking about my review of the Luhdorff Scalmanini Technical Memorandum.

Q. That's correct.

A. To continue that, what I'd like to do is show Slide 7. And on this slide, I've -- I'll wait till it comes up.

MR. ZIMMER: We'll mark this slide --

THE COURT: This is Number 7.

THE WITNESS: Slide Number 7.

MR. ZIMMER: Which would be Exhibit 16. Is that correct, Mr. Joyce?

MR. JOYCE: That, I believe, is correct.

THE COURT: 16 should be next in line.

MR. ZIMMER: So we're marking Slide 7 as Exhibit 16, for the record.

Q. (BY MR. ZIMMER:) And that is what, sir?

A. Slide 7 is my base map with a red line on it showing the line depicted by Mr. Scalmanini's map of what he refers to as the Bloyd 1967 boundary.

Q. Is -- now, that shows up on this slide on the screen

right now.

A. That's correct.

Q. Did you by any chance have an extra copy of that that we could highlight for the Court so the Court could have maybe two highlighted lines? Maybe we can highlight her copy.

THE COURT: That's -- well, I can just work off -- we need to highlight probably whatever's going to be the exhibit.

MR. ZIMMER: The exhibit.

MR. JOYCE: Here's Exhibit 7 that's been marked -- excuse me -- Exhibit 16 as marked.

MR. ZIMMER: Maybe it shows up clearly enough.

THE WITNESS: Well, I believe it's clear. It's the red line that is shown on the --

THE COURT: I see that.

THE WITNESS: -- on the exhibit.

Q. (BY MR. ZIMMER:) And that shows it clearly on here. Okay.

Let's have you take a look at Exhibit 16, Mr. Sheahan, and have you discuss that with us.

A. Well, Exhibit 16, again, shows the red line that is shown on Mr. Scalmanini's map that he intended to represent the boundary that -- that he interpreted from the Bloyd 1967 document.

First of all, just -- just to relate back, if I may point out something on the screen. The areas that I was talking about earlier as being important areas are outside of the line that he shows. There's the area to the south of the line, there's the area in Leona Valley. The entire Fremont Valley area

is excluded, and there's a large area to the east side. Those are the examples that I gave you earlier as areas that I believe are important to include and that are not included within that boundary.

Now, as I understand from reading Mr. Scalmanini's report and from listening to his 3 days' of deposition testimony and his testimony here, he constructed this line based on a description provided in the Bloyd 1967 report that he suggests describe this line as what Bloyd determined to be a groundwater basin.

If I may, I'd like to bring up Exhibit 113 on the board over here to -- to explain this.

Q. Tell me generally, sir, what that was.

THE COURT: Bloyd's map.

THE WITNESS: That's the Figure 10 of the Bloyd 1967 document.

MR. JOYCE: Rich, it will be --

THE COURT: It's going to be --

THE WITNESS: It will be a big map.

Q. (BY MR. ZIMMER:) Figure 10, I think.

A. That looks like it right there, I believe. Figure 10 would be in the upper right-hand corner. Is --

(Discussion - Not Reported.)

THE WITNESS: Okay. I thought we had a larger version of that. I have a larger version with me.

MR. JOYCE: Let's mark it.

THE COURT: Is that the larger version?

MR. ZIMMER: This might be the larger version here.

THE WITNESS: That's the larger version.

MR. ZIMMER: Yes. This looks the same.

THE WITNESS: That's it. That's it.

MR. ZIMMER: The only difference is it does not have this pink line on there.

THE COURT: Let's just mark the larger version Plaintiffs' 17.

THE WITNESS: And then I can draw some lines on that if you'd like.

MR. ZIMMER: We can do that.

That's 117, your Honor?

MR. JOYCE: No. 17.

THE COURT: 17.

MR. ZIMMER: I'm sorry.

THE COURT: It's Bloyd's larger map.

MR. ZIMMER: It's just a blowup of Figure 10 per Bloyd's record.

MR. JOYCE: May I, for the record, suggest that it be entitled Larger Version of Defendants' Exhibit whatever that exhibit number would be?

THE COURT: 113. That's fine.

All right. Did you need to approach?

THE WITNESS: Yes. May I?

THE COURT: You may.

THE WITNESS: Your Honor, if I may, let me go to this larger version and trace the line on here that represents the red line shown on my figure that represents the boundary line shown in the Plate 1 of Mr. Scalmanini's report. And so that --

THE COURT: You may.

THE WITNESS: -- will be, as best I can, the -- exact same line as shown on Exhibit 113.

THE COURT: All right.

THE WITNESS: Just so we have something to compare it.

THE COURT: And you're tracing it in the pink?

THE WITNESS: I'll trace this in pink.

MR. ZIMMER: Fluorescent pink.

(Pause in Proceedings.)

THE WITNESS: All right. I've done that.

And, again, the line I've traced in pink on Exhibit 17 is the line that Mr. Scalmanini selected from what he read in Bloyd as -- and which he has called the groundwater basin described by Bloyd.

In fact, in Bloyd's report on page 20, he describes what he calls the Antelope Valley basin to a number of subunits and subareas partly which is -- part of which are included in this line and part of which are not.

What Bloyd actually describes as the "Antelope Valley basin" -- and if I could use those three words in quotes for right now --

THE COURT: You may.

THE WITNESS: -- includes an area called the Rosamond-Bissell area and the -- let me outline these in -- which is this area. It includes what's called the Hi Vista area. And I'm going to outline the outer boundary of that area as shown in Bloyd. And it includes the Foothill area. And I'm going to attempt to outline that area in -- I'll do it just generally

instead of following each of the little catches down here. And so there are three additional areas that Bloyd refers to when he describes what he calls the Antelope Valley basin.

And you may recall, I believe, Mr. Scalmanini was asked to explain what Bloyd referred to as basin as opposed to groundwater basin. This is -- what? -- on page 20 of the Bloyd 1967 report, this outer boundary, including the green, is what he described as the Antelope Valley basin.

Now, even more important, earlier in his report on the previous page, on page 19, Bloyd actually defines what he considers to be both the Antelope Valley groundwater basin -- and I'll accent the groundwater part -- and the Fremont Valley groundwater basins. And so what I'd like to do is to show you Figure 2 of his report, which he refers to when he says there are two major groundwater basins in the AVEK area, Antelope Valley and Fremont Valley basins, Figure 2.

And I believe I need to have our version of Figure 2 to put up here. I don't know that we have a copy of Figure 2.

THE COURT: We've had Figure 2 up there.

MR. JOYCE: Figure 2 is Exhibit --

MR. BUNN: Exhibit 10.

THE COURT: Okay. That's Exhibit 10. I think it's up there somewhere.

MR. JOYCE: Actually, your Honor, the -- the Exhibit 10 that I marked is exactly the same scale as pulled from Bloyd's report which is roughly 8-by-11. And it's a one-page small --

THE COURT: Right.

MR. JOYCE: -- smaller document.

THE COURT: So you have a big one.

MR. JOYCE: I think he has an enlargement of it.

THE COURT: All right. So we will mark as Plaintiffs' 18 the bigger version of Exhibit 10?

MR. ZIMMER: We're making sure we have a copy first.

Q. (BY MR. ZIMMER:) Mr. Sheahan, while she's looking for that, what you have outlined in pink and green, is that what Mr. Bloyd described as the basin including the subbasins?

A. Yes. That's -- that's the specific definition that he described using the subunits. He doesn't refer to these as subbasins, but he calls them "subunits" and "areas." And his definition of the basin includes both subunits and areas. And when he refers to the Antelope Valley basin, he's referring to this area outlined by the green and pink boundaries. So it's a larger area.

Q. In terms of the way the report reads, does the report start out by Bloyd with a description of the groundwater basin?

A. Yes.

Q. In other words, start out generally?

A. On the previous page is where the text that I read a moment ago shows. So the introduction to his section called delineation of groundwater basins states that there are two basins, and he refers to Figure 2 to demonstrate what the two basins are. And on that figure, I'll be able to show what he was referring to as the two groundwater basins, the Antelope Valley and the Fremont Valley.

THE COURT: And let me ask our witness, as you're using these terms, is there a -- what is your definition of a

groundwater basin versus the basin?

THE WITNESS: Your Honor, the definition of a groundwater basin is a very difficult question to answer. Groundwater basin is not a term of art in the field of hydrogeology. It's a term that's applied to various study areas dealing with groundwater. And the areas depicted and the definitions of those areas varies significantly and varies depending on the purpose of the person defining the basin. And that's specifically the point that I'm going to be presenting.

What -- what Mr. Bloyd described as a basin was an area that he wanted to focus on for the remainder of his study. In other figures in his report, he refers to the area as a study area. The only place that I've found in his report that he refers to a groundwater basin is the boundaries shown on Figure 2. Everywhere else, he uses "basin" without saying groundwater basin in quotes, and he refers to study area.

So it's clear to me from reading his report that for the Antelope Valley vicinity, he focused on a certain group of subunits and areas for his study. He didn't -- he didn't choose to study other subunits that are up in the Fremont Valley area. He didn't choose to study other areas outside this. He chose to study an area that he defined as these units and these areas.

THE COURT: Thank you.

THE WITNESS: And there's no place in Bloyd that I have seen where the pink line that's shown here is highlighted as being a groundwater basin. It's an interpretation of -- that is made from the text in Bloyd by including the subunits and excluding the areas that he describes as part of his basin.

The other point that I'd like to make once I'm -- and I apologize for getting to this figure slowly --

Q. (BY MR. ZIMMER:) Let me get you this, Mr. Sheahan. At least we can get back on track here. We've marked Exhibit 18 what I believe is a copy of Figure 2 from Mr. Bloyd's report. You might want to highlight on that copy what Mr. Bloyd's groundwater basin line was for purposes of his study.

A. This is a figure I believe you heard testimony about yesterday.

Q. Mr. Sheahan, if you can make a line, I thought I'd put it up on the ELMO for the Court to look at.

A. You want me to do it here and show it there?

Q. That's correct.

A. I'm going to use a blue highlighter on this.

What is shown on this figure -- the only boundary line shown on the figure -- boundary lines are the AVEK boundary which is, if you will, a political boundary, and the drainage boundary.

The drainage boundary is what I'm going to highlight -- is blue. And I'm also going to highlight in blue the words "Antelope Valley" and the words "Fremont Valley." So it's clear in looking at this figure and reading the text that Mr. Bloyd provides --

Q. Let me put that up there, Mr. Sheahan, so the Judge can see it.

A. I'm sorry.

Q. And she'll know what you're referring to.

A. Now, the blue highlighting is not showing up very well.

Q. Not very well.

THE COURT: It's there.

MR. ZIMMER: We can see it, I think.

THE WITNESS: To the extent I -- the line that I'm showing in the legend that I'm pointing to --

(Discussion - Not Reported.)

THE COURT: It might help if you indicate with a laser pointer perhaps.

THE WITNESS: Certainly.

The line that I outlined, would you like me to indicate that?

THE COURT: Please.

THE WITNESS: I outlined starting in the lower right-hand corner this boundary line that goes up to the top on the west side and generally across the top, stops at that point. And another line that's also the drainage basin boundary that goes generally through the center and upper portion.

And the point, your Honor, this is the map that Bloyd is referring to when he describes groundwater basins. He describes two groundwater basins as being shown on this figure: The Antelope Valley groundwater basin and the Fremont Valley groundwater basin.

So what he has done is to define groundwater basins using drainage basin boundaries. This is not an uncommon practice in some of the information that you've been provided by Mr. Scalmanini. Use of drainage basin boundaries is totally appropriate for defining groundwater basins if it meets your purpose. It is one of the terms commonly used for this purpose.

And, in fact, this is not the only time that agencies

such as the United States Geological Survey that Bloyd worked for or other state agencies have used drainage basin boundaries to design groundwater basins.

I'd like to show you the figure -- I believe it's Exhibit 109. And I believe I have a larger copy of it.

THE COURT: That's Bulletin 118?

THE WITNESS: Yes. I have a small copy of that, but I believe I have a blowup of a Bulletin 118 figure that shows that the Department of Water Resources, as early as 1975, as shown by Exhibit 109, was using the same drainage basin boundary for the separation between the Fremont Valley and the Antelope Valley groundwater basins as they define groundwater basins.

THE COURT: All right. We'll mark as Plaintiffs' 19 -- this is the larger version of 109? Is that what it is?

THE WITNESS: No.

THE COURT: Well, Exhibit 109, being Bulletin 118, the map from 1975.

MR. JOYCE: Is this the update?

THE WITNESS: This is the update. The update I have is dated 2000.

THE COURT: This is Bulletin 118-2000.

THE WITNESS: Yes.

There are no significant differences in area shown by the groundwater basin in the Bulletin 118-2000 version that I'm showing you and the bulletin on 118-1975 version that is Exhibit 109.

With regard to the point that I'm making concerning the

upper boundary, there are no differences at all, so --

MR. JOYCE: Your Honor, for the purposes of the record, I am placing the exhibit sticker on the back of the exhibit so it will be --

THE COURT: That's fine.

MR. BUNN: Your Honor, may we review that exhibit, please?

THE COURT: You may. Why don't we give them about two seconds to do that.

(Pause in Proceedings.)

MR. ZIMMER: Your Honor, the other exhibit that came up there, we took the hard copy up to the clerk.

THE COURT: All right.

Q. (BY MR. ZIMMER:) Mr. Sheahan, we are showing you what has been marked as Exhibit 19 for identification.

Do you recognize this document, sir?

A. Yes.

Q. Can you tell the Court what that document is.

A. This is a document that I downloaded, again, off of the Internet from the Department of Water Resource's Web site. Currently, the Department of Water Resources is continuing to update its Bulletin 118. But in that process at various times, it issues the maps and maps of a specific date.

This map was compiled and prepared as of August 22nd, 2000. The map has actually been updated again on the Web site, but this one remains as the one published on the Web site as of August 22, 2000.

Q. Why don't you go ahead and put it up on the board so we

can see what it depicts.

A. (The witness complied.)

I hope this stays on the board.

Q. Let me ask you this before we get started: Is this -- can you show us the line that it depicts and then tell us whether that's the same line that's on the 1975 study.

A. Yes. I can highlight the line in pink on this exhibit. I've forgotten the number.

THE COURT: You may.

THE WITNESS: The portion of the line that is shown on -- on here is the line that I'm highlighting in pink. Let me say it's the portions of the line, because it has segments.

What I'd like to point out that I think is important is that in defining a groundwater basin, the Department of Water Resources has used its own set of criteria for its own purposes. One of their criteria has been the aerial extent of unconsolidated materials, and that's the area generally shown in blue. But in those areas where the unconsolidated deposits or aquifer materials go beyond one area into another area, they have selected other boundaries for convenience and for the purpose of defining groundwater basin. This map shows the Fremont Valley -- and I'll show that with an "FV" in pink -- and the Antelope Valley -- and I'll show that with an "AV" in pink. That shows continuous water deposits in the Antelope Valley and Fremont Valley.

For their convenience and appropriately to divide this into separate groundwater basins for groundwater basin management purposes, Department of Water Resources has chosen to utilize the

drainage basin boundary, watershed boundary, if you will, that separates the Fremont Valley and the -- the Antelope Valley as a line of demarkation between their two identified groundwater basins.

Since 1975 -- perhaps before that, but certainly since 1975, the map that you see on Exhibit 109, they have designated the Antelope Valley groundwater basin by a number, 6-44, which I'll highlight in pink, and the Fremont Valley groundwater basin by a number, 6-46, which I will highlight in pink.

This general designation of groundwater basins has been essentially the same from 1975 to date. In fact, the most recent map published on the Internet as of May of 2002 shows the same designation and shows the same drainage basin boundary separating the two so-called groundwater basins.

In response to your earlier question, DWR has defined their groundwater basin based on their purposes based on their criteria. And they've defined a considerably larger groundwater basin that they call the Antelope Valley groundwater basin, than has been defined by the pink line on Exhibit 17.

In fact --

Q. (BY MR. ZIMMER:) Just for record identification purposes, Mr. Scalmanini's line.

A. Yes. I'm sorry. Scalmanini's line.

The Department of Water Resource's information indicates that the Antelope Valley groundwater basin that they have defined is approximately 1,730 square miles. I believe you heard earlier that the -- the Scalmanini boundary line is approximately 920 square miles. I think it's slightly larger than that, but I

believe it's less than a thousand square miles. That's a considerable difference.

This is a relatively small area shown by Mr. Scalmanini compared to the groundwater basin that the Department of Water Resources has used. And it's -- Department of Water Resource's groundwater basin is probably 70 percent larger. They have chosen to include in their groundwater basin those example areas or many of the example areas that I mentioned earlier. They've included portions above the Rosamond Fault. They've included the area south of the south line of Mr. Scalmanini's area. They've included the Leona Valley. And they've included all of the land out east of Saddleback Buttes.

Q. Mr. Sheahan --

A. I think I'm done with that.

Q. Okay. Mr. Sheahan, the DWR line, for its purposes, is still somewhat less inclusive than where you -- what properties you think should be included for the purposes of Phase 1 in this case; correct?

A. That's correct. Let me explain why.

As I mentioned earlier, the Antelope Valley aquifer system doesn't stop at the watershed boundary to the north. The watershed boundary goes across a relatively high spot in the flat ground out there. And the aquifer system continues on up into the Fremont Valley.

Q. Can you show us what you're talking about.

A. I can do this with a highlighter. Would that be sufficient?

Q. Sure.

A. The area I'm talking about, the blue area on exhibit -- help me out? Is that 17, or 18?

Q. That is 18.

A. Thank you.

Q. 19.

MR. JOYCE: That's Exhibit 19.

THE WITNESS: The blue area is the area designated by the Department of Water Resources as aquifer material. And they show that it's a continuous aquifer system running from up in the Fremont Valley all the way down through the Antelope Valley and out past the Saddleback Buttes area.

And so my assessment of this included both the Fremont Valley and the Antelope Valley. My boundary includes both of those because there's hydraulic continuity across that line, certainly. Groundwater can easily flow under that drainage divide. Pumping in the Fremont Valley in the area that I'm showing here above that line can have an hydraulic effect on water levels south of that line and vice versa.

So in my assessment, I found it not appropriate to limit the area for the Phase 1 boundary to just a groundwater basin, and certainly not just this groundwater basin, but to take in an area that included all of the aquifer system that was important for Phase 2 analysis.

Q. In terms of gross amounts --

THE COURT: Can you hold on one second?

While we're on this subject, I'm looking at the smaller map, which was 109-A.

THE WITNESS: Yes.

THE COURT: You're saying Fremont Valley and Antelope Valley are hydraulically connected. I don't think I've ever seen that word right. But then we look -- you can't see the numbers, but when we're going to the right, is it 43 and then 42?

THE WITNESS: Yes.

THE COURT: Do you see those, which I take are other basins somewhere?

THE WITNESS: That's correct. 6-43 is the El Mirage basin and 6-42 is the Alto basin.

THE COURT: You're not including those?

THE WITNESS: Well, DWR did not include those in their boundary basin, and I have not included those specifically in the area that I've shown in my Exhibit B. And I can explain why.

THE COURT: I want to know why the Fremont Valley would be hydraulically connected but this one -- at least, this one, 43, whichever basin that is, is not. Because in looking --

THE WITNESS: I'm sorry. I didn't mean to imply that. That basin is hydraulically connected.

THE COURT: All right.

THE WITNESS: I have another reason why I did not include that.

THE COURT: Then explain that reason.

THE WITNESS: It definitely is hydraulically connected.

THE COURT: It would look, in looking at this map, 109, that there's a whole lot of basins hydraulically connected.

THE WITNESS: That's correct.

THE COURT: All right.

THE WITNESS: There are a lot of basins hydraulically

connected.

THE COURT: So have you made the decision to include the Fremont Valley basin and not this -- these other ones?

THE WITNESS: Give me just a moment. I may have a slide that will demonstrate that.

Give me Slide 5, please.

THE COURT: Slide 5, we'll mark as 20.

THE WITNESS: I'll use the highlighter to show you. It may be difficult to see there, but there are two boundary lines, if you will, drawn on the base map on Slide 5. The black line is the watershed boundary for -- actually, for several watersheds. I have shown the watershed boundary for the Fremont Valley, the watershed boundary for the Antelope Valley.

Now, these are the drainage basin boundaries, the watershed boundaries. And I've shown a small watershed boundary down to the east portion of the Leona Valley.

If we were to select watershed boundaries and consider that we were interested in looking at all the water within those boundaries, which is sometimes appropriate in defining a study area for groundwater studies because the watershed includes all the surface water and all the groundwater within that area, we might have chosen that entire area.

There is hydraulic communication across the watershed boundary to the east, as you indicated, your Honor, through the groundwater system. That hydraulic communication is important. However, there's another aspect that's important as well. And that's the fact that the area to the east generally of the San Bernardino County line and this watershed boundary has

already been addressed in court, if you will. And by that, I mean just generally adjudicated. And so that's an area where, as I understand it, water rights have already been determined.

It's -- in my review of the Phase 1 stipulation and my understanding of what's required in this case, is to adjudicate water rights, it seems inappropriate for this Court to address properties located east of the line that represents the west line of the Mojave basin area adjudication. So I've chosen on my map that I'm referring to as Exhibit B -- I don't know if we have a figure number for it or a -- or a true exhibit number for it.

Q. (BY MR. ZIMMER:) We've not marked this one yet; correct?

A. I don't think so, no.

MR. DUNN: Objection. Move to strike the witness's testimony as to what is legally appropriate with regards to what's been adjudicated in the Mojave adjudication on the grounds that it's a legal opinion.

THE COURT: His testimony just goes to his opinion as to why he did not include it, not whether or not it is legally or not legally appropriate. So to that extent, I'll allow it.

MR. ZIMMER: And as we said, your Honor, we have no objection to considering groundwater flows in and out of the area.

Q. (BY MR. ZIMMER:) Did you want to mark this?

A. Yes, I would like to.

THE COURT: We'll make that 21.

What should we call it for our clerk?

THE WITNESS: I refer to it as Exhibit B to my report.

But perhaps Phase Area 1 boundary, which is its title, might be better.

Q. (BY MR. ZIMMER:) Mr. Sheahan, we're showing you what's been marked as Exhibit 21 for identification.

Can you tell us what that is, sir.

A. Yes. This is the map that I produced as a result of my studies on this -- in this matter. It's Exhibit B of my report dated June 16th. On this, I've shown three lines. Again, the solid black line is the set of watershed boundaries that I described earlier, the boundary of the Fremont Valley, the boundary of the Antelope Valley, and these are drainage basin boundaries, and the boundary of what I'll call the western portion of the Leona Valley.

I've also shown a dashed line that is generally north and south in this area, and that represents the county line. It's essentially the western boundary of San Bernardino County.

In my review of the judgment in that case and the maps that are shown to represent the western boundary of the adjudicated area, from the point marked F on my map to the point marked G, the red line that I have drawn represents the boundary of the area that I have proposed. And that's the western boundary of the adjudicated area. And I've chosen that on my map because I believe, in my opinion, it is inappropriate for me to have included an area that has been previously adjudicated in this matter concerning water rights.

Q. Is the line that you indicated on your map the same line as described in the Mojave adjudication?

A. Yes, it is.

Q. Okay. And that would be the line that follows the county line on the southeastern portion?

A. Yes.

Q. And then picks up the watershed on the northern portion.

A. That's right. The upper portion is generally watershed, although there are two places where it stops being watershed and becomes county line there and there. And then the lower portion, it goes beyond the watershed and actually includes part of what Exhibit 109 shows as groundwater basin 6-43. So it includes part of that groundwater basin. And I have included that within my total watershed boundary.

THE COURT: Let me just ask counsel: I take it that other adjudication is a nonpublished decision?

MR. TOOTLE: Supreme Court decision.

THE COURT: Which one is that?

MR. ABBOTT: Barstow versus Mojave Water Agency.

THE COURT: Thank you.

Q. (BY MR. ZIMMER:) Is there anything more at this time that you wanted to comment upon, Mr. Sheahan, regarding this particular diagram or the previous one?

A. Well, the previous one I was talking about was just to make the comparison that in -- and in response to your Honor's question about groundwater basin definition. DWR has chosen to define a groundwater basin in a particular way. They have done it consistently since 1975 in terms of using a drainage basin boundary for that purpose.

The Figure 2 of the Bloyd report presents the groundwater basin as described by Bloyd, which is different than

the groundwater basin so-called that Mr. Scalmanini has presented as the red line that I showed earlier. And that's the information that I wanted to present to you with regard to that issue.

THE COURT: Is it your opinion that Mr. Scalmanini's basin is essentially a subbasin of the Bloyd report?

THE WITNESS: Your Honor, I have the same problem with the term "subbasin" as we do with the term "groundwater basin." A "subbasin" is not a term of art. We can use that as long as we all agree to what the meaning is.

The problem that I have with that is that it has been attributed to Bloyd that he has used the term "subbasin" to designate certain areas. And, in fact, he did not. He used the term "subunit." I have no idea why, but he chose the term "subunit" and area to represent divisions within the overall two groundwater basins that he defined.

If we would like to agree that there's some specific definition of what a subbasin is -- and hydrogeologists do this all the time -- then it's fine to apply that term. But I think at this point in this case, to use the term "subbasin," it just continues to be confusing.

I would prefer to go back to Bloyd's use of the term "subunit" to define the areas that Bloyd identified, which Mr. Scalmanini has presented on his map, and refer to those as subunits. I realize that's not an answer to your question.

THE COURT: You would agree that what Mr. Scalmanini has depicted is simply a subunit of what you believe is the Bloyd basin.

THE WITNESS: If I may.

THE COURT: You may.

THE WITNESS: What he has done is to select 8 subunits of the 14 subunits that Bloyd presented. And based on his interpretation of what Bloyd said on page 20 of his report, Mr. Scalmanini has chosen to make the outer boundary of those contiguous subunits equivalent to groundwater basin.

THE COURT: All right. And when you say 8 of the 14, you've outlined three general areas.

THE WITNESS: That's correct.

THE COURT: So could you be more specific and on some map show me where you believe the missing six, seven units are.

THE WITNESS: Yes. I'd be happy to. I need Figure 113, which is the -- I'm sorry -- Exhibit 113, which is Figure 10 of the Bloyd report.

Let me use a green highlighter, if I may.

THE COURT: Is that green, or that orange?

THE WITNESS: I'm sorry?

THE COURT: It looks orange. Thank you.

THE WITNESS: It's definitely orange. Thank you.

Rather than the boundary lines, let me use orange to highlight the names of the subunits and we'll count them as I go.

The eight that are included within Mr. Scalmanini's line are the Finger Buttes, the West Antelope, the Neenach, the Lancaster, the Pearland subunit, the Buttes subunit, and the North Muroc subunit, and the Peerless subunit. That should be one, two, three, four, five, six, seven, eight.

The other subunits that are shown on here are the

Willow Springs, the Gloster subunit, the Chaffee subunit, the Oak Creek subunit, the Koehn subunit, and the California City subunit. So that's 9, 10, 11, 12, 13, 14 -- a total of 14 subunits.

THE COURT: All right. And then those other two areas to the south and to the east that you've shown in the green outline were not part of Bloyd's study area, however you want to call it?

THE WITNESS: They are included in what Bloyd describes as his Antelope Valley basin. They're not included as subunits. They're a different thing. But he did include those in what he described as the basin.

Now, in fact, the drainage basin boundary is not shown on here. But if it were -- and we can do an overlay that shows that -- several of these subunits that are not within the pink line that represents the Scalmanini groundwater basin are within what Bloyd describes as the Antelope Valley groundwater basin. Particularly, Willow Springs, which is just north of his line of part of the Gloster subunit, part of the Oak Creek subunit.

MR. ZIMMER: Would it be helpful, your Honor, to have one more color on there to show the groundwater basin as described by Mr. Bloyd?

THE COURT: If we can maybe take a black marker and you do the outermost limit in black? Can you do that?

THE WITNESS: I would have to only -- I would have to estimate it because the drainage basin boundary used by Bloyd as the boundary of the Antelope Valley and Fremont groundwater basin is not shown on this figure.

This is a figure that -- that presents the units, the groundwater units, and these other areas that Bloyd discusses. In separating them, Bloyd has chosen to describe the area that I have indicated that's the eight subunits and the three areas. He's chosen to call that his Antelope Valley basin for his purposes, and further discussing the area in his report.

He also talks about the other subunits. But the choice of which subunits and areas he has used has been totally Mr. Bloyd's. He did not pick all of the subunits within what he calls the Antelope Valley groundwater basin. He picked a few of them for his purposes.

Mr. Scalmanini has taken the subunits but not the areas and has called that a groundwater basin for his purposes. So I'm still responding to your question concerning what is a groundwater basin and a subbasin. For a specific purpose, hydrogeologists, unfortunately, use the term "groundwater basin," but generally they define what that is for that purpose. There is no such thing as the groundwater basin.

I could very comfortably include several more of these units and draw a line around it and say for my purposes this is a groundwater basin and this is what I will refer to henceforth as a groundwater basin.

As I mentioned earlier, my concern with limiting the number of subunits that are selected for our groundwater basin tends to exclude areas that have groundwater in them wherein pumping can cause effects across those boundaries and tends to create a very difficult situation in doing a Phase 2 assessment of the significance of pumping in this area.

THE COURT: All right. And can anyone -- I'm not sure if this expert can -- point out to me right now on this map where we have all these things where plaintiffs' land lies?

MR. JOYCE: Well, your Honor, I can --

THE WITNESS: I cannot.

THE COURT: All right.

MR. JOYCE: I can point out where the two pieces I have are.

THE COURT: If you would just do that. I won't take it as evidence, but just as a general.

MR. JOYCE: As a general proposition, your Honor.

Your Honor, this will not be the least bit geographical --

THE COURT: Let's not even mark it. I just want an idea.

MR. JOYCE: One of the pieces of property that is before the Court through Diamond Farming is in the Neenach subunit, and another is in the Lancaster subunit.

THE COURT: All right. Those are --

MR. JOYCE: So we have two -- two internally distinct subunits.

THE COURT: All right. So that's all of yours.

MR. JOYCE: That's exactly.

THE COURT: All right. Mr. Zimmer?

MR. ZIMMER: Your Honor, our properties are in the Antelope subunit to the east of Lancaster and some other areas out in the Buttes area.

THE WITNESS: I think the other side --

MR. ZIMMER: I'm sorry. Over in this area, in the Buttes area, near the county line.

THE COURT: And that's all of yours.

MR. ZIMMER: Yes.

THE COURT: All right.

MR. ABBOTT: Your Honor, I brought my maps to all of the hearings. And this one shows where the Diamond Farming properties are in green.

THE COURT: I don't see any green. Is that the grayish? Oh, okay.

MR. ABBOTT: Here and here (indicating).

THE COURT: You know what we need is, like, one master overlay with everybody's boundaries on it.

MR. BUNN: Our technology isn't quite there yet.

MR. ZIMMER: I'm sure Mr. Sheahan can probably do it. Eventually in Phase 2 we'll be doing that.

THE COURT: That would be really helpful.

THE WITNESS: I have one showing all of the lines on Mr. Scalmanini's map and all the lines on my map together.

THE COURT: Plaintiffs' property and --

THE WITNESS: It doesn't show the properties.

MR. ABBOTT: And then this depicts the Bolthouse properties in pink -- rough areas. These are not exactly engineering-specific. It was, you know, rough -- section, quarter-section numbers, and they just tried to estimate it from the section lines. It's not absolutely accurate.

MR. JOYCE: Okay.

MR. ABBOTT: General vicinities.

MR. JOYCE: I just didn't want us to get evidence out of -- and more importantly, I wasn't sure what that was representing. That looks generally -- reasonably accurate as far as generalization.

THE COURT: For some reason, I was thinking Mr. Zimmer had land north of the Scalmanini line, but you don't.

MR. ZIMMER: No.

THE COURT: It's to the east.

MR. ZIMMER: Yes.

MR. TOOTLE: And the pink on this map is the Bloyd area.

MR. ABBOTT: This is the Carlson Phillips.

MR. TOOTLE: This said Bloyd's.

THE COURT: Doesn't he reference Bloyd probably?

MR. TOOTLE: Yeah.

MR. JOYCE: Your Honor, it may be helpful if the defendants can now tell us where their wells are.

THE COURT: That may take a lot longer.

MR. ZIMMER: Let's move.

MR. JOYCE: I meant that facetiously.

(Discussion - Not Reported.)

Q. (BY MR. ZIMMER:) Mr. Sheahan, the Court has asked a question where the properties are, for the Court generally. There was discussion by Mr. Joyce about some of the Diamond Farming's property being up near the Neenach and some by the -- in the Lancaster area, as well as some properties of Bolthouse near the Lancaster area along with some area -- some Bolthouse properties over in the Buttes area.

Is it your opinion as a hydrogeologist, or do you have

an opinion as a hydrogeologist whether, given the generalization of those properties, you would want to include the areas you've described in your area for evaluation?

A. Yes. In my opinion as a hydrogeologist, it's necessary to include the areas north of what we're talking -- calling the Neenach subunit because there is hydraulic communication across that boundary. Mr. Scalmanini has indicated one area where there's hydraulic communication. Actually, Mr. Bloyd's maps indicate that there is greater amount of hydraulic communication and actual flow from north to south across that.

Therefore, in order to assess in Phase 2 effects of pumping, of groundwater pumping, I have to look further north than just the northern boundary of Mr. Scalmanini's line. I need to look into the subunit above that and consider the groundwater conditions and groundwater pumping that may or may not be occurring out there in order to make that assessment.

To truncate the area of interest for Phase 2 using the northern line of Mr. Scalmanini's map, essentially based on my understanding of, I think, what he clearly says in the Phase 1 stipulation, that we will not consider pumping above that point and exclude those properties, it makes it nearly impossible as a hydrogeologist to make a proper assessment in Phase 2. That's why we need to include an area larger than that.

Q. And why is that? Because the entire water table in this area is affected by inflow and outflow?

A. Yes. Absolutely. If there is some flow coming across from north/south across that line -- and just as a -- as an example, I think Mr. Scalmanini testified that there may be up to

700-acre feet coming through one small section. If someone north of that line starts pumping groundwater or has been pumping groundwater and reduces that 700-acre feet to 600-acre feet, then there's 100-acre feet less down in the Antelope Valley portion, which would affect water level in that area.

THE COURT: And I understand what you're saying, but I'm going to interrupt with a question, because this is where I'm having a little trouble.

And I go back to that little area. I guess it's 6-43 that we didn't include because it's been adjudicated.

THE WITNESS: Yes.

THE COURT: Does not the pumping over there have the same effect on this basin -- or whatever -- the area, whatever we want to call it -- as the pumping in the area you want to include?

THE WITNESS: It could have an effect. But we have one other factor in that area that we haven't discussed yet -- at least, I haven't discussed that --

THE COURT: What is that?

THE WITNESS: -- that becomes important.

There has been documented in that area a groundwater divide. And let me explain what that means.

Where we have areas of large groundwater recharge such as a stream coming down from the mountains carrying large quantities of water that infiltrates into the ground, as it infiltrates into the ground and gets into the water table, it builds up a mound in the water table.

Along the crest of that mound on either side of that

crest, groundwater flows in two different directions. I believe -- you may recall some testimony concerning groundwater divides as being one means of defining a groundwater basin. Although the groundwater divide may move some as a result of pumping, it still provides, to a great extent, an acceptable way to separate two groundwater units. So we do have the advantage down in that area of having a groundwater divide.

In Phase 2, though, it would be necessary to consider pumping from one side, let's say, the east side of that boundary, and its effects on pumping within our Phase 1 area boundary. We need to consider that, but we would not need to consider it with regard to water rights issues. We'd only have to consider it in terms of what I'd call a water balance. How much water is coming in and how much is going out. You could take care of that --

THE COURT: But assuming -- and I have not made any predecisions on this, but say I adopt a smaller area than what you have outlined. Could we not do the same things? I was trying to explain before when I was talking to counsel, request the area not in terms of the rates, but in terms of the effect the pumping would have?

THE WITNESS: Yes, we could.

THE COURT: All right. And explain to me why, in your opinion, to the north, and then I guess to the -- what is that? -- the southwest, those areas that would not work.

THE WITNESS: To the north -- well, I'm sorry, your Honor. If I understand your question, why we need to go outside of Mr. Scalmanini's line?

THE COURT: Right. Because you said this area in

Subsection 43 would not be considered to the extent of rights, but you'd still consider the effect of the pumping on that area. I thought that's what you said.

THE WITNESS: We'd consider the inflow or outflow of groundwater in that area --

THE COURT: All right.

THE WITNESS: -- as part of balancing out our water system.

THE COURT: All right. So if I adopt a smaller area than what you are proposing, why would not just considering the inflow and outflow of the -- the larger areas not be adequate?

MR. JOYCE: Your Honor, I think --

THE WITNESS: I'm not following you.

MR. DUNN: Let's let the witness answer.

THE COURT: I want an answer. Just -- if you have an objection, just state your legal basis.

MR. JOYCE: I'm sorry. It's not intended an objection, your Honor. The issue really is --

THE COURT: Then I'm going to ask just for the legal basis.

MR. JOYCE: Fine. Then I withdraw. Proceed.

THE COURT: And then you can certainly argue that I'm misplaced in the wrong area.

MR. JOYCE: No.

THE COURT: I'm trying to get my way through this as good as I can.

MR. JOYCE: I understand.

THE WITNESS: I'm sorry. Just to clarify your question,

the larger area that I'm referring to is the eastern side of the 6-43 area, for example?

THE COURT: Well, that. But the area to the north and the area to the southwest that you've also included in your area.

THE WITNESS: I believe you mean the southeast.

THE COURT: I have south on that, the green? Isn't that part of yours?

THE WITNESS: This here. I'm sorry. Southwest.

THE COURT: And the north.

THE WITNESS: Yes.

THE COURT: In other words, if I have a smaller area than what you've outlined but we're still considering the inflow and outflow, why would that not be adequate to adjudicate the plaintiffs' rights?

THE WITNESS: Okay. I understand your question.

And one reason is that the Willow Springs subunit and the Gloster, if I believe I'm pronouncing that right, subunits that are north of that area would not be within the -- what Bloyd defined as the Antelope Valley basin. But they are adjacent to and hydraulically connected to the subunits that are included within Mr. Scalmanini's red line.

Those are areas where we would need to consider specifically pumping because plaintiffs, as I -- I'm sorry -- defendants, as I understand it, have wells in that area and there are other properties that have wells in that area.

In considering the impact of specific pumping on water levels and considering the effects of groundwater production, we would need to take those areas into account. Not just general

inflow and outflow, but the specifics of what is happening in terms of groundwater production in those areas.

THE COURT: Are you saying in that area that we call -- whatever -- 43, there's no wells?

THE WITNESS: No, I'm not saying that. There may be wells in that area, but the parties that own those wells are on the other side of the line that -- that represents the Mojave basin area adjudication. So I chose -- for convenience as a method of keeping our area as small as possible, I chose that boundary just to separate the area that we would be concerned about. And I believe without any question, we could -- as a hydrogeologist, I can easily say I will not consider the effects of specific groundwater pumping on that side. I don't need to consider that. And I could meet the Phase 1 stipulation by saying that's a line along which groundwater pumping on the east side of it would have no effect for the purpose of this matter on the west side because of the adjudication boundary.

THE COURT: Okay. But the effect is -- the no effect, in your opinion, is more because it's been adjudicated than because of inflow and outflow?

THE WITNESS: Yes.

THE COURT: All right.

MR. JOYCE: Your Honor --

THE WITNESS: That's correct.

MR. JOYCE: -- at this point, I think it would be of some aid to the Court to understand that in the process, as lawyers, we made it clear to him that what we understood the case to be is that that line of legal significance and that whatever

he chose to do as a hydrologist, that in light of the Phase 1 stipulation, the use of the term "adverse," that none of us could do anything with.

MR. DUNN: Objection. I will not agree to that, your Honor. That's a --

THE COURT: Wait. Wait. Wait. The court reporter can't take you all down at one time.

MR. JOYCE: That is the legal opinion I expressed. Whether I'm right or wrong, maybe I don't know. But I was of the opinion that the -- that line created a line that we couldn't cross anyway.

MR. BUNN: Your Honor, if I may.

THE COURT: You may.

MR. BUNN: I want to take issue with Mr. Joyce's representation because Mr. Sheahan did testify in deposition that his use of that line did not come from the attorneys at all, but came from his own evaluation of the Mojave basin area of judgment. So to the extent that Mr. Joyce is representing that he told Mr. Sheahan something, that's contradicted by Mr. Sheahan's own testimony.

THE COURT: I'm not sure it really matters whether Mr. Sheahan's coming to this conclusion because of something Mr. Joyce said or something he said. I mean, he's basically made a determination he's not going to consider this area.

MR. BUNN: Yeah. I understand that.

THE COURT: I don't think it makes a difference.

MR. BUNN: I don't quarrel with that. I just have a problem with --

THE COURT: I'm just curious as to why -- I suppose it's that Barstow case -- why they stopped it there.

MR. BUNN: It's the Mojave River adjudication --

THE COURT: All right.

MR. BUNN: -- is what it is.

THE COURT: There's nothing -- I take it, there's nothing in their decision that deals with their basin determination that helps us, is there?

MR. DUNN: There is indeed.

MR. JOYCE: Actually -- I'm sorry -- actually, your Honor, it's the portion of the Supreme Court opinion I was proffering to the Court the other day with Mr. Sheahan. It describes the hydrologic condition existent in the immediately adjoining Mojave basin to the east. And it describes very similar hydrologic conditions as to what's present here. And what the Court will find in reading that opinion is that they used, in essence, the drainage basin as the basin boundaries except, your Honor, as what we've been trying to explain for over a week, is that a groundwater basin is not a scientifically fixed animal.

THE COURT: I think that's really evident from what I'm hearing and seeing.

MR. JOYCE: And that's the reality. And the reality is that for political reasons, they cut off the -- the, quote, unquote, "basin boundary" using the county line because that happened to be co-extensive with the jurisdictional boundaries of one of the water agency's parties in the litigation. It's a political boundary. But now it's a judicially established basin

boundary. That is the problem. And that's why the science and the law aren't always matching up.

MR. ABBOTT: Mr. Joyce is making all sorts of representations about what went on in the Mojave case. I was one of the attorneys in that case and sat through that whole trial -- I think 28 days. Something for your Honor to look forward to.

THE COURT: What we need to get --

MR. ABBOTT: And the judgment in that case defines an adjudicated area which was proposed by the parties who stipulated to a physical solution.

THE COURT: Mm-hmm. And?

MR. ABBOTT: And the published decision just describes the general hydrology of the reason. It does not discuss the specific boundaries at the outer edges or within the basin itself. And how they were arrived is just silent on that.

MR. BUNN: What Mr. Joyce further omits to say is that adjudicated area was further divided into groundwater basins --

MR. DUNN: And let me put it another way --

MR. BUNN: -- plural.

MR. DUNN: -- based on this witness's testimony that his entire opinion is based on hydroconnectivity and that his testimony is that there's hydrology connectively between his area and Mojave basin, Mojave basin is now at issue in this case, and all of that involves. So we'll all consider that over the weekend.

MR. JOYCE: Your Honor --

MR. ZIMMER: Your Honor, we're going off on the arguments and --

MR. DUNN: That's what it means.

MR. JOYCE: Your Honor, I would just --

THE COURT: I'm not sure that's what it means.

It almost sounds like the courts, to some extent, draw arbitrary lines as do the scientists. That's what it seems like.

MR. JOYCE: Thank you, your Honor.

THE COURT: Doesn't it?

MR. ZIMMER: That's correct.

MR. BUNN: No.

THE COURT: Didn't I just hear that they drew a political line because of jurisdictional reasons?

MR. ABBOTT: The issue that was tried in Mojave was do we have a river? Do we have a series of interconnected groundwater basins? And, in particular, there were claims of riparian rights and appropriate licensed rights under the State Water Resources Control Board. Judge Kaiser found against those when making those contentions and, you know, applied the law of groundwater rights as he understood it.

MR. BUNN: And --

THE COURT: I'm looking at this map. I mean, if you kind of look at all what's outlined here, we're pretty much all connected. Probably someone could make the argument that they're all hydraulically connected somehow to each other.

We certainly can't adjudicate four counties worth of basins. I don't know how many counties are in that area.

MR. JOYCE: Your Honor, we only have two jurisdictional counties concerned.

THE COURT: We only have two here. But it just seems

you have to get it to a -- a size that makes sense based upon the facts of the case and what specific rights you're trying to adjudicate.

MR. BUNN: Exactly.

THE COURT: The question is where in this case do we draw the line? I don't know.

MR. ZIMMER: That's why we came up with the concept of the area rather than groundwater basins.

MR. BUNN: We think we can make that clear with further testimony.

THE COURT: Let's keep -- actually, why don't we take our recess now. This is probably a good time. 15 minutes.

MR. JOYCE: Thank you, your Honor.

THE COURT: And then we'll start up again.

(Recess.)

Q. (BY MR. ZIMMER:) Mr. Sheahan, could you possibly show us in overlay format the Scalmanini line, the line you've drawn, and the DWR line?

A. Yes, I believe I can.

I have a -- an overlay of Mr. Scalmanini's map -- at least, this is the map from his report. It's not exactly the same as Exhibit 126, but it's -- the only change to that is the one that you've testified to. And --

MR. JOYCE: Your Honor, that overlay would be what number, please?

THE COURT: Well, your next in order is 22.

MR. BUNN: And, your Honor, what's the exhibit number that he's overlaying it onto?

THE COURT: That's a good question.

MR. ZIMMER: He's now overlaying Exhibit 22 onto Exhibit Number 21.

MR. BUNN: Okay.

MR. TOOTLE: Your Honor, can we have the question read back as to all the different lines you see on this map?

THE COURT: I'm sorry. You want the question?

MR. TOOTLE: Yeah. I think Rich asked --

MR. ZIMMER: I think the question involved the Scalmanini line, the DWR line, and Mr. Sheahan's line.

MR. BUNN: Okay.

(Pause in Proceedings.)

MR. JOYCE: Your Honor, Exhibit 23 is the DWR Bulletin 118-2000 overlay.

THE COURT: We'll so mark it.

(Discussion - Not Reported.)

THE COURT: What's 22?

MR. ZIMMER: 22 is the Scalmanini overlay.

MR. JOYCE: It's a vellum overlay.

THE COURT: It is an overlay. All right.

MR. JOYCE: Depicting Mr. Scalmanini's line.

THE COURT: And so 23 is just another overlay.

MR. JOYCE: Correct, your Honor.

THE COURT: That's what I thought. Okay.

MR. BUNN: A suroverlay (sic).

THE COURT: And they're all overlaying 21.

We'd better watch it. It is too late in the day and week for this.

MR. BUNN: Sorry.

(Pause in Proceedings.)

THE WITNESS: I believe we're ready.

THE COURT: I think we need a question. We might have had one, but let's get it again.

Q. (BY MR. ZIMMER:) Mr. Sheahan, have you now put up for us on the board the overlays which will show us the Scalmanini line, the DWR line, and your line?

A. Well, yes. What I'm showing now is my line in the background on the solid board and an overlay that shows Mr. Scalmanini's line. Actually, the overlay shows all of the lines, but I believe he testified that he would select the red line as his boundary line.

Q. Is there any way to write on the overlay so we can take it off later if we want to?

A. Yes.

Q. Or leave it, as the case may be? Just so we can make three different lines in different colors?

A. I believe so. If I test this, I believe this will erase off if we want it to.

Is that what you're asking?

Q. All I'm saying is it's probably hard for the Court to see what -- from distance what lines we're looking at. Maybe it won't help. Do it how you think will work with the overlays, but --

A. I can do as I did before, use a pink highlighter. And I believe the highlighter will work. It will. I can highlight Mr. Scalmanini's line if that would help.

THE COURT: Why don't you do that.

MR. JOYCE: I would suggest the pink's not going to help because you can't see it.

MR. BUNN: Do you have anything darker?

THE WITNESS: May I have the purple one back so we're using something different. Let's see if this one works better. Yes. This one works better. I'll highlight it in purple.

THE COURT: Thank you.

THE WITNESS: And I believe, though, this erases, so it's not necessarily a permanent line.

All right. Just for the record, I'm highlighting the red line on Mr. Scalmanini's map that represents the outline of the boundary that he testified that he would select as the boundary from the lines that he showed on his Plate 1, which I believe is Exhibit 126.

And the portion that I've highlighted now is that portion that his report indicates he took from Bloyd.

MR. ZIMMER: You need to keep your voice up, Mr. Sheahan. I don't know if it's just back here, but that thing is making noise.

THE WITNESS: Thank you. What I was saying is the portion that I've highlighted is the portion that Mr. Scalmanini indicated he obtained from the Bloyd 1967 study.

If you'll notice that there's an open end in the southeast corner. We can talk about that later. But essentially that's that line.

Q. (BY MR. ZIMMER:) This is the Figure 2 line, Figure 2 from Bloyd, Figure 2.

MR. JOYCE: No. Bloyd, Figure 10.

MR. ABBOTT: Objection. Misstates the testimony.

Q. (BY MR. ZIMMER:) Figure 10.

MR. TOOTLE: Figure 10.

THE WITNESS: It's not that either. It's the group of subunits that Mr. Scalmanini collected from Figure 10 that include 14 subunits. This outlines the 8 subunits that he collected and the boundary of those 8 subunits that represents what he's referring to as the groundwater basin.

The black line that's on this -- this figure underneath is the watershed boundary. And the red line that is on the figure underneath is the boundary that I have selected, if you will, as the Phase 1 area boundary.

THE COURT: All right.

THE WITNESS: I note that I have not explained the basis.

THE COURT: I don't think I can see the difference between what you said is the watershed line and the line that you have depicted.

THE WITNESS: My line and the watershed boundary -- or drainage basin boundary are coexistent everywhere except along the county line.

THE COURT: Oh.

THE WITNESS: So this red and black line here is coexistent with watershed boundary all along the south, all along the west, all along the north, and for a portion of the northeast until it becomes that portion of the Mojave basin area adjudication boundary.

THE COURT: All right. Thank you.

THE WITNESS: The black line going across generally the center -- upper center of the figure is the watershed or drainage basin divide between the Antelope Valley and the -- I'm sorry -- the Antelope Valley to the south and the Fremont Valley to the north. This line coexists with the line used by DWR to separate the Antelope Valley groundwater basin from the Fremont Valley groundwater basin. And I'd like to show that by pulling this other overlay down.

THE COURT: You may.

THE WITNESS: And you'll see that the lines are not exactly the same, but they are -- and that's because my overlay of the DWR groundwater basin map is blown up from a smaller map. But essentially, you'll see -- and I'll use another color to highlight this, if I may. I'll use an orange color.

MR. DUNN: And, for the record, this is Exhibit Number 23?

THE WITNESS: Yes, it is.

MR. DUNN: Thank you.

THE WITNESS: Those portions of the -- this may not be showing as well as I had hoped, but those portions of the DWR groundwater basin boundaries which are drainage basins are the portions that I am highlighting now.

The other portions of their drainage basins -- I'm sorry. That highlight is not -- not very clear. I think you can see that the black drainage basin boundary that I've shown and the orange groundwater basin boundary that DWR has chosen to separate the Fremont Valley groundwater basin from the

Antelope Valley groundwater basin are essentially coexistent.

Q. (BY MR. ZIMMER:) So going back -- pull the slide up there for a minute. Pull the vellum for a minute. The top one.

So we have essentially Mr. Scalmanini's line inside the purple; is that correct?

A. That's correct.

Q. And then we have the DWR line being essentially this line.

A. Something like that. Not exactly, but yes.

Q. But close.

And then we have your line being all of the DWR line plus, essentially, the Fremont Valley.

A. That's correct.

THE COURT: Are the Fremont basin and the Antelope Valley basin separated by what you referred to before as a -- is it a groundwater divide?

THE WITNESS: No, your Honor, they're not. They are hydraulically connected. And while there are some groundwater divides in some of the subunits, there's no such groundwater divide that separates the two valleys.

THE COURT: Thank you.

Go ahead.

Q. (BY MR. ZIMMER:) Mr. Sheahan, I'd like to figure out how you got to the point of making your line. And it's my understanding that derived from examining Mr. Scalmanini's line and figuring out what portions were not included that should have been included.

A. That's correct.

Q. And can you take us through that.

A. Yes. If I may, it's important in explaining that to explain the process that I used. And the process that I used began with my review as a hydrogeologist of the Phase 1 stipulation.

May I take my seat?

Q. Sure.

THE COURT: You may.

THE WITNESS: I was asked to review the Phase 1 stipulation, again, as a hydrogeologist looking at this case to see what the requirements of the Phase 1 stipulation were in terms of my perspective as a hydrogeologist to see what a Phase 1 boundary line would require. And I looked at that in -- in detail.

The first sentence of the Phase 1 stipulation states, "Phase 1 will determine the area within which claims of groundwater rights will be adjudicated in this lawsuit and will include or exclude overlying properties from the lawsuit."

As a hydrogeologist, I understood that to clearly say that we were looking to adjudicate groundwater matters concerning some properties and to exclude properties from that.

Based on that, I considered the fact that the western boundary that I've shown on my map is a previously adjudicated area. And, again, as a hydrogeologist, it seemed appropriate to me to exclude that area from the Phase 1 area boundary that I would define. So I selected the eastern boundary as -- the eastern boundary of what I'll call the Phase 1 area as the western boundary of the previously adjudicated Mojave basin area

adjudication.

The second portion of the Phase 1 stipulation states: "The parties agree and based on such agreement the Court finds that groundwater production from outside this area does not have and has not had any legally adverse effect on groundwater production inside the area and vice versa."

That tells me that the Phase 1 requirements concern themselves with physical conditions. Groundwater production is a physical aspect that, as a hydrogeologist, I can deal with. The effects of groundwater production, I can also deal with. I do not have to address whether the effects are legally adverse or not. I can deal with whether or not there are effects.

Groundwater production causes a lowering of the groundwater level. And that's the key effect, in my opinion, that -- that impacts either beneficially or adversely groundwater production elsewhere.

THE COURT: All right. And the term "groundwater production," how are you defining that as far as your understanding of the stipulation?

THE WITNESS: Groundwater production, in my profession, generally means obtaining groundwater from its natural resource, if you will, or natural reservoir, the aquifer, and producing it for use. Pumping from -- groundwater from wells, essentially. Groundwater production can also occur by draining of groundwater through springs or horizontal wells or other means. But principally, in this area, what it means is pumping groundwater from wells.

THE COURT: Thank you.

THE WITNESS: So groundwater production, pumping groundwater from wells, causes the water level to go down. When the water level goes down, it takes more energy to pull groundwater out for additional production. That's an effect of groundwater production.

So I understood very clearly that the one requirement of the Phase 1 stipulation was to define an area such that along the boundary of that area groundwater production on the outside would not have an effect on groundwater production on the inside because the stipulation indicates that the Court is going to agree and the Court will find that that will be the case. So as a hydrogeologist, I looked for means to define a line where that would be essentially true in all cases.

I believe you've heard testimony from Mr. Scalmanini that, essentially, a watershed boundary is a line along which groundwater production from the outside does not have, at least, a significant effect. I think he used, but does not have an effect on the inside. I think that's generally understood and I think we agree on that. So a watershed boundary would be one such line.

Another important element of defining such a line and to define such an area is to have a line that can be surveyed, a line that is not a variable. We discussed groundwater mounds because pumping can cause the crest of a groundwater mound to move. It's not a finite line that one can determine today and have it be the same forever.

Similarly, a postulated fault is not a finite line that one can survey and field. A watershed boundary or a drainage

boundary, however, is a line that can be surveyed. Two surveyors can go out on two different days and look at the same area and define exactly the same line that represents the drainage basin boundary or the water. So that makes a drainage basin or watershed boundary line, let's say, an enhanced line for selection as one of the possible lines that we might select. So I considered the surveyability of the line.

The third thing is that the watershed boundary line, turns out, encompasses all of the recharge to all of the groundwater aquifers within that area. At least, all of the surface recharge.

The watershed boundary is the line within which all precipitation goes into those groundwater systems and outside of which all precipitation -- or none of the precipitation goes into those areas. So it gives us a finite boundary containing all of the water that, as a hydrogeologist in Phase 2, I would need to look at in order to make assessments concerning the water resources and groundwater conditions.

Then the other aspect that I considered was the materials underlying the watershed boundary. Notwithstanding the fact that we might agree that on either side of a watershed boundary, we won't consider that groundwater production has an effect. Certainly in some places, that's not exactly true. For example, the -- I'll use the highlighter. If I can remember what I did with it.

Q. (BY MR. ZIMMER:) Laser?

A. I'm going to point at the map that's up on the board, but specifically to Exhibit 21, which is my Phase 1 area boundary

map underneath, and point to the drainage basin or watershed boundary that separates the Fremont Valley from the Antelope Valley.

That happens to be a surface water divide. A very faint surface water divide, but it is a surface water divide. The aquifers on the north side and south side are hydraulically connected. And groundwater production on one side can easily have an effect on water levels on the other side. So that's -- that's a watershed boundary that I found not to be acceptable as a Phase 1 area boundary because it did not -- it specifically did not meet the requirements of the Phase 1 stipulation that groundwater production from outside this area does not and has not had any legally adverse effect on groundwater production inside the area. So I was not able to select that drainage basin boundary.

And if I may, let me back up. The reason that I have selected the other portions of the drainage basin boundary has to do with the geologic materials under them. The drainage basin boundary generally along the south side overlies bedrock. Bedrock with either a low hydraulic conductivity or a low transmissivity -- and I'll explain those in a moment -- which means that there is little chance that groundwater flow will occur across that boundary. Further, it means that there's little chance that there will even be groundwater production in those vicinities.

Hydraulic conductivity, I can -- I have a chart that would explain what I mean -- I'd be happy to, but just in general, that's the ability of a material to transmit water. If

you can imagine a clay material that's very fine grain, it might get wet, but water won't go through it very easily. That's a low conductivity material. Solid and fractured bedrock is low conductivity. A coarse gravel deposit with a lot of void space, interconnected void space, is a material that has high conductivity. Water will go through it very easily.

Transmissivity -- and, by the way, Bloyd's report refers to it as transmissibility, an older term meaning the same thing. Transmissivity is simply the value for hydraulic conductivity multiplied times the thickness of an aquifer unit. So an aquifer with a high hydraulic conductivity such as a gravel but which is very thin would have a low transmissivity.

There are some areas in the mountains where there are some small streams and there's some gravel deposits that are relatively thin. Those materials have high hydraulic conductivity but very low transmissivity, little or no water will go through them because of that.

So I selected as a criteria for defining which of the watershed boundary line segments would be appropriate by choosing those segments which are underlain by geologic materials that contain either low hydraulic conductivity material, such as bedrock that is not highly fractured, or materials that have a low transmissivity such as gravel deposits that are buried in.

And I was able to trace around using the geologic maps that are available for this area and determine that the watershed boundary that I defined on the -- we'll start with the south side -- that entire boundary meets those requirements. So, again, that's a boundary line that is surveyable that contains

all of the water within it that overlies geologic material with relatively low hydraulic conductivity and/or relatively low transmissivity. And I found that to be an acceptable boundary to meet the Phase 1 requirement of the boundary lines of an area such that groundwater production on one side would not have an effect on the other side.

I continued that process throughout the whole area starting with the south line and around the west side and around the north side. And those criteria are fully met, in my opinion, by the watershed boundary going from the point that I have marked "G" in the southeast corner all the way around to the west and north and back around to the point that I have marked "F."

Those criteria, by the way, were not met by the watershed boundary that goes between the Fremont Valley and the Antelope Valley. So I was not able to choose that watershed line as part of my Phase 1 area boundary.

And I've already explained that the western boundary from Point F to Point G, I show as the Mojave area -- I'm sorry -- the Mojave basin area adjudication western boundary. So just so you understand, that's how I've selected my boundary.

And that includes, then, all of the aquifer systems within it that are hydraulically connected and all of the surface water that is available to a greater/lesser extent as recharge to those systems. And they'll allow me, as a hydrogeologist, to properly assess the impacts of groundwater production in Phase 2.

Sorry for such a long answer, your Honor.

THE COURT: That's all right.

Q. (BY MR. ZIMMER:) Mr. Sheahan, why didn't you select the

line between Fremont Valley and Antelope Valley?

A. Well, that line, again, represents a drainage basin boundary. If you can imagine a piece of paper that is just slightly bent upwards in the middle and a drop of water falling on one side of it, it would drain one way; falling on the other side, it would drain the other way. All that line represents in the physical characteristics is that pressed or that high point of a very slight bend in a piece of paper. It is a drainage basin boundary. Surface water goes both ways from that line.

The reason I didn't select it, though, is beneath that line in the groundwater system, we have contiguous aquifers. Groundwater flows across those lines very easily. That line is a surface topography line. Has nothing to do with groundwater flow in that area. It's not a boundary for groundwater flow. Its presence or absence has no effect, if you will, on -- essentially, no effect at all on groundwater flow.

So it -- and that drainage basin boundary, then, overlies materials with high hydraulic conductivity and high transmissivity such that groundwater can easily flow through it. So it didn't meet my criteria, and so I did not select it for those reasons.

Q. Do you happen to have, by any chance, a cross-sectional representation of what, generally speaking, is included from, let's say, the south line to the north line?

A. Yes. I've made a sketch that shows that. I think I can put that up.

THE COURT: That would be 24.

MR. BUNN: Did you say that was a cross section?

MR. ZIMMER: Did you guys want a copy of that?

MR. TOOTLE: Yeah, I do want a copy.

Q. (BY MR. ZIMMER:) Mr. Sheahan, can you show us the general location of the cross section that you have graphically depicted.

A. Yes. I've prepared a diagrammatic cross section, your Honor. It's not exactly to scale, but it's done for the purpose of explaining the groundwater and other conditions in an area. And I've started generally in the area near Leona Valley on the south. Actually, just at or below the watershed boundary on the south. And I've carried it up across the lines that Mr. Scalmanini has chosen and on up into the Fremont Valley and all the way to the watershed boundary to the north.

And what I want to do is to show the line -- the cross section that represents the subsurface conditions generally in that area to explain some of the characteristics of it.

Now, on this -- in this sketch -- and it's just a hand-drawn sketch -- the left side represents the San Gabriel mountains, the line going up from the top of the mountains -- which I'll highlight in blue now. It says "watershed boundary."

Q. Just for reference, is this south down here?

A. South would be on the left side, yes.

Q. Why don't you put an "S" down there.

A. I'll put an "S" in blue on that side, and an "N" for north on the right-hand side.

Okay. And what I've shown as the top line is, essentially, the groundwater surface so we have a reference.

I'm sorry. Let me correct that. The ground surface,

not the groundwater surface. So the top line is the ground surface.

The high point here represents the watershed boundary overlying bedrock. Somewhat fractured, contains groundwater, but it's not high, high hydraulic conductivity or high transmissivity. Groundwater will move through it, but groundwater production on one side would not have, essentially, an effect on the other side.

That line then goes down through the Leona Valley. And I've shown in -- with vertical hatches the area in the Leona Valley that we have not yet discussed, but it represents the location of the San Andreas Fault. San Andreas Fault zone is a zone up to about a mile wide through the Leona Valley where the bedrock has been fractured. And because it is so highly fractured, it acts as a bedrock aquifer, or a fractured rock aquifer.

The next high point represents the high ground or bedrock separating the Leona Valley from the main portion of the Antelope Valley. It can't be shown in the cross-section view, but there is direct hydraulic connection between the fractured bedrock aquifer in the Leona Valley, which is the San Andreas Fault zone with the unconsolidated aquifers out in the Antelope Valley.

Q. Since we're talking about that, could you show us on a slide -- do you have a slide that shows that?

A. I -- yes, I do. If you'd like, I think I can do that.

Let me have Slide 10, please.

THE COURT: That would be marked as 25.

MR. ZIMMER: Thank you, your Honor. Slide 10 marked as Exhibit 25.

Q. (BY MR. ZIMMER:) And Mr. Sheahan, what is that?

A. Slide 10 is a blowup of my base map. And if I may, I'll use the highlighter. It's a blowup of my base map, the green and the topography and the roads and so forth are from the base map. It shows the south line of the boundary that Mr. Scalmanini has drawn. And that is shown on here as San Andreas Fault zone because that's what Mr. Scalmanini's original map showed on that line. In fact, that is incorrect. The San Andreas Fault zone runs through the area that I'm now showing that you can essentially see as a low portion of the topography, which is known as Leona Valley.

This is -- this area in Leona Valley is a fractured rock zone that is connected in the outlet of Amaragosa Creek to the main portion of the Antelope Valley. So this is a hydraulic connection between this aquifer and these aquifers out here.

Q. When you say "highly fractured," there's difference in fracturing?

A. Yes. When we have faulting as we do in this area and we have significant faulting such as the San Andreas Fault zone, the Garlock Fault zone that marks the northwestern portion of the Antelope/fremont Valley area, the movement of rocks along those faults, the movement of the plates causes the rocks adjacent to the point of movement to break up a great deal, highly fracturing those rocks. But even out from that area, those stresses cause the otherwise brittle rocks to break and fracture.

There may not be movement along those fractures, and,

therefore, they may not be faults, but they still are fractures and they open up an opening in the rock. And those openings can contain water.

And the openings caused by fractures in the rock that are interconnected, the fractures being interconnected, form a permeable material that can transmit water. If it's highly fractured, it can transmit enough water to be used as an aquifer such as in the Leona Valley. So that's the -- that's the area and that's the hydraulic connection that I was referring to.

Q. Mr. Sheahan, is it correct to state that the only hydraulic conductivity is through the outlet, or is there hydraulic conductivity across this area as well?

A. The latter is more correct. And I can explain that, I think, more easily on the diagram. That's one of the points that I wanted to show on this diagram, if I may.

I'll finish discussing the rest of the top line in a moment, but let me highlight for a moment what I've shown on this diagram to be the upper -- upper level of the saturated material below ground, what we call the saturated aquifers or saturated fractured bedrock.

I'm highlighting the blue, a line that's marked on here to designate the water table. And I'm going to take that all the way on across while I'm in the process.

Now, in answer to your question, Mr. Zimmer, between the Leona Valley shown here under the words "San Andreas Fault zone," between that and the main portion of the Antelope and Fremont Valleys is bedrock. That bedrock is fractured. But below the water table, the fractured bedrock is saturated with water.

Rainfall occurs in the mountains, builds up a higher head in that area than the head of water in the valley. And I mentioned differential head earlier. There's a differential head between the water level and the fractured bedrock between Leona Valley and the main valley portion. And that differential head causes groundwater to flow through the fractured bedrock out into the unconsolidated deposits in answer to your question.

Q. Okay. So you haven't colored in blue, but everything below this blue line would be described as fully saturated conditions.

A. I would -- yes. I would characterize that. I don't -- I haven't gone through the full depth, but just everything within the blue block that I've drawn would be considered saturated materials.

The other point I wanted to bring out concerning what we were discussing a moment ago, the drainage between the Fremont Valley and the Antelope Valley I tried to depict in this upper line. There is a surface water drainage basin boundary that I've listed on here as watershed boundary also.

Again, water falling on the surface on the right side of -- in a line to -- tend to move to the right. Water falling on the surface of the left would tend to move to the left. There may be a groundwater mound in some areas, but there may not be. But the groundwater beneath that can move in either direction.

The groundwater body beneath it is hydraulically connected all the way from the Fremont Valley all the way down through the Antelope Valley. And, in fact, all the way up to at least the watershed boundary on the left side and all the way up

to the upper watershed boundary north of the Fremont Valley.

So the point I was attempting to make to begin with is the surface water boundary can be used to define a groundwater basin. For my purposes in defining a line, I found this line to be unacceptable for purposes of Phase 1 because it did not mark the boundary of an area where groundwater pumping on one side would not have an effect on the other side.

THE COURT: All right. And you're showing the water flowing through the San Andreas Fault zone; correct?

THE WITNESS: Yes. Groundwater --

THE COURT: And I think I'd heard before that a fault acts as a barrier?

MR. ZIMMER: You heard that from Mr. Scalmanini.

THE COURT: Right. So why do you not believe that the fault zone acts as a barrier? Is that -- is a zone different than what you've depicted as the postulated fault and the Rosamond Fault in the sense of how it acts with water?

THE WITNESS: Yes.

THE COURT: Can you explain that.

THE WITNESS: Yes. It's different in several regards. The fault zone produces a wide area of highly fractured bedrock. It's different than the specific definition that I gave you of a fault where it's a fracture along which there's movement. It's a zone where there has been movement of the -- I'll call it the bedrock mass to the south side or left on this diagram versus the entire mass to the right side. And that whole zone is broken-up, fractured bedrock that has large voids in it that are capable of collecting, storing, and transmitting water and producing water

to wells in economic quantities. In fact, there are wells in the Leona Valley, as I understand it, that produce water from the fractured bedrock.

Now, that's a fault zone. The fault that we talked about before is represented on Exhibit 24 by two lines. In fact, I've shown two faults. One, the deposited postulated fault that represents the south line of Mr. Scalmanini's map. And I can show that on Slide 10 with the highlighter. He has now referred to as a -- an unnamed fault, a pattern that he shows with dots is the postulated fault. So the southernmost or left-hand most fault I've shown here, which I'll discuss in just a moment, is -- it represents that fault.

The solid line that I've shown just to the right of that represents the Rosamond Fault or otherwise known as Cottonwood or Willow Springs Fault. But that represents the northern boundary of the area that Mr. Scalmanini's red line encompasses.

So, essentially, I'll show in brackets the portion of this diagram which is -- is the portion that he has included as the groundwater basin is only this portion. And I'll put an "S," if you will, for Scalmanini. That is the width that he has included as part of what he's defined as groundwater basin. In fact, there's groundwater running from watershed boundary to watershed boundary. And it is hydraulically connected across.

Q. (BY MR. ZIMMER:) Did he have a diagram -- with the "S" there, he had a rather simplistic diagram with a little --

A. Yes, he did.

Q. He tried to make it look like a bucket kind of?

(Pause in Proceedings.)

MR. TOOTLE: Your Honor, can we have the question read back, please.

(The Record Was Read.)

THE COURT: Why don't we have a new question.

MR. JOYCE: Let's see. Let the record reflect it's about ten to 4:00.

Q. (BY MR. ZIMMER:) Maybe the other diagram would be correct, the other diagram there?

A. Perhaps. I would prefer to start with this one, if I might.

THE COURT: Let's just go through this. We're going to have to wrap it up so we can talk about the legal procedures we're going to go through. So let's try to just get through some questions on this.

Q. (BY MR. ZIMMER:) Go ahead, sir.

A. If I may, the reason that I'd like to present this is just to compare and contrast.

On Mr. Scalmanini's diagrams, on all three of them, he fails to indicate that there is any fracturing or any bedrock water -- groundwater in the bedrock on either side. And, therefore, he doesn't show a water table in that area. That is not the case. There is water in the fractured bedrock that comes from rainfall within the watershed infiltrating down through the fractures and then from the fractured bedrock out into the aquifer materials.

Q. That's this area over here in your diagram.

A. That's right. In my diagram, I'm showing that by this -- this blue portion.

He also doesn't show faults in this. He shows a -- a water table that is level. In fact, the water table is not level. There's a slope to the water table in most tables because water is draining and it's following a slope downward.

I think that's enough. I think the important thing is that even though my diagram is simple, 24, I believe it is, there is a lot more detail that's important to be considered when you're looking at the simplistic diagrams.

Q. Let me show you this diagram, because we were talking about the faults there. And Mr. Scalmanini has drawn a diagram of a fault and, at least, in his opinion, the effect that it has.

Now, in your diagram over here, you have water going across the fault, or moving across the fault. And Mr. Scalmanini is basically saying it's an impermeable barrier for all intents and purposes.

Can you discuss this concept and diagrams?

MR. DUNN: Which exhibit are you referring to?

MR. ZIMMER: This is -- I'm not sure -- Defense Exhibit 112.

THE COURT: Groundwater basin boundaries is what I -- is that what that says?

MR. ZIMMER: That says "Groundwater basin boundaries. No appreciable underflowing."

THE COURT: All right. What's our question?

Q. (BY MR. ZIMMER:) The question was can you -- Mr. Scalmanini has essentially said that there is no appreciable underflow. It acts as a dam. That was his analogy. That the water doesn't go across there.

You, by contrast, have indicated that there is migration of water across there that should be considered.

I'd like you to tell us why.

A. Let me point out a couple of things on Mr. Scalmanini's diagram, also, that I think are really important to take into account.

Again, the bedrock areas are portrayed as being solid, impermeable rock. They are not. They are permeable, they're fractured, and they contain water. And water from the bedrock feeds into the -- even more permeable aquifer materials.

Secondly, he shows a differential head. He shows a water table that he described and a water table on each side of the fault. He shows a differential head between those two, and, I believe, testified that that differential head indicated that there is no flow of water across the fault.

In fact, that is not the case. On the south side -- and I'm going to point to my figure for a moment -- the boundary that he has used, the postulated fault boundary, based on the information from Bloyd's Figure 10, there is groundwater on the south side that is approximately 50 feet higher than groundwater on the north side. And the contours in that area indicate, clearly, that there is groundwater flow from south to north across that barrier.

Similarly -- and I can show you this in more specifics, but because of the time, I'm trying to do this really fairly quickly. Similarly, the 300-or-so-foot differential head that he referred to along the Rosamond Fault, the contours on Bloyd's Figure 10 indicate clearly that there's a component of

groundwater flow that goes across that fault also. The fact of a fault or the presence of a fault does not mean a barrier to groundwater. If that fault is such that it includes impermeable clays or causes something to happen other than just faulting that might act as an impermeable barrier, then perhaps it would be.

In most cases, the fault simply displaces material from one side to the other and makes it more difficult for groundwater to flow through the fault. We call that retarding fault. And that happens frequently. When that happens, it causes the groundwater to need more energy to get through that material because the hydraulic conductivity at the fault may be lower. That requires a greater differential head.

So the groundwater levels due to recharge will build up to a higher level on the one side to increase the head. And once the head gets increased to an appropriate differential head, then the groundwater essentially has enough energy to go through that lower material. And that's exactly what we have happening not only along the Rosamond Fault, which is the northern boundary that Mr. Scalmanini has selected, but also along the southern boundary, along the postulated fault. There's differential heads on both sides. There's -- the contours in the area indicate the groundwater is flowing towards those faults and not stopping at the faults, otherwise it would just fill up and be flat. It continues to be flowing in that direction. The outflow of that zone has to be -- can only be across that fault. And, in fact, in the modeling study done by Durbin, he quantifies the groundwater underflow going across those zones.

So, again, one of the reasons that I disagree with

selecting those boundaries for our area is there's considerable groundwater inflow going across those zones and, therefore, groundwater production on one side could have an effect on groundwater production on the other side. I don't know the significance of that production, but for Phase 1 purposes, it's not appropriate to determine the significance.

It's only appropriate as I -- you know, as I indicated, the requirements of Phase 1 are to select the boundary line where we don't have that happening. So I'm not able to accept a boundary that allows that to happen. I must go to a boundary where groundwater production on one side doesn't have that effect. And that's one of the reasons I've selected the boundary that I have.

THE COURT: Thank you.

Let's stop here. I'm going to have you take your seat.

And we have a motion by Mr. Bunn, I believe, to vacate the stipulation.

MR. BUNN: Yes, your Honor.

THE COURT: All right. We're not even going to get into the grounds at this point, because I'm going to make you file it in writing.

I keep thinking the problem we're having here is based upon the wording of the stipulation, the "legally adverse effect," because it is requiring, I believe, plaintiffs to include a greater area.

Is not, really, what we're supposed to be doing in determining the area is simply determining that area where we can adjudicate plaintiffs' overlying rights? Correct?

MR. JOYCE: Your Honor --

THE COURT: And doesn't it just simply connect to the aquifer, connected underneath, i.e., that basin? And isn't that what we should be looking at? Because I think then you can still consider pumping outside the basin and flow in and out of the basin without actually adjudicating a larger basin than we need to.

MR. ZIMMER: Your Honor, I --

THE COURT: I've not -- you know, I've got to sort of read through all of this, but that's sort of what my mind thought is. I want to see how the cases explain it.

MR. JOYCE: Your Honor, if the only issue was do plaintiffs have overlying rights, the answer to your question would be yes because then the area is the legal description of the property. There it is. We have overlying rights. That's an incident of the deed, an incident of the title. The importance of the area is the end product of the defendants' answer and claiming of prescriptive rights.

The problem and the issue is this: In Phase 2, at some point, hydrologically, there's going to have to be an analysis of the, quote, unquote, "water supply," where that's the water supply based upon the entire watershed, both surface and subsurface flow. What is the water supply based upon? Cross-flows from outside of an area, from another area? And then once you've done that, then you've got to go to the next hydrologic interconnected issue, and that is, is there pumping? And is one pump affecting another pump, or is Pump A the one that's having an affect on Pump B, or might it be Pump C?

So when you start pulling an area down, down, down, and down, then they can say, as Mr. Sheahan pointed out earlier, "There's your well. There's our well. Your water table is going down. It must be us. We must be adverse. We must have prescripted. You win; we lose."

THE COURT: But the flip side of that is if you make it bigger, bigger, bigger, bigger, you -- the mathematical calculations are going to take into account the -- I don't know. Is it volume of the land?

MR. JOYCE: That -- the dynamics of the system.

THE COURT: I mean, what I think I have to do in determining the boundaries is have a size that is fair to both sides, but also what the law requires. But I don't think any of the cases that I've seen so far give me a formula in how I do it. They talk about it. They talk about basins. They talk about watersheds. But where do they explain how they -- how that Court sat down and calculated the boundaries --

MR. TOOTLE: Your Honor --

THE COURT: -- in some detail that I can take that formula and apply it here? I see little smiles. No one --

MR. ABBOTT: I see case law that says follow Steps A, B, C, and D. What it talks about the common supply, the safe field, kind of storage unit in which this water is. There is a fundamental disagreement between plaintiffs and defendants as to what we have to show to prove the adversity element of prescription. We understand the case law to be that if we were pumping water from the basin, while it was in an overdraft condition, that is, by law, adverse to their rights. We do not

have to show direct well interference, just pumping during the overdraft to establish the adversity element. So we've got that disconnect between plaintiff and defendants.

MR. JOYCE: That's --

MR. ABBOTT: The overdraft is focused on the storage unit in which all this groundwater is located.

MR. ZIMMER: May I be heard somewhere in here?

MR. JOYCE: I'm sorry. Go ahead, Rich.

THE COURT: You may.

MR. ZIMMER: I think the problem is the Court has read some of these cases which discuss groundwater basins. And a lot of those cases are dealing with cases where there were injunctions. The one party was trying to stop another party from pumping and, therefore, the extent of or the reach of the right of the party seeking the injunction was in issue.

In this case, we have brought suit to quiet title to these properties. And the defendants have claimed that they have prescriptive claims to water on those properties based on the elements that they need to prove on our prescriptive rights -- make of prescriptive rights claim.

So that's why I keep coming back to the point that the Court needs to focus on the area of inquiry to allow us an area of study so that we can look at that area hydraulically and determine whether pumping in one area is, in fact, affecting pumping in another area.

There is no case that you will find that says that as a prerequisite element to this kind of a claim that you have to prove what the basin is or that you have to prove what -- a

certain groundwater basin exists. Groundwater basin has simply been used along with other terms, "subdivisions." "Subdivisions," as a way of describing --

THE COURT: I understand.

It seems like the problem, though, is perhaps maybe in the Antelope Valley basin that some of the other areas could be included. I'm not sure. I'd need to hear all the testimony.

But it's that jump that you want me to make to include -- is it the Fremont Valley basin? And I'm having a hard time understanding why that should be included if, in fact, there's no overlying land there. And it seems to be something separate.

Now, there's some connection, yet there's a lot of connection between all kinds of different basins. You know, what is it about that to include what is really a big piece of land?

MR. JOYCE: One of the defendants --

MR. TOOTLE: Your Honor, I think what's important is not only the cases, but also the studies that have been performed in this area by USGS over a number of years. And what areas they have chosen to do these studies and to do these models. And I think you need to take that into account when you look at what -- forming your basins to be consistent with what they have done.

MR. ABBOTT: And if I can make one point, your Honor. Although, you know, we don't have a Step A, B, or C, I don't know how you define a basin. If you go back -- and I don't know how far you've gone back in your reading -- the initial case Katz versus Walkenshah (phonetic), the Supreme Court explained the hydrologic conditions in Southern California that prompted them

to depart from the English common law rule that whoever can pull the water out of the ground can do whatever they want with it and replace it with the correlative rights system where people who overlie the basin have a right in common with each other to pump water. And the surplus can be appropriated. If there's pumping that isn't a surplus, that's adverse to those correlative rights, owners' rights.

If you read that case, I think you can get a pretty good flavor of what the Supreme Court was looking at and having in mind for the common supply that they were referring to in that case.

THE COURT: Well, let's do this. Because I am really leaning towards the continued trial starting up September 16th. With that in mind, how much time does everyone want to brief this? I can have you come in Tuesday, but I think the feeling I'm getting from everyone is you don't think that's going to give you enough time to really sit down and think about it.

So if we get the actual motion to vacate the stipulation -- filing it more as a motion in limine versus a noticed motion with the Court. So file it directly in this department so we can handle it.

If we get that done -- do you need more than a week? Or can you get it done --

MR. BUNN: A week is fine, your Honor.

THE COURT: All right. So today being the 9th. That gets filed by the 16th.

Opposition --

MR. JOYCE: No.

MR. ZIMMER: Opposition -- yes. There will be opposition.

THE COURT: Well, I heard a no. I was kind of excited here for a second.

MR. JOYCE: I said "well." I said seven and seven would seem fair minimally.

THE COURT: So we'll give you till the 23rd. Reply on the 20 -- I'd say by the 29th. With the motion September 4th, something around the 4th, 5th, or 6th.

You know what? I'm going to have you file it as a noticed motion. I think it will work better. If you end up filing in this department, it's going to end up confusing things. So I take that back.

What day the week of September 3rd -- avoiding the 3rd because Monday's a Labor Day holiday -- do you want it heard?

MR. JOYCE: Your Honor, I can't -- I was trying to see if I can see the calendar. Would it be possible to hear it that Friday, on the 6th?

MR. DUNN: That would work best for me, your Honor because I'll be in a case that's dark that day.

MR. JOYCE: And I'm in a trial --

THE COURT: All right. Let's put it on Friday the 6th.

(Discussion - Not Reported.)

MR. JOYCE: Your Honor, just as a discussion, and it may or may not be of any help to the Court, if the Court were to read the Mojave decision and read, more importantly, background introduction, it's a fairly explicit and detailed hydrogeographic description of the area in controversy. It may be of some help

to you.

THE COURT: All right. This is what I want everyone to do. This will cure what I was trying to do the last time. But we're going to file it as a noticed motion. When you file it with the clerk, have a courtesy copy delivered up here. That way, I will make sure I get it ahead of time rather than our usual day before.

MR. JOYCE: And we'll do the same with the opposition.

THE COURT: All right. So -- and on the reply. And that'll give me a chance -- because I've started to read through some of the cases. They're all so long, I can't say that I've read through a complete case. And I want to do that. So that will give me a chance well before the hearing to have everything and not have any surprises. So let's do that.

MR. JOYCE: Thank you, your Honor.

(Proceedings Adjourned.)

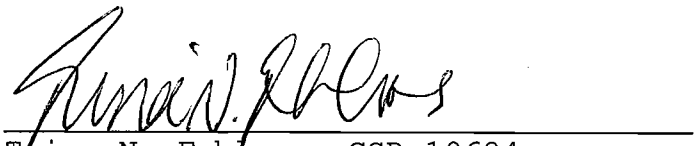
REPORTER'S CERTIFICATE

STATE OF CALIFORNIA)
) ss.
COUNTY OF RIVERSIDE)

I, Trina N. Fehlman, Certified Shorthand Reporter, Number 10684, hereby certify:

That on August 6, 2002; August 7, 2002; and August 9, 2002, I took in shorthand a true and correct report of the proceedings had in the Diamond Farming, et al., versus City of Lancaster, et al., matter, pages 163 - 516, inclusive, which is a true and accurate transcription of my shorthand notes, taken as aforesaid, and is my oral proceedings transcript.

DATED: Riverside, California, August 29, 2002.



Trina N. Fehlman, CSR 10684
Official Court Reporter
Riverside Superior Courts