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Trial Transcript, Vol. 96, Morning Session

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File # 203

4454

IN THE DISTRICT COURT FOR THE FIFTH JUDICIAL DISTRICT

WASHAKIE COUNTY, STATE OF WYOMING

IN RE:	)	
	)	
THE GENERAL ADJUDICATION OF ALL RIGHTS TO USE WATER IN THE BIG HORN RIVER SYSTEM AND ALL OTHER SOURCES, STATE OF WYOMING.	)	Civil No. 4993

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VOLUME 96

Morning Session

Thursday, July 30, 1981

ORIGINAL

APPEARANCES

FOR THE STATE OF WYOMING:	HALL & EVANS 2900 Energy Center Building 717 17th Street Denver, CO 80202 BY: MR. MICHAEL D. WHITE, Special Assistant Attorney General
FOR THE UNITED STATES OF AMERICA:	MR. JAMES CLEAR Attorney at Law Land and Natural Resources Division Department of Justice P.O. Box 7415 Benjamin Franklin Station Washington, DC 20044
FOR THE ARAPAHOE TRIBE:	WILKINSON, CRAGUN & BARKER 1735 New York Avenue, N.W. Washington, DC 20006 BY: MR. R. ANTHONY ROGERS
FOR THE SHOSHONE TRIBE:	SONOSKY, CHAMBERS & SACHSE 2030 M. Street, N.W. Washington, DC 20006 BY: MR. HARRY SACHSE
FOR THE PRIVATE WATER HOLDERS:	MR. GEORGE RADOSEVICH Attorney at Law 910 15th Street, Suite 866 Denver, CO 80202
CLERK TO THE SPECIAL MASTER:	MR. LEO SALAZAR Attorney at Law 701 Rocky Mountain Plaza Cheyenne, WY 82001

THE SPECIAL MASTER: May we convene, please?

Mr. White, on cross-examination?

MR. WHITE: The United States goes first on cross-examination, Your Honor.

THE SPECIAL MASTER: All right.

CROSS-EXAMINATION

BY MR. CLEAR:

Q. Doctor Willardson, do you know who Robert Toedter is?

A. Robert Toedter?

Q. Yes.

A. I have not met him. I've talked with him on the telephone.

Q. You spent some time yesterday testifying about your November, 1980, three-day meeting with Doctor Mesghinna. I'm a little puzzled as to what relevance that meeting had with the conclusions you testified to as to drainage yesterday. Would you explain to me how that meeting fit into the ultimate conclusions you arrived at?

A. Doctor Mesghinna came to Logan to ask for my assistance in the development of drainage criteria and drainage procedure, design procedure for the Wind River Indian Reservation. He brought with him maps, topographic maps of the area, indicating the proximate zones to be irrigated, and he had in addition an average

value of hydraulic conductivity for the soil profile and the depth to barrier. These were two critical pieces of information that we needed. We used those two pieces of information plus a drainage co-efficient to set up a design procedure based on the average permeability from the surface to the barrier and the variable depth to barrier. With this procedure, then he was equipped to make adjustments for the changes in hydraulic conductivity throughout the area.

Q. I'm sorry for interrupting, Doctor Willardson, but you're testifying how this meeting was helpful to Doctor Mesghinna in his conclusions. How did it help you in arriving at your conclusions, which I understand are different from his?

A. It was necessary for me to lay that background because what we had at the time we set up the design procedure was just an average hydraulic conductivity between the surface and the barrier. I asked Doctor Mesghinna if he had detailed information on the profile, and he said that he did not. All he had was the average hydraulic conductivity, and we set the design procedure based on that average hydraulic conductivity, which is a legitimate and straightforward way to handle variable hydraulic conductivity in a soil profile. So that was apparently

the basis that he continued with his design. I can't guarantee that.

Q. Doctor Willardson, I'm not concerned about what Doctor Mesghinna did and how that's helpful to him. I'm concerned about the relevance of that meeting to your testimony as to the proper drainage pattern.

A. With that information, he was able to design the --

THE SPECIAL MASTER: He doesn't want to know what he did, but what relevance that meeting had to your conclusions you testified to yesterday.

A. Now, when I went to the field to look at Big Horn Flats and the other drainage areas and saw some strong profile features, that is gravel in a profile that has been treated as an average value, and a layer of gravel which could drain to the outside area, then it became apparent that natural drainage, which we could not account for when we had only an average value for a soil profile, may be a significant factor in the drainage system. And since Doctor Mesghinna had only an average profile value of hydraulic conductivity between the surface and the barrier, when we tried to account for the natural drainage in our design procedure, the most we could do was to allow the water to leak out of the edge of these higher

areas near the edges at an average rate. When we found beneath a very -- a layer of very high permeability running to the drains, it was possible then to take advantage of that, not to just lump it into the average permeability of the profile, but to use that as an increase in the ability of those profiles to dispose of water naturally.

* * * * *

Q (By Mr. Clear) Now, when you are talking about the average permeability profile, you are talking about the data that Dr. Mesghinna gave to you in November; is that right?

A That's what we had at hand, just an average value for the total profile with no information on the stratification or the different levels of permeability in that profile.

Q Is it your understanding that Dr. Mesghinna's drainage, the final conclusions contained in his report based on drainage, are based solely on the average permeability of the profile you had in November of 1980?

A Oh, no. We just had those values that we used to set up our procedure. It was necessary for him then to look at each one of these plots and to use an average value of data for an individual field.

There are a number of samples in the field, and they are all different, so he had to choose some single design value. You can only put one number in the equation, but he had to adjust for every piece of land, the numbers, the average hydraulic conductivity, and the depth to barrier, to adjust the drain spacing in each one of those areas.

So what we did was set up a procedure that would enable him to make those designs and to vary them

according to the needs of the soils.

THE SPECIAL MASTER: Dr. Willardson, when you made that conclusion, did you notify him of that, having been his consultant just a few months before?

THE WITNESS: About the natural drainage?

THE SPECIAL MASTER: About the changes you were making in his drainage plans.

THE WITNESS: No, I did not.

THE SPECIAL MASTER: You did not. Didn't you feel it was a duty upon you to do that as a professional consultant who had been hired by Stetson Company to advise your former student?

THE WITNESS: I had only contact with Mr. Bliesner, who was in contact with Mesghinna.

THE SPECIAL MASTER: Because he was your new client?

THE WITNESS: Yes.

THE SPECIAL MASTER: You did not feel you had a duty to the old client to advise him? This leaves a very serious matter of -- I'm not talking about ethics, please, sir, but it does make a matter of real concern in me, a real concern in me.

THE WITNESS: Well, I feel it's a matter --

THE SPECIAL MASTER: You have a right to change his plans, heavens knows, but isn't there a duty to let the

man know you are doing this? "Dr. Mesghinna, I have had a look at some profiles and stratification, and I don't think it is as I told you a few months ago."

Would that have been the better procedure to take?

THE WITNESS: Well, time circumstances were such that I had to depend on Mr. Bliesner.

THE SPECIAL MASTER: I have a few more questions.

You said his conclusions in spacing of drainage were based on no detail of profile, virtually none. They were based on these general matters that HKM supplied him regarding hydraulic conductivity and depth to barrier.

Yet you based your changes on three views of stratification in three places over 10,000 acres. You have not a drill hole to base it on. You have no proof of stratification. You have three pictures -- I mean you have three visits to what you see on the soils.

Isn't that about right?

THE WITNESS: No, not exactly. The pictures that we took we took in the first place that we saw that exposed gravel. That called our attention to the fact that there may be gravel in other areas, and so we looked at these other features that would tend toward enhanced natural drainage.

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That profile that we showed yesterday just happened to be one that we took. We saw this same situation in other areas, and in addition, we had with us this record of soil profiles from HKM (indicating), and as we traveled through the area, when we would come to a field that we were concerned about the drainage, we would locate that on the map.

We would observe the physical situation, the slope of the land, the natural drainage facilities that already existed, look at the soil type, and then refer to the information in this book to see --

THE SPECIAL MASTER: That's the same information you had available earlier, is it not?

THE WITNESS: Oh, no.

THE SPECIAL MASTER: What book are you referring to there?

THE WITNESS: This is entitled, "Wind River Drainage Analysis, Depth To Barrier and Average Weighted Hydraulic Conductivity, Future Lands."

THE SPECIAL MASTER: Wasn't that available at the time you consulted Dr. Mesghinna?

THE WITNESS: No. All we had was --

THE SPECIAL MASTER: You did not utilize it? I mean, you did not have that at your disposal at that time?

THE WITNESS: We did not have it.

THE SPECIAL MASTER: I see.

THE WITNESS: And this is why we just used the average hydraulic conductivity of all these layers in the soil.

THE SPECIAL MASTER: All right. Go ahead, Mr. Clear.

MR. SACHSE: Your Honor, I wonder if it would be appropriate at this time, since you've brought up the question, the propriety of Dr. Willardson testifying --

THE SPECIAL MASTER: Not so much the propriety as the appearance of propriety. I'm not saying there was anything unethical, but this thing bothered me last night, and I could not go to sleep over it, to quote a commercial.

MR. SACHSE: As the attorney that hired Dr. Willardson, it seems to me that I have a duty at this time to make a statement into the record lest reflection be left that shouldn't be there.

When Dr. Mesghinna presented his final report with his final figures, the prices for everything had gone up 10, .20, perhaps 30 percent over the prior figures that we had seen, and the biggest increase --

MR. CLEAR: Your Honor, Mr. Sachse is testifying. He could bring this out on cross-examination.

MR. SACHSE: This is not anything the Witness knows.

MR. CLEAR: He cross-examined Dr. Mesghinna himself, and he could have brought that out at that time. He is testifying now --

MR. SACHSE: I did bring this out from Dr. Mesghinna.

THE SPECIAL MASTER: I believe he has a right to make a statement. It's not evidence. It's argument, and I can make the distinctions.

MR. WHITE: I wouldn't think you would want to let him do that during Mr. Clear's cross-examination.

THE SPECIAL MASTER: At the close of the cross-examination, you may make your statement.

MR. SACHSE: Very well.

THE SPECIAL MASTER: Go ahead, Mr. Clear.

Q (By Mr. Clear) Dr. Willardson, you testified yesterday, I believe, that in the November, 1980, meeting you came up with -- you and Dr. Mesghinna came up with a drainage coefficient; is that right?

A Yes.

Q Is that the same coefficient that Dr. Mesghinna ultimately used in his final report?

A I cannot answer that. He took the notes with him when he left, and I didn't retain a copy.

Q Dr. Willardson, you recall the slides we had yesterday?

A Yes.

Q Without bringing them out, I believe they were --

THE SPECIAL MASTER: Well, he recalls them.

Q (By Mr. Clear) Do you remember what section you -- you identified the section they were in yesterday. Do you recall that? My notes say Section 32, Range 1 West, Township 3 North. Is that --

A I believe that's correct.

Q All three photos were in that area?

A Yes, and in almost exactly the same location.

Q Now, as I recall those photos, you were in a road, is that right -- you and another gentleman were standing by the bluff along-side the road, and the bluff was -- I don't know whether bluff is a proper term, but the surface was at least ten feet above the road surface. Would that be right?

A Yes.

Q Now, I'm going to hand you my copy of Tribe's Exhibit 13-2. Would you mark on there -- is that the Section 32 you found that the pictures were taken in?

THE SPECIAL MASTER: What mark will be put on, Mr. Clear?

MR. CLEAR: I haven't asked him to mark it yet, Your Honor. I will point to --

A It's in this area (indicating). We will have to look at the other map.

Q (By Mr. Clear) At the other map. All right.

THE SPECIAL MASTER: What document is that?

MR. CLEAR: That is 13-3.

I'm sorry. I think I have Stagner Ridge there, don't I? We want another Big Horn Flats, don't we?

(Off-the-record discussion.

Q (By Mr. Clear) Let me try Tribe's Exhibit 13-1.

A I think this little block (indicating) covers up a piece of information that I need to make sure which one of these roads it is.

Q Well, this is the -- where is the match line on 13-1 and 13-2?

MR. ROGERS: Might I suggest we use Court Exhibit 15, which is the composite of these two maps that was --

THE SPECIAL MASTER: We will transfer the information to that. That should be done, and we will do it once I have established where to put the information on 15.

MR. CLEAR: Why don't we use 15 since I don't have a composite map, and I guess 15 is a composite map.

THE SPECIAL MASTER: All right. That's fine.

* * * * *

Q (By Mr. Clear) You find it on Tribe's Exhibit 15, which is a composite of 13-1 and 13-2, I believe. You're in Section 17 and 18. I thought you said these pictures were in Section 32.

A What I remember of the road is that it comes off the flats east of this highway.

Q East of the --

A Am I on the wrong side again?

Q West of --

THE SPECIAL MASTER: Please speak louder, gentlemen, and can you address the Reporter, if you can?

Q (By Mr. Clear) Face the Reporter if you can.

A It's this point right here (indicating). I lost my orientation again. It's right here (indicating).

Q It's in Section 31 on Tribe's Exhibit 15, and that exhibit also had markings, I think, K-12 and K-23, which are the center pivot irrigation markings put on there by Mr. Bliesner; is that correct?

A Yes.

Q Now, you are --

A It's in this area here (indicating).

THE SPECIAL MASTER: Is that where all three of yesterday's exhibits were made?

THE WITNESS: Yes, and they were intended only to

be illustrative, not to furnish data.

Q (By Mr. Clear) Now, Tribe's Exhibit 15 shows in this Section 32 there are at least three center pivots partially or entirely within Section 32; is that correct?

A Yes.

Q How deep would the irrigation types that served those center pivots have to be beneath the surface to make it beneath that road?

A I think you can see that none crossed the road. Not the road that we looked at.

Q Where is the road that we looked at?

A Right here, this small double line is the road that goes down there. (Indicating)

Q Doesn't that road go through Center Pivot K-23?

A Well, it would, but it's not a paved road. It's just a trail through the brush. It's marked as a road here, but it's not a permanent road.

Q But still, the road surface was about ten feet below the surface of the land, wasn't it? That's what the photos showed.

A If you look at the contours here, you can see that that's a natural draw and the road is made in the draw, and in the construction at the road, they exposed the material in the road cut. Just made it easy to see what the soil

profile looked like in that area.

Q And the center pivots themselves don't cross that road?

A Yes, the road runs right through there. The present location of those center pivots covers the road, but the roads can be moved.

Q Don't they fall down the hill when they go down the roads?

A Well, that area is up on top. Those small center pivots are made so they stay up on top. If you look at the contours, you can see (indicating). The place where we looked was down off the top of the mesa.

Q So you weren't on Big Horn Flats?

A We were, but just off the top. The top of that profile would be Big Horn Flats.

Q As I recall, and I think it was Tribe's Exhibit 21, which is another photograph, you stated there was a strata of white material, which were lime deposits in the soil and those would dissolve when irrigation started; isn't that correct?

A Yes.

Q Isn't the level of the land going to sink when that dissolves?

THE SPECIAL MASTER: I beg your pardon. May I hear the question?

Q (By Mr. Clear) Won't the level of the land sink when

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the lime deposits dissolve?

THE SPECIAL MASTER: The level of the land sink?

MR. CLEAR: Yes.

THE SPECIAL MASTER: And the answer of course is no?

THE WITNESS: The answer is no. That white material you see is coated on the surface of the gravel and the gravel was structurally in place before the water washed that lime material from the soil on top of it, so taking it away would not change the structure of the gravel and would not cause the land to sink.

Q So that lime deposit is not all the way through Big Horn Flats, then, it was just a coating or something?

A I would guess that it is all the way through the flats and over the whole area, because it is a natural feature in that rainfall zone.

MR. WHITE: I would move to strike the answer to the last question for lack of probative value. The Witness said he would have to guess. I don't think that's probative.

THE SPECIAL MASTER: It may not have, but I don't think I will strike it. It may stay for whatever probative value, if any. It's a surmise or a conclusion.

Q (By Mr. Clear) With respect again to Mr. Bliesner's Big Horn Flats area, you said you designed the drain

but did not size it?

A We did size the drain.

Q You did size it.

A A technician sized the drain.

Q Did a technician do the sizing for Dr. Mesghinna's drains too, or resizing of Dr. Mesghinna's drains?

A The drains that we changed had to be resized.

Q I'm asking who did that?

A The technician did that.

Q Who is that technician?

A His name is Mohammed Idakadi.

THE SPECIAL MASTER: Is that I-d-a-k-a-d-i?

THE WITNESS: Yes.

Q (By Mr. Clear) Is he an employee of yours?

A No. He's a graduate student at the Utah State University and was hired to do this work.

Q And you were out of the country when he did this work; is that correct?

A I was out of the country when he finished it. I was there in the beginning to make sure that the procedure and the numbers were correct, and then it was just a matter of repetition.

Q Now, with respect to the interceptor drain for Mr. Bliesner's Big Horn Flats area, you said at one point

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in your testimony, you said you had a 20 percent contingency fee to cover unforeseen problems; is that correct?

A In the general project after we computed the total drainage cost, we added to that a 20 percent contingency fee because of the uncertainties in this type of terrain and the uncertainty of the exact magnitude of the natural drainage.

Q You also said you dropped the cost after you figured it initially --

A On Big Horn Flats, since there was only a single drain and the drainage cost was very low, we had a contingency factor of 100 percent there.

Q Is the 20 percent taken on top of the 100 percent, or is it the 20 percent of the original cost of it after the cost is doubled?

A I don't recall whether those things were put together or whether Big Horn Flats was kept separate.

Q Well, there's two contingencies, as I understand it, a 20 percent contingency and 100 percent contingency; right?

A In Big Horn Flats we have a limited amount of drainage and a possibility that special problems will arise, and without a multiplier factor of any size, the drainage

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cost for Big Horn Flats is only $28 an acre and 20 percent of that is not enough to do any significant additional drainage, so we double the calculated drainage cost to make sure we had enough money available for future problems. And the remainder of the project, the contingency factor was 20 percent.

Q So on Mr. Bliesner's Big Horn Flats, you had a margin of error of 240 percent.

A No, it was just 100 percent, and when it was put back in the total project that 20 percent may have also been applied to that, 20 percent of the total project cost. We could determine that if you want to know exactly, but it's not a large number.

Q Let's go to your June visit of the Big Horn Flats area, particularly focusing on Dr. Mesghinna's area.

THE SPECIAL MASTER: I did not get that question. May I hear it from the Reporter, please?

(Whereupon the Reporter
(read back the question as
(follows: Q Let's go to
(your June visit of the Big
(Horn Flats area, particularly
(focusing on Dr. Mesghinna's
(area.

MR. SACHSE: Well, I'll object to that question.

MR. CLEAR: It wasn't a question.

THE SPECIAL MASTER: Right, it wasn't a question.

Do you want to define Dr. Mesghinna's area as a specific part of Big Horn Flats that you have reference to?

MR. SACHSE: It's unclear to me and I'm sure it's unclear to the Witness whether Mr. Clear is trying to define the Big Horn Flats study which is more or less separate from Dr. Mesghinna's study, or a review of other projects than the projects that Dr. Mesghinna completed the plans for.

THE SPECIAL MASTER: You can complete your question. Back to the meeting of June and which specific lands.

Q (By Mr. Clear) Are you familiar with the lands on Big Horn Flats for which Dr. Mesghinna prepared an irrigation system?

A We traveled on top of Big Horn Flats and included are some areas around the periphery. Are you talking about the main area we see here, or --

Q I'm asking if you are familiar with the areas on Big Horn Flats for which Dr. Mesghinna designed an irrigation system.

A I can't say that he designed an irrigation system. He had -- on the maps that we used were marked some possible fields and there were no drains indicated in those fields, and they're essentially the area that's covered by the center pivot system.

Whether Dr. Mesghinna designed a drainage system for this area or not, I have no idea. It was not marked on the maps we used.

Q Did you have with you any maps which show Dr. Mesghinna's drainage systems?

A We had all the maps for the rest of the system and we had a map for Big Horn Flats, but the Big Horn Flats map showed no drainage except on some small plots around the edges.

Q Let's go to the small plots around the edges. Can you identify the maps you had with you?

A The maps we had with us are not available. We gave them to the State during a deposition and they have not been returned.

THE SPECIAL MASTER: Oh gracious.

* * * * *

THE SPECIAL MASTER: Oh, gracious.

MR. WHITE: It looks like really goofed up, Your Honor. We did provide, however, copies that we had made of the original and gave those to counsel for the Tribes last night.

THE SPECIAL MASTER: They are here?

MR. WHITE: But the witness is exactly correct, Your Honor. It appears that we got his smaller maps and made copies of them, and somehow we didn't get them back to him. We are desperately looking for them.

I apologize to the Court, counsel, and the witness.

Q. (By Mr. Clear) So you had some maps with you?

A. When were those maps given to you?

A. When I arrived in Lander, Wyoming, at the time of the visit.

Q. Who gave those to you?

A. Mr. Bliesner.

Q. What else did you have with you?

A. We had HKM's profile data, and we also had a map on which was indicated the general locations of these profiles.

Q. When did you receive that?

A. At the same time I received the maps. Also, this was the first time that I had seen a copy of Stetson's project

report.

Q. Meaning this report (indicating)?

A. Yes.

THE SPECIAL MASTER: Let the record show that Mr. Clear held up WRIR C-245.

Q. (By Mr. Clear) So then what did you do? You went around to these areas, and you mentioned yesterday you marked on the maps which now, I guess, Mr. White has the maps.

MR. WHITE: Jim, the witness has copies of the maps. He doesn't have the originals, but he has copies including his annotations.

Q. (By Mr. Clear) You made hand annotations on these maps; is that correct?

A. Yes.

MR. ROGER: For the record, those maps also have annotations the State made which may or may not be all of the notes that the witness had on the originals.

THE SPECIAL MASTER: Very well.

THE WITNESS: I can describe the procedure to you.

We would drive to an area that was indicated as needing drainage and for which a drainage system had been designed.

Q (By Mr. Clear) I thought you said you didn't have the

maps showing the drainage systems.

A. We did when we made the visit in the field.

Q. That's what I meant. During the visit, what map did you have during the June visit?

A. We had small maps, small copies of maps, that showed Doctor Mesghinna's drainage design.

Q. On Big Horn Flats?

A. Yes, you can say on Big Horn Flats, but there was no drainage on the map.

THE SPECIAL MASTER: Mr. Clear and Doctor Willardson, the evidence in this case so far shows that the Stetson Engineers' report as received from HKM Associates planned a system and the drainage of a system of over nineteen thousand acres on Big Horn Flats, and I find it incredible that we can't identify what you are talking about as acreage. That has nothing to do with what Mr. Bliesner brought in as his project. He added to those nineteen thousand an additional ten thousand acres, so I see no reason for this confusion.

MR. ROGERS: Your Honor, that's not quite a correct statement of HKM's arable lands map.

THE SPECIAL MASTER: I'm taking it exactly from Page 27 of WRIR C-43.

MR. ROGERS: That's HKM's arable lands.

THE SPECIAL MASTER: That's what I said.

MR. ROGERS: But Stetson did not design a system on Big Horn Flats for nineteen thousand acres.

THE SPECIAL MASTER: Stetson designed a system on Big Horn Flats for a total of --

MR. ROGERS: Of about twenty-six hundred acres, not nineteen thousand.

MR. SACHSE: Yes, Your Honor --

THE SPECIAL MASTER: All right. I stand corrected, and when that figure which I quoted from the Kersich report of HKM, which was finally completed in the Mesghinna report, the total acreage on Big Horn Flats was -- let me read it right from the exhibit -- I can't seem to find the total.

MR. SACHSE: Table 4, right there (indicating).

THE SPECIAL MASTER: Table 24, your total on Big Horn Flats is 2,067 -- that's your investment per acre. That is your costs per acre.

MR. SACHSE: No, excuse me.

THE SPECIAL MASTER: 2,670, that's correct, and 2,670 acres just can't get lost in your discussion.

MR. CLEAR: I'm not trying to even identify -- I'm just trying to find out what maps he had with him.

MR. SACHSE: Your Honor --

THE SPECIAL MASTER: Let's proceed with the evidence.

I just wanted to know -- I would like to have some identification of which lands you are referring to.

MR. SACHSE: I want to object.

THE SPECIAL MASTER: Are they a part of the 2,600 or part --

MR. SACHSE: I want to object to the term "Big Horn Flats" until it's used more particularly in asking the questions because part of the confusion, I believe, is in Mr. Clear's use of that term.

There is a geologic feature that's called "Big Horn Flats", and that's the feature that Mr. Bliesner designed the center pivot irrigation for.

There is a general area that Stetson Engineers called "The Big Horn Flats Future Project", which is where the 2,670 acres are.

Now, if someone asks, "Did Mesghinna or Stetson plan something for Big Horn Flats", the answer doesn't make any sense unless someone knows that the question means that area on the top or the --

THE SPECIAL MASTER: Precisely.

MR. SACHSE: -- or the project area that includes the --

THE SPECIAL MASTER; Mr. Sachse, I thank you for your remarks. You have made mine more clear. That's precisely what my objection is.

Q. (By Mr. Clear) Doctor Willardson, what maps of Doctor Mesghinna's showing drainage did you have with you when you went to the Wind River Indian Reservation?

A. They were essentially the maps that we borrowed from you yesterday and put up on the board for comparison.

Q. They are essentially those maps, or they were the maps, you mean?

A. Well, without comparing them, I can't say that they were exactly the same copies, but they are essentially those maps.

THE SPECIAL MASTER: Well, Mr. Clear, do you want to take a few minutes, if it's important to your cross-examination, and find those maps? They are here.

MR. CLEAR: I have the map, Your Honor. I'm trying to get from the witness what he had with him, and I think I have that. He has apparently drainage maps.

THE WITNESS: Yes.

Q. (By Mr. Clear) Doctor Mesghinna's report, as far as you can tell?

A. Yes.

Q. What did you do with those maps?

A. We used those maps as a guide for our visit.

Q. All right.

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A. We used them to locate the areas that would be drained.

Q. Fine.

A. We drove to those areas and examined by observation the topography, the slope of the land, the condition of the soil. Then with the other map --

Q. What's the other map now?

A. It's an arable lands map, I believe, that had marked on it a code by which we could locate the soil profiles from this book (indicating).

Q. Do you have that map with you?

A. No, I do not.

Q. So now you have the map, and you are out on a particular parcel for which the map indicates that Doctor Mesghinna had designed a drainage system; is that correct?

A. That's correct.

Q. What do you do now?

A. We looked at the soil, at the surrounding lands, the position of that piece of land with respect to other lands that may be irrigated.

We examined the soil profile, and on the basis of that information, we examined the profiles and the information in this book from HKM (indicating) -- on that basis, made an adjustment if we felt it necessary to the drainage design in that area.

Q. When you say "we", now, are you just speaking the singular we or plural we? Was that you, or was there somebody else with you marking these maps?

A. Mr. Bliesner was with me. I made the marks on the map. We talked together, but I made the decision.

Q. And you made the marks on the map when you were right on the site; is that right?

A. On the site.

Q. And somehow those marks indicate "leave the drains as is, take them all out, or reduce them fifty percent"; is that correct?

A. That's correct.

I would like to say a word about the fifty percent reduction --

Q. I'm just concerned about marking the maps.

MR. SACHSE: Your Honor, I think the witness has the right to amplify his answer.

THE SPECIAL MASTER: He may, of course, if he wishes.

Q. (By Mr. Clear) You can amplify your answer.

A. These drainage designs, either Stetson's design, Doctor Mesghinna's design, do not precisely show the location of the final drains. These lie --

Q. How do you know that Stetson or Doctor Mesghinna's maps

don't show the location of the final drains?

A. Well, because the information details that he has do not allow him to precisely locate those drains.

Q. How do you know what information he has?

A. Well, this is what's available(indicating), and it isn't enough because there is no drainage -- many of those drains will never be built, so the designing of drains for an area is to assure that there's enough money in the project to take care of future drainage costs.

Those drains will not be installed before the project is built. It's important to note that there will be a drainage need, and that approximately this number of drains will be needed in that area, and the density will be what has been designed if the drains are necessary, but the drains will not be in those precise locations.

When we reduced the drains --

Q. Again, you are saying "we", you mean "you"?

A. Well, when I reduced the drains fifty percent, we just took out every other drain that had been put in in a parallel relief drain system by Doctor Mesghinna.

Q. Now, you said just in this answer that neither your drainage design or Mr. Mesghinna's drainage design is

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exactly in the place where --

A. That's true.

Q. Did you have your own drainage design, or did you just remove drains from Doctor Mesghinna's drainage design?

A. I just removed the drains from Doctor Mesghinna's design, leaving enough drains to leave enough cost so that the drains needed in the future could be installed.

* * * * *

Q. (By Mr. Clear) So you marked the maps, now, one hundred percent and fifty percent, and zero percent, apparently?

A. No drains, collector remains, which meant remove only half of the drains. Perhaps I could draw, if you wouldn't mind, some pictures of these situations.

Q. I'm just asking how you marked the maps. I understand what you did when you went into it some yesterday.

A. We only made the adjustment of plots that we visited, so if there is a mark on the map, this means we saw that area, we made an examination of it, looked at the topography and made a judgment about what should be done, how the drainage should be modified there.

Q. These are the maps that you do not have that are not in evidence?

A. Right. And there were some areas not changed.

Q. Right.

A. And some areas not marked.

Q. And the ones not marked, you didn't visit?

A. Either we did not visit or did not mark those.

Q. Um-hum.

A. So we can't tell. We did not visit every plot of the project. The ones we did not visit, we did not change, and there may be some that we did not change that we did

visit.

Q. Um-hum. Is your drainage system designed for Doctor Mesghinna's irrigation system or for the irrigation system designed by Mr. Bliesner?

A. We used the same drain coefficient that Doctor Mesghinna used.

THE SPECIAL MASTER: Can you give us a description of that drainage coefficient?

MR. CLEAR: Your Honor, I object to the answer. He testified before the coefficient used and decided upon in September was the same that Doctor Mesghinna used --

THE SPECIAL MASTER: He said he didn't know.

A. And the drainage coefficient we used at that time --

Q. (By Mr. Clear) What time?

A. In November, was just one to put into the system to make the calculations so we could see how the calculations went, and it may have been exactly the same one that he used in his final design. I can't say that.

Q. That's fine.

A. But that's immaterial, because in the readjustment we used his drainage coefficients.

Q. You used the drainage coefficient in this report, in his report?

THE SPECIAL MASTER: Mr. Clear, at this point, let me correct, for my own observations, a prior statement. When I said that the ten thousand acres of the work of Mr. Bliesner was added in addition to the 19,644 arable land base after Kersich's and that did not show it was a part of the 19,000. I wanted to make that correction.

Thank you, Mr. Clear, for letting me do that now.

Q. (By Mr. Clear) So the drainage coefficient you used in June may or may not be the same?

A. That's relatively immaterial.

Q. So it's relatively immaterial that you use the same drain coefficient?

A. No.

Q. The drainage coefficient is not relevant?

A. No, it's very important, and we kept Doctor Mesghinna's drainage coefficient and used that in our readjustment of the drainage intensity.

Q. Let me go back. What relevance does the November meeting have as far as you know, if the drainage coefficient has been changed since that meeting?

A. We needed a drainage coefficient number at the time to develop the procedure. It may have been the same or another. It's not important. It's just that we had

a number to put in that part of the calculations.

Q. Whatever you put in at that time was not important for the final?

A. Right. That's the basis on which the systems were designed.

Q. The final number?

A. The final number.

Q. Not the number in November.

A. Right.

Q. And not the hydraulic conductivity in November.

A. Not the hydraulic conductivity in November.

Q. All those were drainage and not the depth to barrier in November?

A. They were drainage and not depth to barrier.

Q. And all were changed for each individual parcel? As far as you know.

A. As far as I know.

Q. All right. Let's get back to the question I asked. What irrigation system did you design the drainage for? Doctor Mesghinna's or Mr. Bliesner's system.

A. Doctor Mesghinna's irrigation system, because we're using his drainage coefficient.

Q. You were out in the field with Mr. Bliesner designing a drainage system for irrigation system which Mr. Bliesner

says is inaccurate, and Mr. Bliesner never said anything to you about that?

A. Well, I don't think that that's a necessarily appropriate question.

Q. Well, I didn't hear your counsel object to it.

A. When you design an irrigation system, there will be some losses from that system due to nonuniformity.

Q. Nonuniformity of what?

A. Water application. Sprinkler irrigation, surface irrigation, any kind of irrigation does not apply water uniformly to the land, so there will be some leakage in various parts of the area.

Q. And it does not depend on the irrigation system above the ground, doesn't depend on the system that puts the water into the ground.

A. Yes.

Q. Why did you use Mesghinna's and not Bliesner's system?

A. Because his numbers were from sprinkler irrigation with a certain level of efficiency. In our report, we state that we have been conservative in our estimate of the drainage coefficient or the water losses, that the actual water losses in the project may even be less than those we used.

Q. So you're saying, does Mr. Bliesner design the drainage

system for his irrigation system?

A. No.

Q. He's saying, as I understand, "I don't need a drainage system, because Doctor Mesghinna is correct." You're saying, "I don't have to worry about the irrigation system because Doctor Mesghinna's irrigation system is correct."

MR. SACHSE: I object to the question, if it is a question, and I want to renew my objection to counsel's questions on the ground of their lack of clarity. If we're going to get into these areas --

MR. CLEAR: Your Honor --

THE SPECIAL MASTER: Let him finish the objection, first.

MR. SACHSE: If we are to get clarity on this, Mr. Clear has to distinguish in his questions whether he's asking about the areas left out of the Stetson design where Mr. Bliesner designed the new center pivot and side roll things and designed the irrigation, or whether he's talking about the five projects designed by Stetson, because there, as I understood Mr. Bliesner's testimony, there was no change in the --

MR. CLEAR: Whoa, that's not true, Your Honor.

THE SPECIAL MASTER: Just a second. If not so, you

can correct it.

MR. SACHSE: There's no change in the original application of the water that Mr. Stetson, through Doctor Mesghinna designed. The same amount of water was coming down, the same amount of efficiency was assumed. It would be the same amount of water to drain, and I think in the questions --

THE SPECIAL MASTER: Gentlemen, let me ask this to maybe help clear this up a bit. Is the difference and question among professional men one regarding whether or not sufficient drainage was needed in these few areas of the 2,900 acres of Big Horn Flats that Doctor Mesghinna and Stetson Company approved, and did the Bliesner - Willardson people come along with a conclusion there was more drainage pipe in there than necessary, and that's the only change they made in the entire Stetson plan?

MR. SACHSE: No. It's for all the projects.

THE SPECIAL MASTER: In other words, you're saying they went to North Crowheart, South Crowheart, Riverton East, and Owl Creek, and Arapahoe, and took from those also?

MR. SACHSE: Absolutely.

THE SPECIAL MASTER: Is that a fact?

THE WITNESS: Yes, with the exception of Owl Creek. We did nothing there.

THE SPECIAL MASTER: But you respaced and increased the size of the remaining drainage, but took out the planning for the drainage pipes in North Crowheart?

THE WITNESS: Yes.

THE SPECIAL MASTER: And in South Crowheart?

THE WITNESS: Yes.

THE SPECIAL MASTER: And in Riverton --

THE WITNESS: East.

THE SPECIAL MASTER: And south and down and in Arapahoe?

THE WITNESS: Yes.

THE SPECIAL MASTER: All right. We've made that clear. That should save, I think, any additional problems there.

MR. CLEAR: Your Honor, with respect to Mr. Sachse's observations --

THE SPECIAL MASTER: Excuse me, Mr. Clear, one more thing. And that reduction was about ten percent of the total drainage maps of Stetson? Was that the testimony of Mr. Bliesner?

THE WITNESS: No, it's more like thirty percent.

THE SPECIAL MASTER: Well, it's more like thirty percent, as you recall?

THE WITNESS: Yes.

THE SPECIAL MASTER: All right.

MR. CLEAR: Your Honor, in response to Mr. Sachse's claim that Mr. Bliesner did not design irrigation --

THE SPECIAL MASTER: Please let me ask one more question, Mr. Clear.

MR. CLEAR: Sure.

THE SPECIAL MASTER: Is the basis for that thirty percent reduction of Stetson Engineering, the details of the three files in evidence yesterday, all taken from one spot on the road near Big Horn Flats?

THE WITNESS: No.

THE SPECIAL MASTER: Well, what else was used?

THE WITNESS: Information in this book (indicating).

THE SPECIAL MASTER: What book are you referring to? When was it published?

THE WITNESS: It has no information except the title.

THE SPECIAL MASTER: Well, I think we have to have more in the record about this book if it's to have any meaning.

MR. SACHSE: This is a book already introduced into evidence. It's the Soil Profile Study done by HKM, introduced with Mr. Toedter's testimony some months ago.

THE SPECIAL MASTER: Let's take a minute now and indentify it by exhibit number. I thought it was a part

of what Stetson Engineers had in the record, and I thought it was available to --

MR. SACHSE: Doctor Mesghinna.

THE SPECIAL MASTER: -- all who were working with this program. I don't want it to hit this lawsuit like the Book of Revelations.

MR. ROGERS: Your Honor, except the witness testified this morning that he did not have that available to him in November.

THE SPECIAL MASTER: He did indeed.

MR. ROGERS: When he first consulted with --

THE SPECIAL MASTER: He also said the information of the soil conductivity and depth to barrier of Stetson's, was your testimony --

THE WITNESS: Yes. He brought just the value.

THE SPECIAL MASTER: Those I just mentioned.

THE WITNESS: Where he got the value, I don't know.

THE SPECIAL MASTER: May I see the book, please, and let the record show I have been handed Wind River Drainage Analysis, Depth to Barrier and Average Weighted Hydraulic Conductivity, Future Lands. I would welcome and take a five-minute break after this question, help from counsel, all of you, in helping me identifying what the number of this document is.

We'll take a ten-minute break.

(Thereupon, a ten-minute recess
(was taken.

* * * * *

THE SPECIAL MASTER: May we come to order, please?

Mr. Clear, you may proceed. If you wish, I will announce what date the document I had in hand was introduced into evidence.

I believe it's identically the same document or a copy of U.S. Exhibit WRIR C-241-A, which was introduced into evidence April 21, 1981, with Mr. Toedter on the stand at that time.

MR. CLEAR: Your Honor, I think perhaps Mr. Sachse was correct in some of the comments he made just before the break; that is, Mr. Bliesner designed the system for the Big Horn Flats shown on Trial Exhibit 15, and he also designed the system for Stagner Ridge which Dr. Mesghinna did not design systems for, and perhaps I did confuse the witness.

Q. (By Mr. Clear) And what I'm talking about now, Dr. Willardson, is are you aware whether Mr. Bliesner went over the irrigation systems design done by Dr. Mesghinna and modified them?

A. It's my general impression that he did that, but that he did not modify the water application or the irrigation efficiency or the drainage coefficient which would result from that, that his modification was more in the mechanical part of the system, economic pipe sizing, different

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pumping plants and changes in geometry, but from a drainage point of view, whatever those changes were, they did not modify anything that would affect the drainage design.

The water delivery, the consumptive use, all of those numbers were the same for both systems.

Q. Did Mr. Bliesner increase the acreage irrigated?

A. I can't answer that except that this was --

Q. In the field when going over Dr. Mesghinna's systems -- or irrigation systems, revising them, did Mr. Bliesner increase the acreage?

A. I can't answer that.

Q. If he had increased the acreage, would that require more water to be applied?

A. Yes, but in -- if he did that, it would have required more water to be applied, but the unit water per unit area would be the same. And so, if the area was bigger, it would just require more drains of the same spacing.

Q. Require more drains?

A. Yes.

* * * * *

MR. CLEAR: Your Honor, Mr. Sachse, during his comments said that Mr. Bliesner had not designed on-farm systems; that all he designed was his pumps and pipes and that's not true. As you recall, Mr. Bliesner took a ten percent sample --

THE SPECIAL MASTER: It's a theoretical thing, Mr. Clear, because if, as I understand it it's one unit run by one entity, government institution or a large tribe or hugh corporation, the on-farm system distincition from conveyance becomes meaningless, it's a moot question.

MR. CLEAR: Yes, Your Honor, unless the acreage --

THE SPECIAL MASTER: This is a bookkeeping transaction where you assign the cost, it's an on-farm system cost or maintenance --

MR. CLEAR: There's two things, Your Honor; there is engineering and there is cost.

THE SPECIAL MASTER: Well, go ahead.

MR. ROGERS: Your Honor, as long as Mr. Clear is testifying about what Mr. Bliesner said --

MR. CLEAR: I'm rebutting what Mr. Sachse's testimony --

MR. ROGERS: The fact is Mr. Bliesner did not change the application of water to the land designed by Stetson, he changed pipe sizing and pumps.

THE SPECIAL MASTER: This had just been confirmed

and we're happy to observe Mr. Bliesner in court looking at us while this is going on, so if we need him we'll come back and that will be the best evidence as to what he did do.

MR. SACHSE: I'd like to make one other statement in connection with what I said. This is a question of law, not of testimony. The Tribes have not claimed any additional irrigated acreage in connection with the review of the Stetson future projects. The additional irrigated acreage that we have claimed is as to the new design on Big Horn Flats and the new design on Stagner --

MR. CLEAR: Your Honor, that is not correct.

MR. ROGERS: That is correct.

THE SPECIAL MASTER: Just a minute.

MR. ROGERS: That is correct.

THE SPECIAL MASTER: We've been fortunate enough to go almost a year and a half of trials without having to buy a gavel or call in deputies from the Sheriff's office. Let's just relax and get back to the issues of our lawsuit and continue showing some patience and some forebearance and some understanding of the tribulations all of us share in this thing.

MR. CLEAR: Your Honor, perhaps I misunderstood --

THE SPECIAL MASTER: I want it known, Mr. Clear and

other Counsel, that I believe that the Tribes make a claim for the additional approximately 10,000 acres of practicably irrigable acreage and that's what this phase of the case is all about.

MR. CLEAR: Your Honor, --

THE SPECIAL MASTER: I want to know -- someone can interrupt me if I'm wrong. In my opinion I think the evidence now shows that that would require approximately 25,000 acres a year of additional water for that land. Now, if those two basic conclusions are in error, speak up now.

MR. ROGERS: That's correct, Your Honor.

THE SPECIAL MASTER: Or forever hold your peace as was said yesterday in Saint Paul's in London.

MR. WHITE: I think I better stand up, Your Honor, because we don't agree with those facts at all.

THE SPECIAL MASTER: Well, I don't ask you to agree with the value or the claim. Mr. Sachse said we are not making additional claims. I want to know which -- what I udnerstand to be the additional claim.

MR. WHITE: I want the right to come in as an Iotolla Khomeni later on.

THE SPECIAL MASTER: Now, proceed, Mr. Clear.

Q (By Mr. Clear) All right, Dr. Willardson, you visited-- willardson-cross-clear

Again, I'm not talking about Mr. Bliesner's Big Horn Flats or Stagner Ridge. You visited Dr. Mesghinna's areas, which he designed a drainage system for?

A That's true.

Q We're still on the gound out there and you've marked on your map --

A Yes.

Q Take 50 percent off, leave 100 percent here, take all of them out.

You testified yesterday that you talked on the telephone with personnel from HKM.

A Yes.

Q Who did you talk to?

A I talked to Mr. Billstein.

Q Mr. Billstein.

A Yes.

Q When did you talk to him?

A About three days ago.

Q After you make your determinations?

A Yes. And I talked on the telephone this morning with Mr. Toedter.

Q Had you talked to Mr. Toedter before?

A No, I tried to get in touch with him, but could only talk to Billstein. Mr. Toedter was out.

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Q Why did you talk to them?
A I wanted to get additional information on their handling of the data in this book, and some values for, if they could give me them, values of the hydraulic conductivity of these gravel layers that I considered to be important in this modification of the drainage design.
Q After you got done visiting Dr. Mesghinna'a areas, what did you do then? I mean you're on the ground, you're done marking your map. What did you do?
A We took the map back to the office and made the modifications to the drainage system that I had marked on the map; removing drains --
Q When did you visit the Bureau of Reclamation people?
A During the three-day period that we were in the area.
Q Before you marked the maps or after?
A During the period we were marking the maps.
Q What was the purpose of talking to those people?
A Just to get their feeling for the drainage problems that they were facing in their areas and to see what procedures they were using and what values of hydraulic conductivity and what drainage coefficient they were using.
Q But you didn't use that information; isn't that correct?
A Some of the information we got from them applied to what

we had done because --

Q What you had done or what you were doing?

A What we were doing and had done, and confirmed some of our observations.

Q What information did they give you on hydraulic conductivity?

MR. WHITE: Objection, Your Honor, calls for hearsay.

MR. CLEAR: I'll withdraw the question.

MR. WHITE: If Counsel would ask --

THE SPECIAL MASTER: He withdrew --

MR. WHITE: -- what information they gave you upon which you relied and was reasonable for you to rely upon.

THE SPECIAL MASTER: He withdrew that question.

Q (By Mr. Clear) Now, when you redesigned or took out 50 percent of all of Dr. Mesghinna's drains, you also testified you increased the size of some of those drains?

A That's true.

Q Now, as I recall when you were talking about Mr. Bliesner's Big Horn Flats, you said that you did not design the drain yourself, you laid it out but you didn't design it, your graduate assistant designed it.

A The graduate assistant sized the drains, which he did in willardson-cross-clear

the case of all the rest of the drains.

Q He did it with Dr. Mesghinna's drains too.

A Yes.

Q So you did not do that?

A No. I set up the procedure and did the initial ones and he used that procedure on the rest of them.

Q And you used Dr. Mesghinna's cost for six, eight, ten inch drains; is that correct?

A That's true.

Q And for 12-inch drains you extrapolated somehow?

A Yes, I have -- I needed cost to put in the calculations and here is the paper on which I made that extrapolation. The costs are plotted for six, eight and ten inch drains, and we took the increment between six inch drains and eight inche-- or eight inch drains and ten inch drains. The cost increase was those two pipe sizes, increased it slightly and assigned that price to a 12-inch drain.

Q Did you contact any dealers in pipes or drainage pipes or whatever?

A No, I did not. And that is really not very useful because this -- These costs are for installed costs, that includes pipe, machinery, backfilling, gravel envelope, connections and it's an estimating price,

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a contractor's price for installation of the drains. So an individual pipe cost is a relatively small proportion of that.

Q Well, you used Dr. Mesghinna's six, eight, ten inch pipe costs?

A Yes.

Q Now, let's assume that he contacted dealers who sold drain pipes and he based his cost in part on that, are you saying his method of deriving cost is inappropriate?

A His method of arriving at cost is entirely appropriate and for that reason I relied on his cost.

MR. CLEAR: I have no further questions.

THE SPECIAL MASTER: Do you wish to make your statement at this time, Mr. Sachse?

MR. SACHSE: I do. It will only be a brief --

THE SPECIAL MASTER: Please take the podium.

MR. SACHSE: -- a brief statement. I just want to assure the Court that we have been in considerable contact with Dr. Mesghinna about the work that we've done, there has been no secrets from him; that as Mr. Bliesner already testified, Dr. Mesghinna helped him pick out the areas to use as sample areas for pricing the pipes. The contacts with Dr. Mesghinna however, have been through myself and through Mr. Bliesner, and

if the Court thinks it's necessary, although I personally don't think it's necessary, we'll be happy to put Mr. Bliesner on the stand to testify as to his contacts with Dr. Mesghinna so there won't be any lingering feeling of people working behind his back. That has not been the case.

In our view, this is a situation of a very good Doctor having rendered an opinion, that's Dr. Mesghinna, but of their being enough doubt in some parts of it that one wanted a second opinion and we asked quite late in the case for Keller Engineers to give us a second opinion about the, particularly the costs and the intensity of drainage that Dr. Mesghinna had planned and that's what we've done.

MR. CLEAR: Your Honor, I do not have any concern that the Tribe's witnesses have acted behind Dr. Mesghinna's -- he may not have known about the details, what they were doing. He knew his work was being reviewed, I don't know if he knew of the conclusions. He heard them, of course, Tuesday and Wednesday and was not terribly upset by them.

THE SPECIAL MASTER: Let me add --

MR. ROGERS: Your Honor, may I say something on this?

THE SPECIAL MASTER: Yes.

MR. ROGERS: I'll go one step further than my

co-counsel, Mr. Sachse did. I would like to put Mr. Bliesner back on the stand after Dr. Willardson, to have in the record, because I think Your Honor is concerned about undercutting Dr. Mesghinna.

THE SPECIAL MASTER: No, I'm not concerned so much about undercutting Dr. Mesghinna. I wanted to make sure I can ascribe every witness a weighing of his evidence in good conscience without having imposed upon my conscience the fact that there has been some activity that would limit the good faith I put on every man of good faith and his evidence and that's how I want to treat everybody accordingly. I think any engineer who is handed a document with a conclusion of 19,644 arable acres in a given area and comes up with a fact that he's only going to put 3,000 of them into a system, can expect that somebody's going to go over his work. I think that's understandable, and I believe that the record is sufficiently clear that there has been no question, as I said earlier, of anybody's ethics in accepting clients and completing work with clients and accepting other interests who may have been, not in conflict, but I guess it was a second review, I don't know, but in any event I want to rest your fears of my being unable to judge this evidence fairly.

I don't mind telling all of you that my fear in this

matter at this point, and I think that's it's fair that I do this, rests with the fact that you take and reduce the drainage facilities and pipe of a given vast three or four systems in order to add 10,000 acres in a state that has a long, tragic record of too much insufficient drainage to begin with in irrigation systems, and I would say that the burden of proving otherwise is going to rest upon the Tribes in this case. I think that's fair.

MR. SACHSE: We thank you for your remarks. I have only one other short statement; that our intention with this testimony is not that, to reduce drainage on the whole thing because of 10,000 acres, but to reduce drainage on the whole thing because in the professional opinion of our experts the drainage on the whole thing is excessive. It has nothing to do with the 10,000 additional acres, this has to do with the amount of money --

THE SPECIAL MASTER: We'll go back over the record when the time comes and consider all of the evidence as to these matters when questions arose questioning them.

MR. ROGERS: Your Honor, one last thing. I think it would also be clear from the record of the testimony of both Dr. Willardson and Dr. Bliesner, at the time they actually started their work, that in fact Dr. Mesghinna had already testified and his work was literally in stone

as far as his record is concerned and whatever came after that had been completed.

THE SPECIAL MASTER: All right. Is their cross-examination by other counsel?

MR. RADOSEVICH: Yes, Your Honor.

THE SPECIAL MASTER: Mr. Radosevich, for Lander and other defendants.

MR. RADOSEVICH: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. RADOSEVICH:

Q Dr. Willardson, in the report that has been submitted as Tribal Exhibit No. 13, your name is included on the title but it appears to be prepared by Keller Engineering. Are you under contract with Keller Engineering to do this, your part of the analysis?

A Yes.

* * * * *

Q. Were you contacted by Doctor Keller or by counsel for the Tribes to prepare this work?

A. Mr. Bliesner.

Q. Okay, and the graduate student that you testified did the work with you, was he more or less under a sub-contract with you, or is he an employee of Keller Engineering?

A. He was paid by Keller Engineering.

Q. Yesterday you testified that the reason for the reduction of the drainage and the limitation on some of the drainage is because the natural drainage would take care of any drainage problems, but then you went further on to allude that there would be some possible drainage problems along the edges of the area on the Big Horn Flats and Stagner Ridge.

Is that a correct summation?

A. Yes.

Q. The question I have with respect to that, had you made any determination as to the impact on the water quality from this drainage on the surrounding -- on the land around the edges of these two projects?

A. No, I have not, and the reason is that we do not know where the water will appear or what sort of soil it has passed through and what kind of circumstances will

occur when the water exits from the natural drainage system.

It may develop wildlife habitat, for example. A new vegetation may grow where that comes.

It may come out into heavier soil that will just become a salt seep.

Q. Are you aware of any irrigated acreage below in terms of the natural ground water flow of water in this area below these two projects?

A. Well, below these projects, below Stagner Ridge on the side toward the river, there is irrigated land presently. On the north side of Stagner Ridge, there are areas that will be irrigated under this project that would possibly be affected by this natural ground water flow, and for this reason, we have included interceptor drains in the twenty percent contingency that I have mentioned earlier to take care of these unforeseen problems.

Q. But there was no determination within the soil profile whether they are heavily salt-laden or alkali-laden?

A. No.

Q. And you testified that there is a considerabe amount of limestone, at least a limestone -- evidence of limestone above the gravel?

A. In the picture we saw yesterday, there was a layer in

the soil, a layer of gravel that was coated with lime. This is sometimes called caleche, and it's a deposition of lime that occurs when rainwater falls on the soil, leeches that water down, and the carbon dioxide causes the lime to dissolve and the plants extract that water at that particular level or the water evaporates.

The lime is deposited there, and that's what we can see on the surface of the rocks. In this sort of a climatic area, it's a common thing.

Q. With the decision now going from the natural rain to irrigated area, would the application of water dissolve that limestone at a greater rate then?

A. It's not dissolving now. It's precipitating. Any movement of water through that soil can pick up salts in addition to the salts that are brought to the land with the water. That land has not been leeched for many years, and so any water that moves through it will pick up a lot of salts in addition to the concentration, as I said, that has occurred just due to evapotranspiration, so the water that comes out of the drains, the artificial drains that we install or the natural drainage system, will be carrying salt.

It may be calcium sulphate or calcium carbonate, which are relatively benign, or that may be sodium salts

where it moves over the surface of the shale. Some lands are underlain by shale.

Q. And this could spread to adjacent irrigated land that is within the path of the return flow?

A. This is the reason for the interceptor drain system so that that sort of drainage can be prevented.

Q. Regarding this Big Horn Flats Unit and the Stagner Ridge, how much actual time did you spend in the field examining the land in these two areas?

A. On those two areas themselves, perhaps a total of two hours.

Q. Does that include travel time from --

A. Oh, no, that's actually on the ground.

Q. In terms of days that you were in that area?

A. I was in the area for three days.

Q. And approximately two hours on two projects. How much time would you assign to the Big Horn Flats area?

A. Well, an hour and a half. A half an hour on Stagner Ridge, but this is -- in the case of Stagner Ridge, for example, besides being on Stagner Ridge, we drove around the outside, and I was looking at the geologic features during that time, so even though it could be charged to travel time, it was still observation time.

Q. How much time then did you spend in your office or off-site, so to speak, working on the calculations that you came up with as far as the drainage?

A. My personal time?

Q. Yes.

A. Approximately eight hours. The rest of the calculations and all of these things were done by the student we hired to just do the work that I outlined.

Q. And how much time did he spend on working on these two projects?

A. I can't answer that.

Q. Over a period -- was it over a period of months or --

A. No, it was a period of two or three weeks.

Q. I see. Did you make a model of these two areas when you prepared your design?

A. No.

Q. So it was based then strictly upon your observation of approximately two hours examining these reports and discussions you had with Doctor Bliesner and Doctor Mesghinna?

A. It was based on my visit to Big Horn Flats and an inspection of the topographic map. We drew an interceptor drain in the most logical location for that drain at the change in slope.

As I pointed out earlier in my testimony today, the precise location of these drains is not fixed.

When the drainage problems arise, then the drains will be located in the place where they will be most efficient. The purpose of drawing in the drains is to indicate that there will be a drainage cost and that it will be approximately this much.

There may be no drainage problem develop there. There may be a drainage problem develop in another area, but we will have cost assigned to that irrigated area in order to have a drainage facility available when necessary.

Q. Okay. Getting back to these costs, just a few minutes ago you responded to some questions by Mr. Clear as to how you made those calculations.

What type of pipe were you actually looking at in terms of that, PVC pipe or --

A. I did not use any pipe, any particular pipe. I just used a drainage cost, multiplied by the length of pipe -- by the length of the drain. I did not specify any particular kind of pipe.

Q. I see, so as I understood it, you took the figures for the six, eight and ten; is that correct? Six-inch --

A. Six, eight and ten, and we used a Manning's coefficient of

.017, which is the roughness coefficient for a corrugated plastic pipe. It could be either polyethylene or PVC.

If we use some other kind of pipe, concrete drain tile or clay drain tile, it will be smoother than that.

Q. You stated you increased the price slightly for the twelve-inch drain?

A. Yes.

Q. After you determined the difference between the six and the eight -- is this the Manning's coefficient that you were talking about?

A. No, this is just strictly a cost for unit diameter.

Q. All right. Is this --

A. We had the installed cost for eight-inch pipe, the installed cost for ten-inch pipe. I took the difference, that incremental difference, added it to the cost of the ten-inch pipe to get the cost for -- the installed cost for a twelve-inch pipe and increased it slightly, and this is the graph on which I made that adjustment (indicating).

Q. But you yourself determined those prices, Doctor Willardson, or did your student do this?

A. I did this. The prices came from Stetson. They were Stetson's prices.

Q. Did you have any reason to question those prices?

A. No.

Q. What year prices would you assign to the calculations you made?

A. I have no year assignment.

Q. So you don't know if they are '79 or '81?

A. No.

Q. And you didn't inquire into how those prices were derived by Stetson?

A. It was my understanding that Doctor Mesghinna visited the drainage contractors in the area, obtained from them their prices for installation.

Whether they were '79 or '80, I don't know. And these are the ones that he included in his report, and I saw no reason to doubt those numbers, and so I accepted them.

Q. I see. Did you have a discussion with Doctor Mesghinna as far as how he derived those prices?

A. No, I did not.

Q. On Stagner Ridge, you stated that it's a very -- or it is a high mesa, and apparently the land that's going to be reclaimed is on this plateau.

From your observation of the soil profile there, is there a possibility of land sloping or erosion due to

putting this under cultivation?

A. I don't anticipate any problems like that.

* * * * *

Q. (By Mr. Radosevich) Okay. Well, there seemed to be considerable question this morning with respect to the difference between your conclusions and recommendations, I should say Keller Engineering recommendations, and that of Dr. Mesghinna. You have read Dr. Mesghinna's conclusions and recommendations?

A. Yes.

Q. Do you feel he made those conclusions and recommendation without sufficient data to make them?

A. I don't know what data was available to him to make those conclusions.

Q. But you did review the HKM report and Stetson report?

A. I had -- The HKM report, are you referring to this report?

Q. Yes.

A. We had this in the field when we made the decisions about changing the drainage intensity, and I read Stetson's, the drainage sections of Stetson's report.

Q. You stated this morning that in the reduction of drains to fifty percent, that the reason you left fifty percent there is because you wanted a cost figure to include some drains; is that correct?

A. That's correct.

Q. In other words, you could have reduced it by a hundred

percent?

A. In some cases, I did reduce it to zero, took all the drains out.

Q. Did you then include a cost for the installation of drains in the event that it should be other than the twenty percent calculation?

A. No. The twenty percent contingency will cover that amount. One of the things we learned in our visit to the Bureau of Reclamation was that they use a fifteen percent contingency factor, and they have, they have based that on a more intensive sampling system than we had available to us. But we have used twenty percent for a contingency factor.

Some of the lands that we have removed all the drains from may require additional drains. Some of the lands that we have left drains in may require less drainage, and at this point, it's impossible to anticipate that, and this is the reason for the contingency.

Q. How much time did you spend on going to the future lands, the other five areas covered by Dr. Mesghinna?

A. Over the period of three days, we spent approximately twenty-four hours in the field.

Q. How much time of that was spent with the Bureau of Reclamation?

A. Approximately one hour.

Q. One hour?

A. Yes.

Q. You testified yesterday that you went out in the field with the Midvale Project people?

A. No, we did not.

Q. You drove around the project area?

A. In company with Mr. Bliesner, the two of us travelled over the area.

Q. Did you have an opportunity to see the lands that had gone out of production due to high water table and lack of drainage?

A. In the irrigation project, the parts of that that we drove through, we saw those lands, we reviewed the drainage work, we got out and looked at the drains, we saw the types of drainage systems that they were installing.

Q. I see. Based upon your observation, was, are those lands similar to lands included in other parts of the five areas covered by Stetson's report?

A. There is a considerable difference, in that many of the project lands are high mesas, and the Riverton Project lands are lower lands and flatter lands. There are some that are similar, but there are no irrigated

lands in the Riverton project that I saw that are comparable to Big Horn Flats, for example.

Q. I see. Well, given the fact that you are now designing projects for higher lands and you stated before that these interceptor drains should take away any return flow, isn't it quite possible then some of those lower lying lands will be adversely affected by construction of this project?

A. This is the purpose of the drainage system, to prevent that.

Q. But where will -- The drains will discharge into, either into one of the river systems or into perhaps a small area prior to the time it gets --

A. The water will flow naturally toward the river unless it's consumed wherever it appears.

Q. Was there any effort made to determine the impact on other water users?

A. No. I think that should be part of the irrigation water supply study and was not of concern to me.

Q. Was there a concern about raising the water table in terms of damaging or destroying domestic wells in the area?

THE SPECIAL MASTER: Raising the water table to destroy --

MR. RADOSEVICH: Raising the water tables on these projects.

THE WITNESS: I saw no domestic wells there so I did not consider that to be a problem.

Q. (By Mr. Radosevich) In the lands adjacent to the Big Horn Flats area that are now in production, you did observe some of those lands?

A. Yes.

Q. Are you aware of the fact that there are domestic wells in the area?

A. No.

THE SPECIAL MASTER: He said he saw none.

THE WITNESS: There is no guarantee that the aquifers that those wells are in are at all connected with these, with the aquifers into which this water will run, so there's no way of anticipating that there will be an interference between the two.

Q. (By Mr. Radosevich) Just a few minutes ago, you testified that you had a discussion with Mr. Toedter, is that right, this morning or last night?

A. This morning.

Q. Based on that discussion, would you change any of your calculations?

A. No.

Q. Did he provide you with information that was relevant to your testimony yesterday?

A. I described to him our idea of using natural drainage in these areas to reduce the drainage cost, and he said he agreed with that, that --

MR. WHITE: Objection, Your Honor.

THE SPECIAL MASTER: We can't have that; objection is sustained.

Q. (By Mr. Radosevich) Did you use any of the figures -- Well, upon what figures you relied on to determine coefficients, would they have changed?

A. No.

MR. RADOSEVICH: I have no further questions.

THE SPECIAL MASTER: All right. Thank you, Mr. Radosevich. Does the State of Wyoming require cross-examination?

MR. WHITE: Very short, Your Honor.

THE SPECIAL MASTER: I assume no one wants a break? If you do, please say so. You want a ten-minute break now?

MR. WHITE: I don't care, Your Honor. It probably won't take more than ten minutes to get through the cross.

THE SPECIAL MASTER: All right, we'll take it

afterwards.

MR. WHITE: I'll do my best to get done.

CROSS-EXAMINATION

BY MR. WHITE:

Q. Doctor, how much time, during the three days you were in the field, was actually spent viewing the lands for which your drainage analysis was conducted?

A. Approximately twenty-four hours.

Q. Of those twenty-four hours, at least one hour was spent down in Midvale, is that correct, in the Riverton area?

A. Yes.

Q. And of the remaining twenty-three, there must have been a lot of travel time between these project areas because they're not right next to one another; is that correct?

A. That's correct.

Q. How much time did you spend in the car just travelling from one project to another?

A. Well, it was part of this twenty-four. As I indicated earlier, while you're travelling, you can also make observations, so you don't shut your eyes when you're in the car, you're looking at geological features at the same time.

Q. With respect to the project areas for which you've done your analysis, would it be fair to say that you spent no more than twenty-hours in those project areas, actually in the areas and observing the areas?

A. That's -- I would accept that estimate.

Q. Could you tell the Court how you used Exhibit C-241-A, which you referred to as the HKM report when you were in the field?

A. We would come to an area from which we were reviewing the drainage, we would observe the topography, the soil and whatever physical features we could find. Then from our index map, we would locate in this book the soil profiles that applied to that area, and on the basis of what we were able to observe and the information contained in here, we made a decision, I made a decision whether to reduce the intensity of drainage, remove the drainage or leave the drainage as it was designed.

Q. Isn't it true, Dr. Willardson, that when you were in the field you could not precisely locate the soil profiles which were shown in Exhibit C-241-A?

A. That is true. And I can say that as I said earlier, that in the drain spacing equation, you can put one value depth to barrier and you can put one value for hydraulic conductivity, so anyone who uses this information

in this book must average the information, and if you observe the drain spacings on the map, you can see that they are uniformly spaced, which means that a single value was used for an area that size in making that design.

There may have been five holes or ten holes in that area, but only one number can be used, so what we did was an averaging of the information in the book just as the designer must make an averaging for a given area before he can make a design.

Q. Do you know how that, the information in the book, C-241, was prepared?

A. I think so.

Q. Did you review the cross-examination of Mr. Toedter concerning the preparation of that document?

A. I did not. That has not been available to me.

Q. Do you know that there are soil profiles in all of these areas which are not included in that book?

A. My conversation with Mr. Toedter this morning, he told me that there are profiles that are not available here that are only available on maps prepared for the Bureau of Reclamation.

Q. Do you know the magnitude of the number of those holes that are not included in this book?

A. No.

Q. Why did you not investigate more thoroughly the development of the information which was contained in C-241-A?

A. This was the -- This was the information that was available to me at the time that I visited the field, and seemed to me to be adequate for the thing that we were doing.

Q. Dr. Willardson, had you been involved in the drainage design for these areas in the beginning, isn't it true that you would have expected soil logs from holes of a density of roughly one hole per forty acres, for relatively shallow holes, ten feet to barrier, and one hole for approximately 400 acres for deeper holes, forty feet to barrier?

A. Yes.

* * * * *

Q (By Mr. White) I would like you to assume that the density of holes in these areas is actually one hole per 500 acres for the shallow holes that you have described and one hole per 1,000 acres for the deep holes that we have just described, and ask you, if that assumption were correct, whether that would have any effect on the comfort you'd have with the reliability of your conclusions?

A Yes, I think so. The actual density of these samples is about one hole per 100 acres for the information in this book and a larger proportion of those are deep holes, so we actually have more confidence in the information from deep holes.

As I spoke with Mr. Toedter this morning, he said that he changed the number of holes according to his observation and the information that he was getting in the field, so some areas may have greater density and some may have less density, depending on the variability that he found.

Q Are you really saying that there were deep holes in the density of one per 100 acres?

A This is the total density.

Q Are you saying that there were holes to ten feet or barrier, one per 100 acres?

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A No.

Q Isn't it true --

A All of the --

Q I'm sorry. I'll withdraw the question.

MR. WHITE: We'll deal with that in our direct case, Your Honor.

Q (By Mr. White) Dr. Willardson, as I understand, your difference with Dr. Mesghinna, it is based on your field review, your time in the field. You were able to determine that natural drainage was available and that the artificial drainage developed by Dr. Mesghinna would not be necessary. Is that sort of the essense of your difference?

A In some cases.

As you recall, in some areas we felt the natural drainage would be adequate. In some cases we felt that the intensity could be reduced from a relief drain system to an interceptor drain system, and in other cases we felt that the full intensity of drainage designed by Dr. Mesghinna would be required.

Q But that's the essense of your opinion at the time that you spent actually observing these areas in the field; is that correct?

A My opinion is based on that, yes.

Q And isn't it true that if you visited roughly 80 percent of the lands included in the Tribe's claim over the space of 20 hours, that works out to over 2,500 acres per hour?

A Yes.

MR. WHITE: No further questions.

THE WITNESS: It could be.

THE SPECIAL MASTER: All right. Let's take a ten-minute break.

(Whereupon a short recess
(was taken.

THE SPECIAL MASTER: Gentlemen, before we officially proceed with the case, can we get some bearing on where we stand for the rest of the week, generally speaking?

MR. SACHSE: Mr. White and I have just been discussing that, and we think we'll finish by the end of the day today, maybe 5:00-5:30, maybe.

MR. WHITE: I want to make it clear that's a guess, Your Honor, but it's the best guess.

THE SPECIAL MASTER: Well, if we miss it and five o'clock comes, we may crank it over to get out and do an hour or two in the morning, but if we can wind it up by five, that will be fine.

The next witness?

MR. SACHSE: No, this is --

THE SPECIAL MASTER: Redirect?

MR. SACHSE: Redirect.

THE SPECIAL MASTER: Very well, proceed, Mr. Sachse.

REDIRECT EXAMINATION

BY MR. SACHSE:

Q Dr. Willardson, as I understand your -- strike that.

Dr. Willardson, as the transcript of your testimony yesterday shows, at Page 8582, in answer to the documents that you had concerning the depth to barrier, conductivity, and the nature of the soil and so forth, when you are out in the field reviewing these projects, you stated, "Well, the documents we had were the Stetson report, the Stetson drainage maps, a Bureau of Reclamation report on drainage, report of a Board of Consultants to the Regional Director on drainage, and a third section of the Riverton Project, and an HKM report on soil profiles, depths to barrier and hydraulic conductivity."

Now, my first question is: Is that HKM report the report that has subsequently been identified as WRIR C-241-A, the Wind River Drainage Analysis?

A The report we refer to is Wind River Drainage Analysis, Depth to Barrier and Average Weighted Hydraulic

Conductivity.

Q Thank you. Now, in arriving at your conclusions as to the changes in drainage design from Dr. Mesghinna's, you've already stated that you relied on the Wind River Drainage Analysis and on your own personal observations.

Did you rely to any extent on the Bureau of Reclamation report?

MR. WHITE: I object.

MR. CLEAR: It's going over yesterday's --

THE SPECIAL MASTER: Two objections at the same time spoken so that I can't hear a thing, but I guess I had better sustain them. Numbers would indicate that they have a point.

MR. WHITE: I apologize for speaking over Mr. Clear, Your Honor. I didn't realize --

THE SPECIAL MASTER: Nobody's owes an apology.

Q (By Mr. Sachse) Dr. Willardson, based not on any hypothetical about number of holes or so forth, but based on what you actually had with you and reviewed in the field in the way of documents, and based on what you actually saw in the field, and based on your consultations with the Bureau of Reclamation in Riverton and on your review of the Stetson report, are you comfortable with your conclusions as to the reduction of

drainage put forth in the Stetson report?

MR. CLEAR: Objection, Your Honor.

THE SPECIAL MASTER: I'll overrule the objection. He's an expert, and he may testify --

MR. CLEAR: Yes, Your Honor, but that's proper for direct, not redirect.

MR. SACHSE: We have already ruled that's it's absolutely correct for redirect.

MR. WHITE: I join in the objection.

THE SPECIAL MASTER: You join in the objection too?

MR. WHITE: Yes.

THE SPECIAL MASTER: Despite the growing strength in numbers and authority, I'll still overrule it.

MR. WHITE: I would object to the question on the grounds of ambiguity as well, Your Honor.

THE SPECIAL MASTER: It calls for a subjective value.

MR. SACHSE: That's virtually the same language used by Mr. White when he was asking about under a hypothetical situation is Dr. Willardson comfortable with his results, and I'm asking under the actual situation is he comfortable with his results.

THE SPECIAL MASTER: I've ruled.

Q (By Mr. Sachse) Would you answer the question?

willardson-redirect-sachse

A Yes, I'm comfortable with our results, and the 20 percent contingency is a measure of the uncertainty that we feel about the information that's available and the problems that may arise.

Q Thank you. Now, if I understood your testimony correctly, in answer to one of Mr. White's questions, you gave some data as to the intensity of holes actually drilled in the land that was under review.

Would you state the basis for your statement about those intensity of holes per acre?

A The intensity that -- approximately 100 acres per hole was obtained by counting the holes in this book and dividing by the irrigated acreage.

If any of these holes fell outside of the irrigated acreage, they will reduce that intensity.

From my conversation with Mr. Toedter today, I found that the average depth to barrier and the average hydraulic conductivities that he reported in this book are based on his information that he took in the irrigated areas.

MR. WHITE: Your Honor, I would move that the answer be stricken. Mr. Toedter has already testified with respect to that particular matter. That testimony ought to stand, not what he told --

THE SPECIAL MASTER: That portion of his testimony which was not quoting Toedter will stand. That portion quoting Toedter is stricken.

I have a question that I have to ask.

MR. SACHSE: I have nothing further.

THE SPECIAL MASTER: You may have some more after I get through.

MR. SACHSE: That's why I'm stuttering.

MR. WHITE: We all may, Your Honor.

THE SPECIAL MASTER: I am still of the conclusion that on Stagner Ridge and on Big Horn Flats, which is a part of the Bliesner recommendation of the system, we have virtually no probe holes. Is that a fact, Dr. Willardson?

THE WITNESS: No, that's not true. There are holes there.

THE SPECIAL MASTER: Where did you find the information that was revealed as a result of those holes with regard to depth to barrier or soils analysis or hydraulic conductivity?

THE WITNESS: I can't say which ones in here are those holes.

* * * * *

THE SPECIAL MASTER: Then how can you answer my question by saying that I'm in error when I conclude there are none on Stagner Ridge and none on --

THE WITNESS: But there are on Stagner Ridge because I saw evidence where holes were drilled.

THE SPECIAL MASTER: But you saw no factual data taken from the holes to base your conclusion on.

THE WITNESS: But I don't know which holes I saw. There is evidence on the Ridge that holes were drilled.

THE SPECIAL MASTER: Right.

THE WITNESS: And I cannot identify them.

THE SPECIAL MASTER: Now, my second --

THE WITNESS: But they are there.

THE SPECIAL MASTER: My second question deals with this subject matter, and it's not altogether philophical, it's in the science or the disciplines of agriculture and engineering.

If the practice that you've alluded to here and recommended here, of reducing man-made drainage systems and allowing for contingencies or recognizing that it may be necessary to augment them in the future years after the first seven years, isn't it better, the better practice to err, if an error is to be made, to err on the side of installations from the beginning at the

construction period rather than to wait and damage crop possibilities, ruin income for farmers, delay programs, as we've seen in Riverton, to have to plan to augment the system later? Aren't we better off with a pipe, every other pipe that Stetson puts in now and may not be used for 20 years, and have to go back ten years from, 15 years from now and tear up a system and put it out of production for years because we now have an alkali field?

THE WITNESS: This sort of a drainage project will require a monitoring system as part of the maintenance to be aware of where these problems are arising.

As I indicated, the soil profiles on the high areas particularly have no water in them, and it will be quite a period of time before the water table builds up to the point where it may cause a problem. And there is adequate time to anticipate that drains will be necessary.

THE SPECIAL MASTER: That's excellently answered, and that's what I wanted to know. Thank you, Dr. Willardson. That's the end of my intrusion.

MR. SACHSE: I have one further question appropos of the Master's question.

REDIRECT EXAMINATION

BY MR. SACHSE:

Q Do you know of instances where drains have been installed in the beginning of a project and then never been able to be used at all and then new drains had to be put in because when the problem actually arose it was actually in a different place?

A I can't say, give you a specific example. There are many more examples that express your fear that no drains were planned in the project and as a result, serious damage occurred to the soils. But we are planning the drains, we are just not installing all the drainage initially.

As I pointed out in my testimony yesterday, if we, for example, put a relief system in Stagner Ridge, no water may ever get to the drains and the drainage installation cost would all be lost. If the natural drainage takes care of the, the excess water as we propose that it will, by not putting any drains in there, then the installation of drains would be wasted money.

MR. SACHSE: I have no further questions.

MR. WHITE: I have one question arising out of the Master's question.

THE SPECIAL MASTER: All right, Mr. White.

willardson-redirect-sachse

RECROSS-EXAMINATION

BY MR. WHITE:

Q Dr. Willardson, assuming that no drains were installed to begin with --

THE SPECIAL MASTER: Where?

Q (By Mr. White) In one of these projects, and in seven years it was determined that drains needed to be installed, isn't it true that the installation of those drains, seven years from now, would cause a disruption in the growing of crops during the year that the installation was made and for some years after, adversely affect crop production and income to the project from the sale of crops?

A It's common practice to install drains in irrigated lands. In the Imperial Valley there are drains being installed all the time. The practice is to install the drains in the off season so that no production time is lost.

Q My question is, however, after the drains are installed, after the land is disturbed, isn't it necessary for a year or a period of years to pass before crop production returns to its original levels?

A We would propose or hope that the system, to anticipate these rising drainage problems, would enable the installation of the drains before any damage had occurred to the land.

MR. WHITE: Let me ask a couple more questions in this regard, Your Honor.

Q (By Mr. White) Dr. Willardson, when you first put land into production, the first couple years crop production is down, isn't it, or not as good as it eventually becomes? Is that correct?

A I can't answer that one.

Q You don't know that?

A No.

Q Let me ask you this: If you tear up land that's currently producing crops and then either reseed it or redevelop it in some way, isn't crop production, after the redevelopment, down for awhile before it returns to its former levels or levels that you would eventually anticipate?

A With the installation of a buried sub-surface drain, you're digging a trench perhaps two feet wide every 500 feet, which is a minor disturbance as to the surface of the land, and in many cases the production in the trench is greater than the production adjacent to the trench.

Q Is it your conclusion then that the only land disturbance that results from the installation of drains is just along the area where the drainage ditch is dug for the pipe to be installed in?

A And where the machinery moves. If that's done in the off season, there is very little damage to the soil.

MR. WHITE: I have no further questions, Your Honor.

THE SPECIAL MASTER: All right.

MR. RADOSEVICH: Your Honor, I have one question with respect to the response that Dr. Willardson gave on redirect.

RECROSS-EXAMINATION

BY MR. RADOSEVICH:

Q You mentioned that in any drainage system or at least in this drainage system, it's necessary to have a monitoring system in order to determine when the drains are going to have to be installed; is that correct?

A Yes.

Q Was this included in the cost of this project?

A It will be in the operation and maintenance cost, it would be included there.

I put no specific numbers in for that monitoring.

Q What type of monitoring system do you need?

A This would consist of water table observation wells or peisometers in areas where suspected problems may arise or there is some indication that there is a concentration of water there.

In our visit to the Bureau of Reclamation, I asked

them how they diagnosed their problems and they said they did not carry, presently carry on an extensive diagnosis, that they waited for the farmers to come and say they had a problem.

Q Are you aware of the tremendous success they have on that project, drainage wise?

A I don't understand your question.

Q Their drainage problem is quite bad on the Riverton Project, as I understand it. Did you not observe that in the field?

A Yes, but I observed they were installing drains to solve those problems where they arose.

Q Is it a good device to have, to depend upon a farmer, a lay person to inform the engineers when drainage should be installed?

MR. ROGERS: Objection, Your Honor, it's --

THE SPECIAL MASTER: It's argumentative, I'll sustain it. That's a little bit argumentative.

Q (By Mr. Radosevich) You stated that there should be bore holes to determine water table in order to have this monitoring or peisometers installed. And that cost is included in your O & M calculations?

A You can charge it to that or you can charge it to the 20 percent contingency, if you wish.

Q I see. Is the installation of a monitoring system very expensive on a project of, say, 9,000 acres, monitoring system in order to determine what drainage --

A In terms of magnitude of the project, no.

MR. RADOSEVICH: Your Honor, I have no further questions.

THE SPECIAL MASTER: All right. Dr. Willardson, thank you very much for your testimony in this matter. And I -- You may very well be recalled, I suspect. If you do, I'll remind you you're still under oath.

MR. WHITE: Your Honor, before the witness leaves the stand, I told the Court I was going to voir dire Exhibit 13 and the 13 series exhibits. I would like to object to their admission at this time on -- Well, first of all, let me ask the purpose for which they're admitted. If they're offered to illustrate the opinions of the Witness I would have no objection. If they're offered for the truth of --

MR. ROGERS: Truth of their contents.

MR. WHITE: I would object with respect to the drainage portion because -- Mr. Merrill already objected with respect to the other portions. And completely inadequate foundation has been established for the facts set forth in the report concerning drainage as well

as the conclusions.

THE SPECIAL MASTER: For the reasons that I set forth yesterday as well as the fact that I cannot escape a conclusion that there is an overlapping of the information, even though it may not be the speciality of a particular witness through which it was introduced, I'm going to overrule the objection and admit them for what they may be worth.

(Whereupon, RB-13 was hereby
(admitted into evidence.

THE SPECIAL MASTER: As you can tell, Dr. Willardson, we're at a very, very crucial point in the evidence-taking in this particular matter and I think you sensed a little of that.

Next Witness.

MR. CLEAR: Your Honor, I think I left my maps up there.

MR. WHITE: I assume the Court retains jurisdiction over Dr. Willardson and he will be available to be recalled?

THE SPECIAL MASTER: Yes. You're aware of that about having to have subponeas reissued and you'll still be under oath.

All right.

The exhibits I think --

MR. ROGERS: Your Honor, I just want to clarify what you have admitted, and I think it's clear, Mr. White's objection, you have admitted 13 --

THE SPECIAL MASTER: And all of it's dashes.

MR. ROGERS: And all of its dashes. Thank you.

THE SPECIAL MASTER: Right. There was a hole in those dashes, let's see if I can find that.

13-4 through 13-10.

MR. ROGERS: Yes, sir.

(Whereupon, RB-13-4 through
(13-10 were hereby received.

THE SPECIAL MASTER: Next witness, please.

(Off-the-record discussion.

(Thereupon a lunch recess
(was taken at 11:40 a.m.

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