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Trial Transcript, Vol. 47

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File # 154

4405

IN THE DISTRICT COURT FOR THE FIFTH JUDICIAL DISTRICT

WASHAKIE COUNTY, STATE OF WYOMING

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

FILED

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DEPUTY

VOLUME 47

Friday, April 24, 1981

ORIGINAL

APPEARANCES

FOR THE STATE OF WYOMING:	HALL & EVANS 2900 Energy Center One Building 717 17th Street Denver, CO 80202 BY: MR. MICHAEL D. WHITE, Special Assistant Attorney General and MR. STUART RIFKIN and MR. SCOTT KROB
FOR THE UNITED STATES OF AMERICA:	MR. THOMAS ECHOHAWK Attorney at Law Land and Natural Resources Division Department of Justice 1961 Stout Street Denver, CO 80294 and MR. JAMES CLEAR and MR. JOSEPH MEMBRINO Attorneys at Law Land and Natural Resources Division Department of Justice Washington, DC 20006
FOR THE SHOSHONE TRIBE:	SONOSKY, CHAMBERS & SACHSE 200 M. Street, N.W. Washington, DC 20006 BY: MR. HARRY SACHSE

INDEX TO EXAMINATION

INDEX TO EXHIBITS

THE SPECIAL MASTER: Please come to order.

MR. ECHOHAWK: Your Honor, before we resume the direct examination of Dr. Mesghinna, the United States has several matters we would like to bring up. The first item would be to inform the State of Wyoming of a slight change in our witness order. The subject matter will be the same. We had informed them earlier Dr. Mesghinna would return to the stand and discuss in full engineering regarding historic lands. We changed, and we will call Tom Stetson of Stetson Engineers to discuss the historic lands.

THE SPECIAL MASTER: Do you want to anticipate or project a probable date for that, or are you just going to --

MR. ECHOHAWK: He's going to follow Dr. Mesghinna whenever he finishes, then the economist, Mr. Dornbusch, to discuss the economics.

THE SPECIAL MASTER: Before or after Stetson?

MR. ECHOHAWK: Before Dornbusch to discuss eonomics, and following him will be Mr. Stetson.

The other matter, Your Honor, would be the question of the computer listing that was requested earlier from Mr. Toedter. This, too, is a matter of

utmost importance to the United States and to its consultants that we have hired, and we would like to possibly set that for argument sometime during the next session.

MR. WHITE: What's there to set for argument, Your Honor? You already ordered it.

MR. ECHOHAWK: I don't think there was an order. I think we were to take it under advisement and discuss that matter, and I think that we have discussed that with the parties involved and we would also like to resesearch the matter a bit and possibly set that down for discussion sometime during the next session.

THE SPECIAL MASTER: Is it possible after you research you may conclude it's inappropriate that you produce him?

MR. ECHOHAWK: That's right, Your Honor, with certain limitations.

MR. WHITE: I don't think that's being quite candid with the Court. We have been advised by the United States they will not produce him under any circumstances. If that's the case, I think he then ought to tell the Court then we could go ahead and argue about it.

MR. ECHOHAWK: I don't think that's quite

right:

MR. WHITE: I'm sort of ashamed to use the language to place in the interchange, Your Honor, but --

THE SPECIAL MASTER: Here we are again. Let's set it down for one of those matters that we will take up before the regular evidence of the next session, which will be ten days from now.

MR. ECHOHAWK: We set that also for the same Thursday that we have the argument set on that request to produce the Crow.

THE SPECIAL MASTER: We will, but you know how strong I feel about that. I'll set it for hearing and keep an open mind, but you know how I feel about that. Give me again what --

MR. CLEAR: It's not a computer printout, Your Honor.

MR. ECHOHAWK: What they're asking for is the computer program. They're not asking for the information generated, they're asking for the program, and within that as much, much time; much, much money, and many, many of the companies own hardware, but the secrets they don't want divulge that to other companies to be used in other situations.

MR. WHITE: Let me explain what is involved,

Your Honor. What's involved, the United States' expert has a bunch of data, he dumped it into the computer, and out comes some results. What they are saying by that is we can't have a program and we cannot know exactly what the computer does to the data they feed in to get the results that come out. In other words, the computer has to be accepted as a little black box, opague, accepted at face value, and what we're asking for is a program listing, the program listing that tells you what happens to the data when it goes into the computer before it --

THE SPECIAL MASTER: You have a right to the software. You have a right to information going in the computer in the United States' case in this matter; what the United States seeks to determine, in feeding this material into the computer. It's not your business after that. Now, you have a right to what's feed into the computer, what the United States is working with in getting their material. That is what you have a right to.

MR. WHITE: Are you saying -- I'm sorry, go ahead.

THE SPECIAL MASTER: I believe -- well, let's set the thing down for hearing and see what it is and be specific in your argument, and maybe I

can do some research and find what my proper order is.

MR. WHITE: We would like to find out what the rule is because I think the legal maximum is what's sauce for the goose is sauce for the gander.

MR. ECHOHAWK: Your Honor, we have much more to lose on that than the State of Wyoming does.

MR. WHITE: The United States doesn't know that yet.

THE SPECIAL MASTER: It will be argued, and I would like citations from both of you and a little bit of guidance from you on this new and novel point as far as I'm concerned so I can have those things to go by on it.

* * * * *

MR. ECHOHAWK: The next matter we bring up, Your Honor, is that during the deposition of Mr. Toedter, the State of Wyoming requested certain information orally. I asked Mr. White to reduce that to writing, which I believe is required in the rules.

THE SPECIAL MASTER: Was that in the last few days before Mr. Toedter left?

MR. ECHOHAWK: Yes.

MR. WHITE: Your Honor, the information which was requested deals with a systems analysis which HKM is doing. The systems analysis is for the purpose of find-out whether there is enough water in the river to satisfy all the claims of the United States.

We asked Mr. Billstein about that last month during his deposition --

THE SPECIAL MASTER: If there is enough water in the system for what?

MR. WHITE: Enough to supply the -- to provide the water being claimed by the United States.

We asked Mr. Billstein about that, and he said no decision has been made to go ahead during his deposition last month.

Two weeks ago Mr. Echohawk endorsed Mr. Billstein and a witness to talk about the systems study. In other words, is there enough water to meet the claims.

During Mr. Toedter's deposition, he had done some work on the systems analysis study, and he described in general what has been going on in the study.

THE SPECIAL MASTER: In his deposition?

MR. WHITE: In his deposition. He had material with him, and I asked him for the specific facts and data which they used. Counsel for the United States would not let him divulge them.

The reason was Mr. Clear said, "Look, I've got to talk with Mr. Echohawk--" that was last Friday -- "and see whether or not it's okay for us to deliver them to you."

Yesterday I was told, "No, you can't have them." And now, this morning, if I would put the request in writing, they'll think about it.

It's set out specifically in the transcript, and I would like the Court to take a look at the transcript. I set it out there and there is no doubt.

Mr. Echohawk said, "We may have already given you some of the stuff." Fine, tell me, you gave it to me, but I still want to have the facts and data analyses used --

MR. ECHOHAWK: Your Honor, we're entitled to 30 days to respond --

THE SPECIAL MASTER: Well, let's get it in

writing and treat it in writing and see what we can't do. It's going to come out in this trial one way or another; either you'll get it or I will.

We're going to be inquiring into every question regarding water in the system which is pertinent to adjudication of the rights to use this water. So let's get it in writing.

MR. WHITE: Is that the general rule of discovery, that it's got to be formally requested in writing?

THE SPECIAL MASTER: No, but I am trying to limit the discovery. I understood there would be no more depositions, but I see them still going on. I suppose that's because you're agreeing on them. But it is not a general rule that everything has to be in writing, no. But let's get this one in writing. It might be more efficiently handled.

Mr. Echohawk wants 30 days; he might come up with more material himself.

It's not going to be denied in the record of this proceeding.

MR. WHITE: The point is, Your Honor, I was entitled to see the material that the witness was referring to --

MR. ECHOHAWK: You were entitled to the facts --

THE SPECIAL MASTER: What you're entitled to in

the deposition is not my concern. It's your concern.

MR. WHITE: Let me make my own motion, Your Honor. Because the witness was not allowed, as I requested, to provide me the information, I would now ask the Court to compel production of that.

THE SPECIAL MASTER: The Court is saying to put it in writing. Is that so unreasonable?

MR. WHITE: If that is the ruling of the Court, we'll play the same game with the United States.

THE SPECIAL MASTER: That's all right. That's all right. Let's put this particular matter in writing and we'll be very happy to work with it.

MR. ECHOHAWK: The final matter is the question of the scheduling once we resume in May. If, at all possible, we want to find out how long we are going to go so we can make plans with our witnesses. If we could have some certainty as to how many weeks we --

THE SPECIAL MASTER: I believe from the top of my head, and I think I'm correct, that we're going to resume on Tuesday, giving you Sunday and Monday off. All right, we start after -- on Monday, May 4th, unless sometime today Mr. White wants the 4th and 5th --

MR. WHITE: I waived that, Your Honor. I'll be here the 4th.

THE SPECIAL MASTER: You'll be here? All

right, we'll start Monday, May the 4th, Mr. Echohawk.

MR. ECHOHAWK: How many weeks would we --

THE SPECIAL MASTER: I have no way of telling that from the evidence. We are prepared to go --

MR. ECHOHAWK: The United States has about eight or nine more witnesses --

THE SPECIAL MASTER: Let me say what we will do. The full week, Monday, Tuesday, Wednesday, Thursday, Friday, through the 8th of May. The first week is that, right, Leo?

MR. SALAZAR: Yes.

THE SPECIAL MASTER: We will resume on Monday, the 11th of May, and fill that full week. I wish I had my calendar here.

MR. WHITE: Maybe we ought to defer this discussion until after break, Your Honor.

THE SPECIAL MASTER: The third week, we will begin on the 18th, Monday, again, 1981.

On May 4th, that meeting the first week of May will be in the GSA Conference Room in the Federal Building.

MR. WHITE: Is there any way we could have that at Room 302 in the Capitol? Is that booked?

THE SPECIAL MASTER: CPA is giving statewide examinations that week, or something of that kind.

MR. WHITE: How about the House Chambers?

MR. SALAZAR: There's nothing available.

THE SPECIAL MASTER: There is one probability. The GSA we know we will have on the 4th. If two trials set for hearing in Judge Brimmer's court are settled, then we are welcome to his courtroom all week, but if not one of the case or neither is settled, then we will have the GSA Conference Room as a fallback.

May 11th is Room 302 in the Capitol. The week of May 18th will be here in the Supreme Court Chambers, and that will be a full week, the 18th through the 22nd.

On the Fridays of each of those weeks, I am amenable to adjourning at noon.

MR. WHITE: I have agreed to that for the benefit of Washington counsel.

THE SPECIAL MASTER: On the week of the 25th, I am not too sure all of you are going to be wanting that full week. If you do, it is agreeable, but we will adjourn at 2:00 on the 27th. We can come in an hour earlier on the 27th and go straight through like we did last Wednesday, from 8:00 in the morning.

MR. ECHOHAWK: I note that the 25th is Memorial Day.

THE SPECIAL MASTER: That week is the week I wondered if some of you wanted off because of Memorial Day or the last of the month or the fact of three weeks

of straight hearings.

* * * * *

MR. WHITE: I'm afraid if we start taking chunks of time --

THE SPECIAL MASTER: We have heard you now about four times tell us that, and we appreciate your concern about speeding us along.

MR. WHITE: Well, you asked, Your Honor.

THE SPECIAL MASTER: I don't know how we can say very certain now that we are going to have the week of the 25th, and even if we do, I suppose if we start the morning of the 26th in respect to the holiday, Tuesday the 26th --

MR. SACHSE: Your Honor --

THE SPECIAL MASTER: Yes?

MR. SACHSE: I think if we set three full weeks in May, that's going to be plenty.

THE SPECIAL MASTER: My head tells me so, my mind tells me so, but again, I'm not going to --

MR. ECHOHAWK: Again, if we set it for the 26th, that would require travel on the holiday.

THE SPECIAL MASTER: It will require you to get here on the Monday and go through Tuesday, Wednesday, Thursday and Friday, four days of that week. Now, if you are prepared and if Counsel for the United States is in agreement, we'll go along with the second or third week of May, but if you don't want

that last week we will scrub it, but as of now, it's set for hearing and we will begin on Tuesday the 26th, that last week, with an early break on the 27th and through Friday again of that week.

MR. ECHOHAWK: Your Honor, could we just set for that a week off? After three weeks of trial and plus a holiday in that week, I would just as soon take it off.

MR. WHITE: The State can't agree to that, Your Honor.

THE SPECIAL MASTER: Well, I'm not much concerned with the State agreeing with it or not.

MR. ECHOHAWK: It also sets a bit of certainty into our schedule if we can have for sure three weeks, then take off and begin again or something.

MR. WHITE: All four of you think that you would rather not have that week?

MR. SACHSE: I personally think three weeks in a month of trial out here is plenty.

THE SPECIAL MASTER: The maximum?

MR. SACHSE: Because all of us have other duties, too.

THE SPECIAL MASTER: You concur, Mr. Clear?

MR. CLEAR: Pardon?

THE SPECIAL MASTER: That is your feeling, too?

MR. CLEAR: Yes, Your Honor. It's very difficult. You have to get home once in awhile to take care of matters at home.

THE SPECIAL MASTER: How about you, Mr. Membrino?

MR. MEMBRINO: I agree.

THE SPECIAL MASTER: You, too, Mr. Echohawk?

MR. ECHOHAWK: Yes, Your Honor.

MR. SACHSE: In fact, I would like to see if it's possible after these three weeks of trial to have two weeks off and start the second week in June instead of the first week in June.

THE SPECIAL MASTER: I'm not sure we can go that far, but I do feel that striking the last week in May is not all that much of a set back to our progress, so I'm agreeable in doing that. We will do it for now. The last week of May would then be stricken for Memorial Day weekend and we will not work. We will resume the week of June 1st, which is a --

MR. ECHOHAWK: Your Honor, I have a note that you have a conflict on Monday.

THE SPECIAL MASTER: Well, somebody has a

conflict. The first day I gave to somebody, I think me.

MR. ECHOHAWK: I think it was you. If I recall, we were in your office that one day --

THE SPECIAL MASTER: That's correct. That's on the calendar. That's right. Then we start Tuesday, June 2nd, and all starting days are 9:15 unless otherwise noted. We will start Tuesday, June 2nd, and that will be in 302 of the Capitol, The week of June the 8th we will begin -- the 8th through the 12th, and that will be at 302 in the Capitol. The week of June 15th will be through the 19th, and that will be at 302 in the Capitol.

MR. SACHSE: Mercy, that's enough.

THE SPECIAL MASTER: I know it's enough, but we have one more week and we will throw it at you.

MR. ECHOHAWK: We have three weeks in a row there.

THE SPECIAL MASTER: I know. It will be we have three weeks in a row, but you have a five-week month in June. You know, it's unrealistic to set that far ahead. We have already seen that in this case. You set it up and then you have stipulations, agreements, something falls out. We have seen that on

several instances. Why don't we wait until the middle of June and see how we feel about that.

MR. ECHOHAWK: That's fine.

THE SPECIAL MASTER: Is that far enough ahead?

MR. SACHSE: Yeah. I want to make a statement about a conflict that I have in advance. I'm going to have a trial on a preliminary injunction in Up-State New York, northern district of New York, in either the 2nd or 3rd -- excuse me, either the third or fourth week of June. I think we may very well be in a stage of this case by that time that I'll feel it's necessary to attend. If I find that that conflict does develop, I would like to be able to ask you in early June to at least cut off about three days of the week so I can make that.

THE SPECIAL MASTER: Do you know which week it will be?

MR. SACHSE: I don't know yet, but I know it will be one of the last two weeks in June unless something unexpected happens. Ordinarily, you know, I would say I have this case first so I can't set the other case, but since this case is going on so long, I've got to be able to set this other matter for trail. Now, if it's something that's a part of

the case that Mr. Rogers has handled or I feel Mr. Perry can do and it's not necessary for me to be here, I'll inform the Court, but if it's a part where it's a witness I plan to present, then I would ask for some consideration on that.

THE SPECIAL MASTER: If you know what specific dates those are and want to write up those dates in the week of June 2nd, I'll let you do it.

MR. SACHSE: I'll know in exactly three weeks the exact date in June. In other words, I'll know in the middle of May the date in June.

THE SPECIAL MASTER: With these dates now set, Mr. Echohawk, your remaining witnesses are Mr. Dornbusch and Mr. Stetson after Dr. Mesghinna?

MR. ECHOHAWK: After Dr. Mesghinna we have Mr. Dornbusch, Mr. Stetson, Mr. Dornbusch again on historic economics, Mr. Vogel on the fish and fish flows; Mr. Toedter again on the depletion analysis; Mr. Keene on the virgin flow, natural flow of the river; Mr. Billstein as to the systems operation and possibly again Mr. Stetson.

THE SPECIAL MASTER: Do you really believe those witnesses are going to take up a full four more weeks of five days each?

MR. ECHOHAWK: Yes, Your Honor. There is

still some fairly complex matters to get into.

MR. WHITE: I have to agree with Mr. Echohawk, Your Honor.

MR. ECHOHAWK: It will be quite awhile. I think Mr. White and I reached a projection before of possibly another 60 days of trial for the Government's case.

THE SPECIAL MASTER: We are halfway through into June. All right. Well, we can plan them the last week or maybe a portion of the 4th and all of the last week of June that we will be in session, but that will bring us into a full July. You see, the reason we ought to not be in session on Monday, June 29th is because that's the Fourth of July weekend so we know we are not going to work that weekend. That will bring us back here July 6th or 7th, and we have put in a full four weeks -- full three weeks of July until the 25th if Frontier Week is not that week. If it is, we will skip it and go --

MR. WHITE: Your Honor, we previously did not have settings for July, and I have a setting for the week of July 13th and the week of July 27th.

THE SPECIAL MASTER: One of those weeks we won't be in anyway. The 27th or so we for one day

wouldn't be in session because of Frontier week. If Frontier week runs the 20th to 25th, we won't be in session then.

MR. WHITE: I need to advise the Court I have pretrial conferences and week-long trials scattered through August and September.

THE SPECIAL MASTER: August I planned no hearings whatsoever, and that's for certain now, so that will take care of that. That's agreed with everyone, I'm sure. September we will pick when we can as we can, but we don't have to set that now, do we?

MR. WHITE: I would ask you to do me a favor, Your Honor. I'm before another judge and he says, "What's open on your calendar," and, well, it's hard for me to say, "Well, we got this trial going on, we don't know how long it will take." If we could make some tentative settings so I could hold time open.

THE SPECIAL MASTER: Let's try tentative settings for September. now that we are all together here. And in September, Labor Day, the first week is the Labor Day weekend, the Labor Day week. Let's resume after the July hearings on September the 7th.

MR. ECHOHAWK: September 7th is Labor Day.

MR. WHITE: I have a trial that week, Your Honor.

THE SPECIAL MASTER: You have a trial most all that week?

MR. WHITE: Well, it starts on Thursday. If we're going to do it, try it --

THE SPECIAL MASTER: You need Monday, Tuesday, Wednesday for preparation?

MR. WHITE: But I'm free the week of the 14th.

THE SPECIAL MASTER: Let's set September the 14th as an assumption to the 18th. Let us set the week of the 21st, that's through the 25th. That's two weeks of September. All right. That takes you to the end of the month for other things. Why are we missing the third week? Well, the third week is the 7th to 11th, and that's all right, and the week before, that is Labor Day weekend.

MR. WHITE: I'm going to plead on bended knee, Your Honor, for October. That's when I always take my vacation and go elk hunting.

THE SPECIAL MASTER: How much time would that be?

MR. WHITE: Well, I don't --

MR. CLEAR: It takes him a long time to find

the elk, Your Honor.

THE SPECIAL MASTER: Between you and Mr. Merrill, could you assign duties once in awhile and maybe he can take a piece of the action in the case? Why don't you pick the two weeks you want there, that the State wants off, and we will try to accomodate you.

MR. WHITE: Can I pick them later? I'm not sure exactly when the elk season starts, but I know it's always in October.

THE SPECIAL MASTER: All right. Now, I want to say a word about -- we get into some problems occasionally in this lawsuit because of my trying to limit the minute detail of evidence, and one or two of you I know on both sides are getting a little bit exasperated with me when I cut you short. I know I have the law with me and the judges with me who supervise at my proceedings when he says shorten it up, go to the next point, conclude the evidence as soon as it's clear, and let you make a conclusion from that evidence and stop any further examination, if you can. I try to do that, but I can't do that in the first few hours of any witness because he's in a theme and program of his whole case, like what happened to Dr. Mesghinna yesterday.

end 3

But when we get into that matter, clearly it's repetitive and duplicative and that serves no purpose, I'm going to rule that is enough evidence, I don't want to hear anymore on that. I don't want to make any of you unhappy, but I'm serving notice upon you now.

If we don't, we could be dragging this case of for another year or two, and we don't have to do that; it will be dragging itself. It's too complex, too unprecedented, too novel in the law, too new in the Rocky Mountain West for any guidelines. There are no guidelines, no one can give me any guidelines. There aren't any. There just aren't any.

So the only way I can go is to set my own way as a pioneer in this thing. I feel like the Dutch boy in South Africa in 1720 from Mr. Michener's novel. It is a whole new world as you're plowing through this material.

Okay. You all understand it's going to be that once I feel I've got enough of the subject matter to make a conclusion, I'm going to say, "That is enough; that's all I want to hear. Let's go to the next point," and maybe I'll help shorten these weeks myself.

MR. ECHOHAWK: All right.

THE SPECIAL MASTER: Okay. We're down through September 25th and that's not bad, with a notation there will be ten days through two weeks through October, if you want.

MR. WHITE: Right, Your Honor.

THE SPECIAL MASTER: We had something else, too, Leo. I forget what it was, now.

MR. WHITE: Do you want to make settings for November and early December?

THE SPECIAL MASTER: No, no. Good Lord, we're already through September, we've got July, August and September. You may have another Special Master by then if I don't do something about getting this case finished. That's all we need is to have that and to have me with all these facts in my head and not be around to finish the case.

MR. ECHOHAWK: It would be a good idea to make settings in November and December just to be safe.

THE SPECIAL MASTER: I wanted to have the case completed, if humanly possible. I don't want to go into next year.

MR. ECHOHAWK: There is a chance we will drag out to early fall with the United States' case. Then we have the Tribes' case and the State's case.

If we get into, say, October and November and December, if we don't make some setting now, perhaps Mr. White may require some later settings and would carry into January.

THE SPECIAL MASTER: The only way you're going to have adequate and ample time for the Tribes' case or the State and for the matter of the Forest Service and the BLM is to shorten up the work now. To take days or weeks here is not necessary to the adjudication of Indian water rights. We are back to the same subject matter, and you control that.

MR. ECHOHAWK: I want to be safe in case it does string out. I hate to get to that point and have Mr. White have other trial settings. If we could put them down tentatively --

THE SPECIAL MASTER: The other settings don't bother me. But the State of Wyoming has a case to put on and the Tribes' have a case to put on and I can't do much about shortening that up.

What bothers me is I think we have got to move through this with a little more regard for germaneness -- or not germaneness but succinctness and compactness and in the gist of the testimony to spend perhaps a little less time on it, however, informative and excellent. Spend a little less time

on that detail that seems to have gone on in some of our evidence. I guess I can't say that fairly, because some of the details are necessary for making a conclusion on the water decision..

MR. ECHOHAWK: It is complex, and as we go forward it gets more complex. We have the economics and the flows for fish, and the hydrology --

THE SPECIAL MASTER: It can't get anymore complex than determining arability, engineering the land, setting up the matter that -- it can't get much more complex, I don't think. We may be in for a surprise; you think so?

MR. ECHOHAWK: Right.

MR. WHITE: It's going to get much more complex.

THE SPECIAL MASTER: Well, let's get on with Dr. Mesghinna who's probably thankful that he's an agricultural engineer and not a lawyer.

If those books bother you, the law books, we can move them off the desk, Dr. Mesghinna.

THE WITNESS: It's okay.

DIRECT EXAMINATION (CONTINUED)

BY MR. CLEAR:

Q Dr. Mesghinna, I believe when we finished up

yesterday we had gone through your eleven point outline and had finished up the pipe network design systems; is that right? Or had we gone through the pump and pumping plants?

A Yes, yes.

Q So can you briefly run through the remaining points on your engineering design with the canals and related structures in your study?

A Okay. The next step after the pump and pumping plant is obviously the canals and related structures.

In order for the pumps to be served by the amounts of water necessary, we need a system or a canal that will serve these areas. When I say a "Canal and related structures", what I mean is the canal that starts from the water source. In this case, from the rivers or streams with the head structure and a spillway and it goes along all the way from the start of the river towards the end of the areas in which it serves.

When the canals are positioned in the areas in each of the units, they were made after, you know, after great going back and

forth and looking which one is the best route for the canal to serve with the least cost, what you call, "Elevation". So I don't think I have to go into that, because we have to make things as concise as possible.

So the canal includes the diversion structures, the canal itself that carries the water. It includes also an operation and maintenance road along the canal in case something happens to the canal or to the pumps so that people can move back and forth alongside the canal. That we call operation and maintenance roads. It includes siphons, Siphons are nothing but pipes that take the water, cross the water through major streams -- I mean major creeks, so we call those siphons.

The other structures necessary for a canal are things like fences so that cattle may not enter into the canal or some other things; drop structures -- when you change from one elevation to another, then you need to drop the water -- drop structures and so on, and there are many other things which may not be necessary to, you know, to go into them one by

One. Such as, for example, road crossing -- there might be a road that crosses a canal -- we have to allow some cost for it. There could be culverts necessary to small creeks; then that is also included in the cost of the canal and so on. When we say a "Canal" it includes -- and related structures -- it includes all this.

All our canals have the same slope -- when I say "Slope" there are two kinds of slopes in a canal: The longitudinal slope, which is along the canal slope --

Q Would you --

THE SPECIAL MASTER: Longitudinal slope? Pardon me, go ahead Mr. Clear.

Q (By Mr. Clear) Could you use Exhibit C-248 to show --

A Yeah, okay. This is the canal I am talking about, and one of the related structures is shown in here. This is a diversion structure; it has a spillway. That is what I said before, a spillway, and this is the headgate where we open the water in order to operate the canals. So the canals delivers water to each of the pump stations.

Okay. So when we say a "Canal" it also includes a road that goes through the side of the canal and, as I said, there are many, you know, structures, such as --

THE SPECIAL MASTER: Many other factors.

THE WITNESS: Yes.

A -- such as waste ways, in case something happens you have to waste the water out from the canal so it does not destroy the canal. So the slope is longitudinal -- that goes like this (indicating). It has to have the side slope.

THE SPECIAL MASTER: You mentioned two. One was longitudinal?

THE WITNESS: Yes.

A -- and the other one is, if I may, let me use the blackboard because it would be much easier.

(The witness stood at the (blackboard.

There has to be a slope in order for the water to run.

Okay. This is the canal, really. It is trapizoidal in shape and it has an embankment here which is operational, an operation road in here that, you know, trucks and things move

through, and also we have some kind of triangular in shape, have shaped small canals that lets the water not to be collected along the side of the canal so that it moves freely and then goes to the culverts and this is the same in this one.

THE SPECIAL MASTER: Sort of a back slope situation? Like a road?

THE WITNESS: Yes, just like a road, a sort of channel along the road.

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THE WITNESS: So when I say the other slope is in-slope, this one is not drawn to scale (witness indicating). So what we are saying is in order to be safe so that the canal does not slack, doesn't fall out, what we are doing is we are saying for every 1-foot vertical, it will be 2-feet horizontal. So this slope is called a 2 to 1 slope. You know, we can go to 1 1/2 to 2. It can be probably still safe with no problem.

THE SPECIAL MASTER: Does the other side of the canal also have the same application?

THE WITNESS: The same thing also this way (witness indicating). So what we are saying is that we would flatten the canal as much as possible. That will make it safe, stable, but it costs more because you have to excavate more from there.

Okay, so in a sense, this is what the canal is. Let's assume that if the water level is here (indicating) when it travels, then we design it a little bit higher than what the canal is supposed to carry in case of emergency, you know, because sometimes somebody might make a mistake and he might open the gates and he might flood out the area. So in case of emergency, there is water

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to flow in here. So we design it more extra than what is needed to carry the water, and that will cost a little bit more, but that's the way how it is.

THE SPECIAL MASTER: Okay. Now, could we, Mr. Clear, could we proceed to drainage analysis and let you know of something that's needed in the canal in the way of structures that's not already on record?

MR. CLEAR: I think there is a question on cost of the excavation of the canal, and more importantly, Your Honor, it's the efficiencies which we have discussed with relation to the --

THE SPECIAL MASTER: All right. Would you ask it on those then, please?

Q. (By Mr. Clear) Could you briefly discuss then, Dr. Mesghinna -- this is the conveyance efficiency?

A. Yes.

Q. Could you go into that and to the question of your canal costs and so forth?

A. Yes. As to canal costs, as I have mentioned and tried to make it as concise as possible, it includes the costs of excavation and compacting operation and maintenance roads. It includes the cost of

fences, diversion structures and so forth.

The other thing of importance that you have mentioned is the conveyance efficiency. I haven't addressed it so far because that is an important point for the water duty. So far, we have discussed about two efficiencies, application efficiency and distribution efficiency, and in order to determine the overall efficiency of the system, we need to know one more efficiency, and that is the conveyance efficiency.

The conveyance efficiency is nothing but the ratio of the water delivered at the point of the source, divided into the amount of water delivered to the pump stations, so this is really what is conveyance efficiency. So if we determine conveyance efficiency; we know distribution efficiency, we know application efficiency; so if we -- the product of these three items will become the overall efficiency. So if we divide the net irrigation requirement by overall efficiency, that will give us our water duty in a short way.

Now, how to determine conveyance efficiency, I think this is a very important point to all of us here to get into a discussion about it. Conveyance

efficiency is one of the most complex things to determine. There is no, so to say, practical, theoretical way of coming to it. We merely depend on experiments that have been done before this time and so on and so forth; base it on limited data that we have and base it on your judgment, then you come up with a conveyance efficiency.

In order to do this, there are some what you call equations. One of the equations is called the Moritz formula, and in order to come up with our conveyance efficiency, we used that formula. And just to state it briefly, S equals 0.2 times C, square root Q over V; where V is velocity, Q is the flow in c.f.s., meaning cubic feet per second, and C is the amount of water lost in cubic feet within 24-hours' time per square foot of wetted area of the canal prism. Of course, .2 is just a constant. However, that equation is quite complex to solve it, and one has to go through, again, a computer in order to do that. And the thing that makes it more complex, we have several reaches, you know, in the canal. For example, if we take the North Crowheart Canal, there are 44 reaches in it.

Q. Define what a reach is.

A. A reach is a distance between -- most of the time between two pumping stations. So what I'm trying to say is we try to determine the seepage losses between each pump station. Okay, so the computer has to go through all these reaches, scan it out and find out the total seepage or the seepage at each system.

THE SPECIAL MASTER: How were irrigation systems built, designed and put into operation before computers were designed?

THE WITNESS: Merely experience, really. This matter of irrigation systems is -- it has to do a lot with arts, really. It's not -- it's not a complete science. During the last 10 or 20 years, you know, things have come up in a more scientific way, the ways that we have been discussing about, water-holding capacities and so on, and all these things. So I think in the last 20 years things have advanced.

THE SPECIAL MASTER: More than ever theretofore?

THE WITNESS: Yes. At a very high rate, really. Se we used a computer aid in order to come up with different seepages. Now, there is another thing that has to be addressed in here in connection with the seepage loss. It's not only seepage loss or

evaporation from the canal, there is another loss that people cannot avoid and that we will call it operational waste. Whether we like it or not, whether we have the most advanced person or people in the canal operating a system, there will always be operational losses.

What I mean by this is sometimes, for example, it might rain, but -- so the fields might get enough water from the rainfall. What do you do? You already have your canal running out. So you have to somehow, you know, take out the water from the canal system to the creeks and other areas. So this we have to do in order to design the canal, we have to design it extra to carry this water.

Okay. You waste it at different points, you know, wherever you have areas where you think are good places along the canal to waste water when necessary.

So, again, on the wastes people think from 5 to 20 percent, they allow waste from 5 to 20 percent as much as they can.

* * * * *

A (Continued) However, in our case we have used about ten percent of waste to design the canal. So what we did is in order to come for -- let me say it right -- in order to come for the efficiency, we came up with efficiencies not only for the whole season, but for each month, month by month, starting from May, June, July, August, September, then we found out all the efficiencies -- conveyance efficiencies, including the operational waste.

Then we know the distribution efficiency and the application efficiency at the farm level. Then we know our overall efficiency and you divide that by what you call the net irrigation requirement. Then we get the net irrigation requirement -- I mean the water duty.

Q One more question and very briefly, back to the cost. Where did you get your information to figure your cost on the canal system?

A Most of our information is from Bureau of Reclamation.

Q Bureau of Reclamation, um-hum.

MR. CLEAR: Your Honor, I have not offered into evidence Exhibit 248, which is the drawing

of the typical irrigation diversion and distribution system which is basically an illustration of the whole distribution system which Dr. Mesghinna has testified about.

I would like to offer that into evidence at this point.

MR. WHITE: Just one question, if I might, Your Honor.

VOIR DIRE EXAMINATION

BY MR. WHITE:

Q Did you include calculations of elevation loss for your canal in your analysis?

MR. CLEAR: I'm going to object to that, Your Honor, it's not proper voir dire.

MR. WHITE: If it shows --

THE SPECIAL MASTER: Just a minute. I am going to sustain the objection. That question is not proper voir dire. You can ask the question of the witness when you get cross-examination. You probably have 500 questions like that, but the time is on cross-examination not at this point.

MR. WHITE: Let me ask again for the purpose of the offer? It is illustrative of what?

MR. CLEAR: It's an illustration of Dr. Mesghinna's -- what he means when he is talking about a canal system, diversion structures, pump station and on-field irrigation distribution system from the diversion point of the river to the application in the field. Generally showing the areas which he has discussed under four, five, six, and seven, which are outlined on the board.

MR. WHITE: I wanted to make sure that it's not offered to illustrate his analysis or his methodology.

MR. CLEAR: No.

MR. WHITE: Let me ask one more question, then.

Q (By Mr. White) You show a diversion structure on there, and if the offer is for the purpose of showing the diversion structure, could you state whether or not that diversion structure would be within or below the high water line of the river?

A Could you state that question again?

Q Yeah, I'll do it again.

Is this diversion structure shown on

Exhibit 241 below or above high water line of the river shown there?

A Well, what you do is you have to make sure that your spillway height -- this is the spillway, that's the thing that collects the water so that you can divert water to here. Your water level here has to be higher than here in order for the water to flow.

Q So you actually built a structure in the bed of the river?

A Yes, yes. It flows across the river.

MR. WHITE: No objection, Your Honor.

THE SPECIAL MASTER: U.S. Exhibit WRIR C-248 will be admitted into evidence and will be described as a drawing of typical irrigation and diversion distribution system.

(Whereupon, U.S. Exhibit (WRIR C-248 was hereby (admitted into evidence.

DIRECT EXAMINATION (CONTINUED)

BY MR. CLEAR:

Q Now, Dr. Mesghinna, you stated right now if your planning system or your system or conceptual system or opinion, once you have completed point seven as canals and waters, you have a

water duty at that point; is that correct?

A Um-hum.

Q Should we go on to the drainage analysis?

THE SPECIAL MASTER: You mean it has the water duty at point seven; is that right?

THE WITNESS: Yeah, I think what Mr. Clear is saying is the drainage system has not much to do with the water duty, really. It is to protect the land from being sour, so in a sense we are almost ready now to say what the water duty is, if necessary.

THE SPECIAL MASTER: Um-hum. I see, I appreciate that. Go ahead.

MR. CLEAR: What we want to do, Your Honor, is complete the eleven steps and then we can go back and quickly just plug in the numbers and just --

THE SPECIAL MASTER: Okay.

Q (By Mr. Clear) Should we go on to drainage analysis now?

A Um-hum.

Q We're done with canals, I take it?

A Yeah.

Q Let's go on to drainage, then.

A It would be appropriate if we can have another drawing that shows drainage.

Q Is this it?

A Yeah.

(Mr. Echohawk put a (drawing on the board.

MR. CLEAR: Let the record reflect we have put on the easel U.S. Exhibit WRIR C-256, a drawing entitled Subsurface Drain.

A Before I go into it, I would like to make clear, you know, really what drainage is. When we talk of drainage in agricultural lands, many people, even experts in the field, think that you don't need to have drainage with sprinkler irrigation. That's the reason you put sprinkler irrigation in order to be more efficient and so you don't have drainage problems, and I respect that idea, but I believe in order to have a secure system, overall system, it is necessary or important to have a drainage system to include drainage in an irrigation project.

THE SPECIAL MASTER: Whether sprinkler or gravity, hum?

THE WITNESS: Yes, whether sprinkler or

gravity.

A The hazzards are much less in sprinkler. That's what I'm saying. The hazzards with drainage problems, in fact it is my belief and my philosophy that whenever someone thinks of irrigation, he should also think of drainage with it.

I mean, it is not -- I mean, irrigation does not just mean apply water to your plant and the plant grows. There are side effects behind it, so we should think about those side effects.

What are drainage problems? There are two kinds of drainage problems. One is called "Surface drainage". That is when you have surface water collecting in an area. We call that surface draining. But surface drainage is a very easy matter, very easy for the farmer to see and easy to correct it. It's just to find a way to take out the water.

So is the sprinkler irrigation. It's not taken as an important thing. The important thing is the subsurface drainage. That is the second problem, subsurface drainage.

What is subsurface drainage? First of all, there is no drainage problem in all the future lands, now. There is no problem; we are anticipating there will be problems in the future. So we are putting these drainage system just to protect our crops and our lands to secure health -- healthy environment for the future. This would come after several years, the problem, but what we are trying to do, we are trying to show another cost at this time.

Okay. What happens is the more we apply water into irrigation for irrigation then we have to expect that the water table will rise up, you know. If we apply water this year, later water will be collected down there next year, the year after, and so, and so forth. It will be collected and goes up.

Okay. So how does this thing work? There are two ways in which this drainage problem can work. One is the water table can rise up, way up like this (indicating). The other is the water can move towards, from higher areas, to lower areas and destroy lands downstream. So we have to protect this area.

Aside from this, there are other problems that happen, and that is water logging will create mosquito problems, you know. If you see an area that have drainage problems, you see mosquitoes and so on. That is unhealthy for human beings and other animals, so we have to protect that. The other area is when the plants take water from down the water table, they take both the water, including salts if there is salts in the water, although in the area we don't have that kind of problem. So what they do is they transpire the water part and they leave the salt part of the surface of the soil. So we see a lot of areas, salted areas. There are millions of acres that have been lost completely that probably requires billions of dollars to reclaim in the world now. Especially in countries like Pakistan, Iraq, and so on, and also in this country in California and other places there are completely destroyed lands from these problems.

So we are trying to -- we know that problem from experience, so we don't want that problem to happen to us, so we have to include drainage.

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mesghinna-direct-clear

THE SPECIAL MASTER: What can be done to reclaim that land? Is it a case of amendment with the use of acids?

THE WITNESS: That's exactly what has to be done. For example, in Iraq where they have invested billions of dollars to reclaim the land which has been salted out due to early irrigation during the Babylonian time and so on, what they have done is they have put amendments, chemicals, and they have built all kinds of crossing canals from place to place to, you know, to what you call take out the salts. They put amendments and water on top of the land, and the water leaches out the soils and all the unnecessary material. In doing so, you lose also the quality of the soil because you are leaching out the nutrients of the soil.

THE SPECIAL MASTER: Doesn't some of the salt also transpire with the water or find its way to the drainage drains and get back into the main flow of the irrigating stream, like in the Colorado River problems and Upper Sandy River problem? It's not in this water divison, but it's a big, big problem.

THE WITNESS: It is a big problem in Colorado.

THE SPECIAL MASTER: Diversion streams, is that

the name of it?

THE WITNESS: When the water reaches Mexico, it's almost salt. It has almost 3,000 TDS, if I remember it.

THE SPECIAL MASTER: Some also goes to the water and some stays in the land for the damage?

THE WITNESS: If you don't drain it. If you drain it, it seeps it out in the drains. That's the reason we use the drains. Then the drains take it out and take it out to the river. So that's the whole problem of drainage. So how do we correct this?

THE SPECIAL MASTER: You are talking now about how to correct it in the North Crowheart?

THE WITNESS: In the North Crowheart. Yeah, I'm coming back to my problem.

THE SPECIAL MASTER: You are not generalizing, you are coming back to the specific matter?

THE WITNESS: Yes, yes. Salt is not a problem in our case, but what is a problem is water logging is a problem. What happens is if the water goes up to the roots of the what you call plants, it opens all the space, water, but one thing that we have to remember is that a plant requires three important

ingredients. One is the air, the other is water, the other is light or warm things in order to grow.

THE SPECIAL MASTER: Yeah.

THE WITNESS: So if there is water logging, meaning that if the area, if the ground is saturated with water, it occupies the air part, you see. So what happens to the roots of the plant is it starts to decay, it starts to die. And if the roots aren't there, it will die. So that's the problem that we want to avoid.

So, in order to avoid that, what we have to do, we have to limit the water table to a certain point. So, with that in mind, let me explain this little picture over here.

(Whereupon the witness is referring to an illustration.

As I said, when we apply water through irrigation, some of the water, you know, goes to surface runoff, which is very small, small in sprinkler irrigation. Some of it, while the sprinkler is irrigating like this (witness indicating), you know, it evaporates and we lose it. What we are concerned with is the amount of water that deep percolates inside here.

So what it does, according to testimony that we have had from Mr. Toedter, there is water in the impermeable barrier. So the impermeable barrier has been defined as a layer beyond which the hydraulic conductivity of this barrier is at least once of the hydraulic conductivity above it.

So it doesn't pass water. The water will remain, let's assume. It will leak. Most waters leak, you know. But, let's assume, you know, just to be sure, the water will stay here. So what happens is the first year we irrigate, the water comes up here. The second year it comes up here, and so on and so on. It goes up, up, then it comes to the plant roots here. We don't want that to happen, so we have to limit that.

In order to limit that, then we put drains, and those are the drains (witness indicating). The drains are perforated pipes. Perforated pipes, but we put also what we call gravel envelope --

THE SPECIAL MASTER: Gravel envelope?

THE WITNESS: Yes, gravel envelope.

THE SPECIAL MASTER: Size of gravel rocks, that's a little bit larger than the size of the perforations?

THE WITNESS: Yes. It used to be called a few years back filter material. It filters out, but it doesn't work as a filter. So, at any rate, we have this gravel envelope around it, and what it does really, the gravel envelope, it makes the pipe diameter bigger, it makes it bigger in a sense because when the water comes like this, when it gets there, it is transferred because there is nothing to hold it. The soil is gravelly material and the water can percolate easily and enter into the pipe and find its way out. So the whole thing of the matter in drainage systems or analyses that I have said is to determine the costs -- I mean, determine the spacing of these drains because, if we put them far apart from each other, the water table will go, you know, up. If we put them too close, it might do -- it might --

THE SPECIAL MASTER: It might do the job, but inefficient?

THE WITNESS: It might do the job, but inefficient, yeah. It's too expensive.

THE SPECIAL MASTER: Yeah, too expensive.

THE WITNESS: So we have to find a way in which this one will work in the most optimum manner.

So what do we have to consider in order to do this?

In drainage systems, three things are important to consider: One is the hydraulic conductivity of the soil; the second thing is the depths to the barrier, and the third thing is the amount of deep percolation.

THE SPECIAL MASTER: The third thing is what?

THE WITNESS: Amount of deep percolation, the amount of water that percolates inside. They call it also replenishment rate. Replenishment rate.

THE SPECIAL MASTER: Replenishment rate?

THE WITNESS: Yes. Okay, when we talk of hydraulic conductivity, I don't want to go to the details now --

MR. CLEAR: I think some of that was explained by Mr. Toedter.

THE WITNESS: If it was explained, then I'll just leave it.

THE SPECIAL MASTER: We put a good day in on hydraulic conductivity, so we feel we are with you on that.

THE WITNESS: Mr. Toedter explained hydraulic conductivity, but it is the hydraulic impermeability, as you might have heard.

The other thing is depths to barrier. The depth to barrier is a minimum of 6 feet, and I think I will assume you have got that from Toedter, too.

Q (By Mr. Clear) You got that information from Toedter also?

A. Yes, yes. So I don't want to go through that.

The third thing of importance is also the deep percolation, and the deep percolation for sprinkler irrigation is not much. However, we have used 18 percent of our applied water will enter to this --

THE SPECIAL MASTER: Eighteen percent?

THE WITNESS: Eighteen percent will enter into the drains.

Okay, based on this, there are two methods in which to design a drainage system. Now, we have our basic data how to design the system.

So, in general, there are two ways how to design the system: One is called the transient or dynamic equation in which Toedter was, I think, addressing it to a certain extent last time. They have a computer program and so on that does those things. And that method is used in, I

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So, in general, there are two ways how to design the system: One is called the transient or dynamic equation in which Toedter was, I think, addressing it to a certain extent last time. They have a computer program and so on that does those things. And that method is used in, I

believe, this is my own assessment, by a few agencies and especially by the Water and Power Resources, which is the USBR. The other one is used internationally and also by agencies like the Soil Conservation Service and most private firms and, you know, who are in this kind of profession, is called steady-state.

THE SPECIAL MASTER: Steady-state?

THE WITNESS: Steady-state, s-t-e-a-d-y, and state is like a state. Steady-state equations.

Okay, steady-state equation, this equation was developed in the Netherlands when they claimed -- they claimed their water, you know.

THE SPECIAL MASTER: The dikes?

THE WITNESS: Yes, the dikes and so on. So I don't want to go through that also.

* * * * *

A Okay. The steady-state equation is nothing, but what it is saying is the act of water that enters into the soil is steady. Once you start the irrigation gate you'll have water all the time, during peak times, they assume during the peak times, so that water always enters there, so you have to say irrigate it. In reality that may not be true. The water does not enter all the time. Sometimes there is a slack time, but you assume anyway peak time.

Okay. So an equation was developed first by people in the Netherlands and also people in the USBR work on it still, even though they use the other method and a gentlemen by the name Donnan have worked on it, Donnan, D-o-n-n-a-n, into it. And so on.

Okay. So the equation simply states that S equals the square root of 4 times K times M open bracket M plus 2-A close bracket over q, small q.

What it means is -- S stands for the drain spacing, q, small q, is that I said is the amount of water that enters in here (indicating).

THE SPECIAL MASTER: Applied water?

THE WITNESS: Yes. The amount of water at deep percolation, the portion of water that deep percolates.

A M is -- let me write it in the blackboard. It will be easier, I guess.

(The witness approached (the blackboard.

I might have drawn this a thousand times in my life.

THE SPECIAL MASTER: We're familiar with that, too, I think.

A Okay. We have the plants, the plant surface is here. And let's assume for all practical purposes, for illustration, this is an impermeable area --

THE SPECIAL MASTER: Inpermeable area.

A Right. Okay -- M is the distance from here to here (indicating). A is the distance from here to here (indicating), and we are assuming that we'll put the drains seven feet below the ground and we'll have four feet between the highest point of the water level. The highest point of the water level -- it's always lower than it, you start with seven feet below the ground.

Then it comes up to four feet. We are assuming four feet in here (indicating). So this will be naturally to three and this is variable, depending on how deep it is, and this is the drains and this is the water table (indicating several times).

This is really exaggerated, you know. Ordinarily it's flat.

I think someone might argue here. You have your weighted depths of 4.5 yesterday --

Q (By Mr. Clear) That was the weighted depths of the roots?

A Yeah, of the roots, and now you have four feet. What happens to the 4.5 feet?

In design you -- in fact, I believe the USBR goes from 3.5 feet lower than it. What happens is that point is a very small portion of the area. It's a very, very small portion in the middle between the drains, so it is happening for a short time and in a small area so you don't have to.

THE SPECIAL MASTER: You've been talking for an hour, now. I don't want to hurt anybody's throat. Let's take a break.

(At this time there was
(a brief recess had in the
(proceedings.

THE SPECIAL MASTER: Let's resume, ladies and gentlemen.

All right, Mr. Clear.

Q (By Mr. Clear) Doctor, I believe you were in the middle of your steady-state formula explaining how it happened. Could you go on with that?

A Yeah, okay. From -- by -- we apply that formula which is called "Steady-state Equation" and I have explained it, what it is, really, and we determined the spacing of the drains.

Now, these are subsurface drains but also we have to make allowances for other kinds of drains which are ditch or small canals. We call them open drains and these open drains are drains that collect the water that comes out from the drains themselves.

THE SPECIAL MASTER: Yeah, we see it on 256.

THE WITNESS: Yes, it's there.

A And those other are other drains. Also there are other smaller channels that would collect water and also drain it to the outlet, you know,

mesghinna-direct-clear

outlet ditch. They are called outlet ditch.

So we have this and we have included the costs of this.

Okay. After we determined the spacing of the drains, we should also determine the sizing of what you call drains.

THE SPECIAL MASTER: Drain pipes?

THE WITNESS: Drain pipes, yeah.

A We can go up to four inch of drain pipes, but we made a limitation of to six inch, because it is in construction easier to use six inch, although it costs a little higher. It's easier for construction, expedite construction. It's easier to handle six inch rather than four inch pipes.

So we have six inch pipes, we have eight inch pipes, and we have ten inch pipes. The cost of this we determined from the costs that had been done in Riverton itself and the reclamation area. From the lower --

THE SPECIAL MASTER: Does the Riverton Reclamation District use a six inch pipe?

THE WITNESS: I think they used six inch pipes too, yeah. Variable, you know, it varies

depending on the kind of flow that they get there.

A So at any rate, by taking the low bids, starting from 19 -- I guess 1975 or '76 or '73 -- I don't remember the date of the different costs of drains -- we jack them up to 1979 costs by indexing method from the Bureau of Reclamation and we came up with these costs and for the drains for the open drains for the small open drains we came up with a $2 per feet, you know. These are open ditch and for the bigger open drain we came up with $6 per feet, you know, for this just excavated, and these are just outlet ditches.

So in a sense when we speak of drainage, it includes all these costs of the pipes, the costs of the drains, and there are other things that also are necessary there, you know, such as manholes, you know, where people can check what is happening in the drain if it clogs, and so on.

So the costs are integrated together in these pipes. The cost I gave you, for example for six inch pipe is $5.82; for eight inch pipe

is $8.69; for ten inch pipes, we used $13.22 per foot, respectively, and these include also the other items related there, including the gravel pack and, you know, all the stuff that is inside there, what is needed to construct it. And I have said that these pipes, these pipes are laid seven feet below the ground. It is a common practice to lay pipes seven to eight feet.

It is a bit cheaper to use seven feet, but we used the eight feet cost for the seven feet digging.

Q (By Mr. Clear) That brings an obvious question: There's been much testimony among the limitations of classes of land by HKM there is a six foot barrier.

A Now there are problems. If we have an area that has an impermeable barrier at six feet, then we don't dig all the way and put the drain at seven feet. We put it at six feet, because we are limited by the barrier there.

THE SPECIAL MASTER: Sure.

A So there is a barrier, but is costs more, much, much more, and one thing we have to realize also,

it does not mean that all lands require drainage. Some are very thin, shallow, and they drain by themselves. There is natural drainage.

Some lands are high, on a plateau, and there is natural drainage that goes either side. So one has to make all these judgments and one has to see each and every area, how it is going to react vis-a-vis the drainage works, and so on.

Based on this, we came up with total cost and comparative cost for each of the units.

THE SPECIAL MASTER: Each of the fields, or each of the units?

THE WITNESS: Each of the units. We added all the pipes necessary, you know.

THE SPECIAL MASTER: Um-hum.

THE WITNESS: How many probably in terms of millions of feet of pipes or, you know.

THE SPECIAL MASTER: Are you going to give those figures? Will that be brought out later in the trial?

MR. CLEAR: Yes, when we go through these specifically, we'll plug in the numbers, Your Honor, for you. If we tried to explain what

he did and explain at the same time what he used and all the figures, I think it would be very confusing to you.

THE SPECIAL MASTER: All right.

MR. CLEAR: But we will give you all that and I think it is in his report, too.

THE WITNESS: It's in my report.

THE SPECIAL MASTER: Very good. I still don't have a report, you know. That was given back yesterday.

A Another question that might arise, probably, I would like to make clear as I go along is the one when we designed these banks of the drains, open drains, instead of 2 to 1 slope. Instead of a 2 to 1 slope we used 1 to 1.5 slope.

THE SPECIAL MASTER: 1 to 1.5?

THE WITNESS: Yes.

* * * * *

THE WITNESS: Yeah, because there is not much there, it's not a canal or anything. It carries a very small amount of water that drains from the pipes, and we believe it is stable. So, at any rate, we came up with a total footage of pipes of the different pipe drains and we added all those pipe drains, including the costs of the open drains and so on, whatever is necessary there, we added them all up and divided them by the acreage of each unit and we came up with a cost of each unit on a per acre basis.

THE SPECIAL MASTER: How much per acre?

THE WITNESS: Do you want me to give you the figures?

THE SPECIAL MASTER: No, I don't. You did come up with a per acre cost base figure?

THE WITNESS: Yes. If it's necessary, it's right in front of me.

MR. CLEAR: You testified --

THE SPECIAL MASTER: Why don't you want the figure brought up now?

MR. CLEAR: I thought it would be easier to --

THE SPECIAL MASTER: Get into the other figures, okay.

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MR. CLEAR: We are just talking about the cost of drainage now.

Q. (By Mr. Clear) We have also discussed the cost of on-farm systems design, pipe network system, pump and pumping plant, canals and related structures. All of those are related costs, too, right?

A. Yes.

THE SPECIAL MASTER: I'm sorry. Proceed.

Q. (By Mr. Clear) Dr. Mesghinna, when you started this drainage discussion, you said you used 18 percent as the figure for deep percolation. Where did you get that 18 percent figure from?

A. That is experience from the USBR.

THE SPECIAL MASTER: Is that a figure of deep percolation, or was this a percentage of the applied water that gets into a drainage system, or are we talking about the same thing?

THE WITNESS: Yeah, the latter one. It is the 18 percent of applied water that deep percolates.

THE SPECIAL MASTER: Eighteen percent of the applied water will enter into the drains?

THE WITNESS: Yes.

Q. (By Mr. Clear) Where did you get that from?

A. From the USBR.

Q Should we go into Operation and Maintenance now?

A. I think it's better to -- for the sake of time, it's better if you need some clarification, we can come back to this in cross-examination or examination.

Okay, now we have the project, we have the on-farm system, we have the pipeline network system, we have the pump and pumping plants. We have the canals and related structures, we have the drainage analysis, everything. So we have investigated everything there and it's on the ground.

THE SPECIAL MASTER: We have everything except water.

THE WITNESS: We have everything except water.

THE SPECIAL MASTER: And now we are in Operation and Maintenance?

THE WITNESS: Yes.

THE SPECIAL MASTER: Is your O and M comparable now to the classic operations and maintenance history of the United States Bureau of Reclamation, what they call O and M?

THE WITNESS: Yeah, except that there are some slight differences in a sense because we have a lot of tampering here, energy costs. They usually have -- in most cases they have gravity flows.

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THE SPECIAL MASTER: Gravity?

THE WITNESS: But we have some additional costs.

THE SPECIAL MASTER: Because you're listing water more than usual conditions?

THE WITNESS: Yes.

THE SPECIAL MASTER: Would you proceed in that respect because I know you will shorten whatever you can to save our time.

THE WITNESS: I'm trying to make it as concise as possible.

THE SPECIAL MASTER: I appreciate that.

THE WITNESS: Okay. When we talk of operation and maintenance, we are talking of realistically how you operate the system. We have everything there, but what kind of professional duty of people and what kind of energy do you need, what kind of power or demand costs do you need and so on, and how many people do you need to work on the canal here and there? So we are actually talking now how to operate it, the systems.

Okay, as I have discussed earlier, there are five units: North Crowheart, South Crowheart, Riverton East, Big Horn Flats and the Arapahoe Units. Okay, what we have assumed in this thing

is when we operate these five units, we will divide them into two administrative projects. We will have two administrative projects. The first one is the North Crowheart Unit will be administered from one location. Just to make things easier, let's say it will be administered from the little town or village of Diversion Dam. Let's say the head office will be there, those people who work on the operation and maintenance of the North Crowheart Unit.

THE SPECIAL MASTER: Isn't that where the diversion facilities and works are now for most of the Riverton projects?

THE WITNESS: Yes. There is a small town there. I don't know if you can call it a town. I'm just saying anyplace it can be.

THE SPECIAL MASTER: Yes.

THE WITNESS: And the others are small units: South Crowheart, Riverton East, Arapahoe and Big Horn Flats. They are very, very small units compared to North Crowheart. All these units can be administered from one location. Let's assume for, you know, simplicity sake, let's say they can be administered from Fort Washakie, a more centralized area. So based on this, what kind of professional

duty people do we need in order to administer these areas?

By the way, when I talk of operation and maintenance, operation and maintenance have nothing to do on operating the sprinklers and so on of the fields. That is up to the farmer. What I'm talking about is to deliver the water from that, you know. After that it's up to the individual farmer to operate his, and that has been taken care of, those costs have been taken care of by the economists.

So in the North Crowheart we would need, for example, one water master; we'll need about two pump specialists, you know, if something happens to the pumps and so on; we will need one canal operator; we will need heavy equipment operators of about two people; we need a truck driver, one truck driver; we'll need ditch riders who would see the canal is working right, probably there are weeds here and there, cleanup, and we need four of them; we will need laborers also who would do certain things, you know, here and there in canal cleaning and so on, five of them; and also need a secretary or a dispatcher of the whole thing.

And we have given time of, for example, the

water master would work twelve months per year, and we said that salary would be $19,000 per year in 1979. Pump specialists can only work eight months during the year because during the off season there is not much to do. So for both of them is total salary of $20,000 for those eight months. Canal operator only eight months per year, $8,000 per year.

THE SPECIAL MASTER: Why are we into costs by dollars and so on when we avoided them in drainage analysis?

MR. CLEAR: I don't think we have to go into them.

THE WITNESS: Okay. At any rate, this is the cost of what you call personnel necessary, but we should also include in the operation and maintenance the cost of what you call maintenance, good mains and so on, based on USBR guidelines. We divided the total professional salaries by .6, and that will give us the overall cost of most of the maintenance, you know, and the operation.

We have gone through the same thing, only in a slight difference, on South Crowheart Unit, Riverton East, Arapahoe, Big Horn Flats, and we have assigned

professional duty people. I don't think -- unless it is necessary to say the people necessary -- but we have assigned also total salaries and so on and we came up with dollar in cost per acre per year, you know, per season, per year. So this is what you call the operation and maintenance costs.

THE SPECIAL MASTER: When you assigned those operational costs per acre per year, did you distinguish between an acre of Class 1 from an acre of Class 4 land?

THE WITNESS: We don't distinguish that. I think all the sprinkler Class 4 lands have been eliminated in our study.

THE SPECIAL MASTER: All sprinkler Class 4 lands and what?

THE WITNESS: Have been eliminated.

THE SPECIAL MASTER: Have been eliminated?

THE WITNESS: Yeah. We are not using them. We are only considering above Class 4, Class 3, Class 2, Class 1. Okay, so this is in a sense what we are trying to do, we are assigning professional duty of people to operate the canal and the pumps. That's what we are doing, really. After that it's up to the farmer to manage his farm, and

that cost has been taken care of by the economists.

Now, there are other costs in operation and maintenance that haven't been addressed yet,and those are the energy costs and demand costs.

The energy costs are the costs necessary to pump out water to the sprinklers. That would depend on how many kilowatts are consumed by each pump station during the season. In order to do that, we have to change the horsepower that I already discussed for each pump station to kilowatts, and that's a simple method, we just multiply by .746 and we come up to kilowatts. But the cost of energy is not the only -- is not really in correct terms, but is in a sense in come cases, but in kilowatt hours. So we ought to know the hours necessary to pump out water. So depending on the total flows that you have and amount of flow that we pump out water, we determine the number of hours necessary for each pump station to pump out water during the season.

THE SPECIAL MASTER: How many pump stations did you say in the whole project in the North Crowheart?

THE WITNESS: In North Crowheart we have 59 pump stations. However, all of them are not pumps.

We have also areas where we -- where we serve areas without the pump just by gravity because there is enough head in those areas.

Okay, so based -- after we determined the kilowatts, we multiplied by the seasonal hours and we determined the kilowatt hours. And we received the cost of -- cost of energy per kilowatt hour from the USBR, which is .02521 dollars per kilowatt hour.

* * * * *

A Using that cost per kilowatt hour, we plan the cost per kilowatt hours. With the kilowatt hours we determine the total energy cost of each unit and then we divided that by the total or what you call acreage, and we determined the cost of energy per kilowatt hour per acre. That's the energy.

The other item that we considered is also the power cost or the demand cost or sometimes they call it the hook-up cost.

THE SPECIAL MASTER: Proof-up cost?

THE WITNESS: Hook-up --

MR. CLEAR: Hook-up.

THE SPECIAL MASTER: Oh, hook-up.

THE WITNESS: Hook-up costs, h-o-o-k.

MR. WHITE: That's -- sorry.

A What that cost is -- the power company every year it disconnects after the irrigation is finished, it disconnects the power and then when irrigation season comes up, it connects the power. So there is cost for there and that cost is based on the horse power of the pump and that is $7.75 per horse power.

So based on our horse power, whatever we

need for each pump take and multiply that by $7.75, we determine the cost, total cost, of hook-up.

THE SPECIAL MASTER: That's a one-shot cost per year, is it not?

THE WITNESS: Per year, yes, that is a one-shot cost.

A We also determine on a per acre cost of that one adding all the costs necessary and hook-up costs, and we determined, as I said, the cost per acre for power, or demand they call it also for each of the units.

So in a sense we have three things in operation and maintenance costs. The first, operation and maintenance where we have all the people who would operate the area; the second is the energy cost; the third is the power costs. We add those three and that gives us the total operation and maintenance.

So this is cost per year, the other costs we determined before are investment costs.

So -- when we talk of costs, these are the total costs.

Q (By Mr. Clear) And that's also divided into a mesgnhinna-direct-clear

per acre basis?

A That is also divided into per acre base. So everything on per acre base is to make things easier.

MR. CLEAR: Your Honor, I neglected to ask for the introduction into evidence of United States Exhibit WRIR C-256. That is the subsistence drain -- or subsurface drain drawing which Dr. Mesghinna used in his testimony regarding the drainage system. I offer it, for illustration of that would be helpful to the Court and Counsel just to explain his testimony.

THE SPECIAL MASTER: Right. Mr. White?

MR. WHITE: No objection.

THE SPECIAL MASTER: U.S. Exhibit WRIR C-256 will be admitted into evidence and it will be identified as a subsurface drain chart -- drawing of subsurface drain.

(Whereupon, U.S. Exhibit (WRIR C-256 was hereby (admitted into evidence.

Q (By Mr. Clear) Well, we have two items left: Water duty and total cost. I was under the impression that we really could determine water

duty once we got done with canals and related structures. Do you have anything to add to the last two items or --

A No. The thing -- what we have to do is, I guess, before we enter into the water duty, it is better to show all the five units, where they are and what they are --

Q Um-hum.

A -- and so on.

THE SPECIAL MASTER: Okay.

A So that will be more practical, you know, we'll see what we are talking.

THE SPECIAL MASTER: Should we set up the five exhibits that we have to do that?

Does anybody want a few mintues of a break here?

THE WITNESS: That would be good.

THE SPECIAL MASTER: All right. We will take a five minute recess.

(At this time there was
(a brief recess had in
(the proceedings.

THE SPECIAL MASTER: Shall we come to order, please, ladies and gentlemen?

All right. Mr. Clear?

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THE SPECIAL MASTER: Shall we come to order, please, ladies and gentlemen?

All right. Mr. Clear?

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Q (By Mr. Clear) Dr. Mesghinna, before the break you said you had finished basically your eleven point outline of the methodology used in testing these study problems and you wish to go on and describe each individual irrigation project for the five areas you're testifying to?

THE SPECIAL MASTER: For the five units?

MR. CLEAR: Five units. I'm sorry, Your Honor.

A Yeah, okay.

Q (By Mr. Clear) Would you like to begin?

A Sure, I can go ahead and --

MR. WHITE: Your Honor, may I get a continuing objection to the witness testifying from exhibits not in evidence and to the use of the exhibits because of violation of the ten-day rule.

THE SPECIAL MASTER: I recognize both and will grant the continuing objection on them.

Don't we have around here somewhere a map of each of the -- maybe we don't -- go ahead.

Q (By Mr. Clear) We have tacked on a piece of hardboard two exhibits, U.S. Exhibit WRIR C-249 and U.S. Exhibit WRIR C-257.

Can you briefly explain what those two exhibits are, Dr. Mesghinna?

A Okay. First of all I would like to --

Q I think maybe you'll have to speak up because your back is to Sandy a little --

A First --

Q Mr. white.

A -- of all I would like to make a distinction between these, between the two maps. This one and this one (indicating) they are all North Crowheart, but this one is the proposed irrigation project, Conceptual Plan Irrigation Project. It includes all the necessary things, on-farm system, the pumps, the pipelines the canals and related structures, and so on. But it does not include drainage.

However, this one --

THE SPECIAL MASTER: Now looking at 257.

THE WITNESS: Um-hum.

A However this one which is 257, shows the drainage system.

THE SPECIAL MASTER: And only the drainage system?

THE WITNESS: And only the drainage system.

A But in the fields that we have in here. It does not mean that the canal is there and pumps are also there and most of the things are there (indicating several times).

THE SPECIAL MASTER: Um-hum.

A Okay. To begin with this is the North Crowheart Unit, a portion of it, because there is another one. The North Crowheart Unit, you know, continues somewhere up here.

Q (By Mr. Clear) You're saying there is another map for the North Crowheart map?

A Another plat depicts a portion of the North Crowheart Unit. So as we have stated it earlier, water is diverted from the North Crowheart Unit from the Big Wind River.

THE SPECIAL MASTER: From the what?

THE WITNESS: Big Wind River.

THE SPECIAL MASTER: But where is it between Cottonwood Canyon and where is that diversion dam?

THE WITNESS: That is about two and a half miles north of Crowheart. The Town of Crowheart. It is at an elevation somewhere 5920 and 5910. It will be somewhere there.

MR. CLEAR: We have smaller copies of those maps, if you want.

THE SPECIAL MASTER: No, that's all right.

MR. CLEAR: The large copies are back there.

THE SPECIAL MASTER: Thank you.

A So all the water required for the whole North Crowheart is diverted at this point (indicating). The canal has several structures, as I have said. For example, the Crow Creek, we have a siphon about 600 feet long, and Dry Creek we have another siphon about 600 feet long; another very long siphon that we have is in Five Mile Creek, when it crosses Five Mile Creek, which is about 10,500 feet of siphon.

THE SPECIAL MASTER: You have no siphon in the Mexican Draw?

THE WITNESS: We don't have. In those areas we have culverts.

THE SPECIAL MASTER: Culverts?

THE WITNESS: Culverts, um-hum. So in the rest of the area where there are small creeks here and there, we used culverts. There are also waste ways at Dry Creek, Five Mile Creek.

THE SPECIAL MASTER: What is a waste way? An open drain?

THE WITNESS: Yes, it is an open channel.

THE SPECIAL MASTER: An open channel for drainage or for delivery of water?

THE WITNESS: No. When there is a, say for example there is a power shutoff, the pumps will not be able to take the water, but the water is flowing through the channel. If it continues on flowing, then we will destroy --

THE SPECIAL MASTER: Oh, now I know. You referred to them before.

THE WITNESS: Yes. So there are waste ways because we have to allow cost for waste ways in case of emergency.

However when the canal reaches somewhere near Pavillion Ridge, this area in here (indicating), we have the -- are at the division box or division structure, because the canal part deflects, part of the canal goes this

way and part of it continues to the other portion of North Crowheart. That portion of the canal that serves the Pavillion Ridge area and some areas around it have also a drop structure that would allow the flow of water to go from a higher elevation to a lower elevation.

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THE WITNESS: At the end of this canal of this Pavillion Ridge Canal, the small canal we are talking about, we can see at the end of the canal where we have a pump, there is also a waste way that we have allowed, and we have determined the cost. We have determined the cost of the waste way there. When I talk about the Pavillion Ridge Canal, this is the small canal in here. It's about, I believe, 7.2 miles in length. The other portion of the canal is about 52 miles long, it goes from -- all the way from -- 2 1/2 miles north of Crowheart to the Pavillion Ridge area, which it is about 52 miles long. And, as I have discussed before this time, there are several pump stations. And also there are turnouts, the turnouts are used when we have enough head to supply it by gravity. In some areas we also have booster bumps. We have a section of an area which is very high compared to the total area. Then we boost the water, and we also made an allowance of cost of those pumps which are needed in -- the booster pumps.

THE SPECIAL MASTER: That's not on the on-farm system, that's along the canals before the on-farm system?

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THE WITNESS: Yes, before the on-farm system, somewhere between the on-farm system and the pumps. I mean, the main pump system there, there are these booster pumps.

Then after each of the pump stations we see the distribution lines that I was talking of or transmission lines which are pipe line network that we see in there (witness indicating). They are shown by dotted lines. They are called irrigation distribution pipelines. They are small dots. They look like lines, but broken dots. Those are distribution lines, and we haven't shown the on-farm pipelines because it would be too crowded if we show the on-farm pipelines, but it has been taken care of as far as cost is concerned.

The other thing that we have considered is we see there are -- in each pump station there are numbers. For example, in the first pump station there is 5.

THE SPECIAL MASTER: Point at that, will you?

THE WITNESS: Okay, here, 5. (Witness indicating). Okay, what it means is there is one pump station there -- there is one pump station there, but we are just suggesting since -- for the economics

of the farmer or of the farmers, they can use several small pumps rather than one pump, big pump, because there we have the cost for the big pump there. They can use smaller pumps because,you know, when the season is not too high, like, for example, in April or May or September or some parts of June or August, towards the end of August, they can use only a portion of the pumps, so they can save energy costs and so on. However, we have used the maximum what you call horsepower or power costs. So the number there, we are just suggesting this can be done this way.

One point I would like to make in the North Crowheart area is there is -- there are two areas, one here, which is Station No. 12 --

THE SPECIAL MASTER: Pump Station No. 4?

THE WITNESS: Twelve.

MR. CLEAR: Twelve?

THE WITNESS: It's not written there, but I just remember it's Pump Station No. 12. Then upstream from it there is another pump station which is Pump Station No. 13. These two pump stations are served by a natural creek, which is a dry creek, meaning that we divert water through -- we are taking advantage of the creek, we divert water

out of Dry Creek and we let it flow down, then we pump out water from Dry Creek.

Okay. See, in a sense, what we see is we are looking at the overall -- the farms, as I have indicated from yesterday, which are the on-farm systems (witness indicating).

THE SPECIAL MASTER: Right where you are pointing now -- put that back up again. On some maps I find a square mile it was omitted on being a Class 6 land, yet on all your maps I see it attached in as part of the irrigable fee lands. It is a square mile paralleling your irrigation distribution pipeline due north of Pump No. 5. Are you familiar at all with a square mile in there that isn't even on such exhibits as the map for the North Crowheart land classification.

MR. ECHOHAWK: Is that the sprinkler map or gravity map, Your Honor.

THE SPECIAL MASTER: This is the gravity land classification map. And in it that whole square mile is omitted, yet I notice all the planning here is to irrigate it.

THE WITNESS: Which one is that? This one? (Witness indicating). No, we are not irrigating

this area at all, sir. This is fee land.

THE SPECIAL MASTER: You are not planning on irrigating that at all?

THE WITNESS: No, we are not planning to.

THE SPECIAL MASTER: That's a very important answer and I appreciate it.

THE WITNESS: Yes.

MR. CLEAR: Explain what that is on the map.

THE WITNESS: I think it's better if I explain it in the legend. We have a legend in here that shows each and every line and sequence and so on. The lines -- the bold lines, which are straight lines, are irrigation system design boundaries, which are farm boundaries. The big bold line with an arrow in it is the main canal and the dotted lines are the irrigation distribution pipelines.

THE SPECIAL MASTER: So all you do is run a pipeline along that fee land, but you don't --

THE WITNESS: Yeah, but we are not doing anything with it. We are not serving it and not claiming it at all. And the vertical hatched lines are the trust lands, and the square-like lines are the fee lands. So those fee lands are just there to show there are fee lands there. Other than that,

we have nothing to do with it. We are not claiming water, we are not --

THE SPECIAL MASTER: Isn't there any cooperation between owners of that fee land and you of possibly putting water on it if it's irrigable and helping share some of the costs? Is there no cooperation in that way?

THE WITNESS: This is possible, but what we have assumed, in that case, we have assumed the worst case, meaning that suppose the people who have the fee land don't want to share it.

THE SPECIAL MASTER: That follows -- that's the usual batting average, but I'm sorry to hear it, nevertheless.

THE WITNESS: So we are taking the maximum precaution, meaning that we are taking the maximum costs supplied ourselves. And if it comes that later on we are willing to do it, the cost of the system will decrease. So, in a sense, I think I have shown as much as I could, unless there are some clarifications that I have to make, this is how the North Crowheart Unit is served.

Now, in North Crowheart we came up with 40,814, I believe, acres. But although we designed

we have nothing to do with it. We are not claiming water, we are not --

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Now, in North Crowheart we came up with 40,814, I believe, acres. But although we designed

the system for all these 40,814 acres, we decreased it from the 40,814 acres by 5 percent. So from the 40,814 acres, we came up to net acres of 38,773 acres. The reason why we did this is there are -- there will be farmsteads, there will be some roads. We might have included small, very small areas for squaring off and so on and all these things, so we have made an allowance of 5 percent.

THE SPECIAL MASTER: Give me that 38,000 again.

THE WITNESS: Yes, 38,773 acres.

THE SPECIAL MASTER: Okay.

THE WITNESS: We started our upper land, I guess, about 48,000 and we went down at least 10,000 acres down from what we received from HKM.

So I think for the time being, this is enough for North Crowheart proposed irrigation conceptual plan, development plan.

The next thing that I would like to discuss in the North Crowheart Unit is the drainage map, which ic C-257.

* * * * *

A The bold lines that we see in the map with arrows are the subsurface drainage or drains that have been -- that I just talked an hour or half an hour ago. And as we can see, the drains, they collect the water from what you call the different areas and then there could be a main drain that collects that area and takes it out and what you call discharges it to natural creeks or something of the sort. Now, I think it is evident that all the drains as we can see have different spacings in many cases as you can see.

For example, just southeast of Crowheart Butte we see the drains are very much crowded.

THE SPECIAL MASTER: Yeah.

A And the reason for that is that area has -- on I'm sure Mr. Toedter has addressed this -- that area has very shallow depths to barrier.

THE SPECIAL MASTER: Depths to barrier?

A Depths to barrier, and that makes it very expensive and we can see, I believe, although I don't exactly remember, it shows drains are every 150 feet.

THE SPECIAL MASTER: So you could classify those as not practicably irrigable lands?

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THE WITNESS: Well, I think the point is --

THE SPECIAL MASTER: I like that. The way you get around --

THE WITNESS: The point is we are looking for the whole project as such. You know, some areas have few drains, some are unlucky because of nature, have more drains. But when we take the whole system, it comes practical.

So what this in correspondence is to what Mr. Toedter showed the last few days that he has different areas which have different classifications as to hydraulic conductivity, depth to barrier, and so on. So based on that we have different drainage spacings.

Okay. So I think if I am going to talk more, I will probably say things more and more again. So for this time, I think this might be enough.

THE SPECIAL MASTER: You think it might be repetitive.

THE WITNESS: Yeah.

THE SPECIAL MASTER: All right. We appreciate that. Does anyone know who owns that square mile? Is that part of Mr. Gerald Spence's ranch or

Walt Urbigkit's?

MR. WHITE: I don't know, Your Honor.

MR. SACHSE: Off the record --

THE SPECIAL MASTER: Right. Let's go off the record.

(At this time there was a
(brief discussion had off
(the record.

THE SPECIAL MASTER: Okay, back on the record. I wondered, because there sits a square mile that should share the costs of that area because he will benefit from it. It's got the drainage right there, the delivery canal paralleling the square mile.

Okay, go ahead, Mr. Clear.

MR. CLEAR: I would like to consult with my co-counsel.

(At this time there was a
(brief discussion had off
(the record.

MR. CLEAR: We are not going to run through each one of these plats, but this one --

THE SPECIAL MASTER: No problem; no problem.

MR. WHITE: If it would speed things up any, the State of Wyoming would stipulate that Dr. Mesghinna's general remarks concerning 251 and 259

be accepted by the Court as applicable to preceding exhibits at the same time.

MR. SACHSE: The tribes would not stipulate to that, Your Honor, as to the Big Horn Flats Exhibits, There are some particular issues with it.

THE SPECIAL MASTER: Fine, proceed.

Q (By Mr. Clear) I have hung up United States Exhibit WRIR C-251 and WRIR C-259. Could you explain what those are?

THE SPECIAL MASTER: Just come around.

THE WITNESS: Okay.

(The witness approached the easel.

A Probably this is the hardest one to explain. We should have started when I had more energy with this.

Okay. At any rate, this is the Big Horn Flats, a portion of the Big Horn Flats Unit, because there are about, I think, 968 acres down south of this which are left.

THE SPECIAL MASTER: Both of these apply to the Big Horn Flats area?

THE WITNESS: Yeah, yeah. Do you want me to --

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THE SPECIAL MASTER: Both of these apply to the Big Horn Flats area?

THE WITNESS: Yeah, yeah. Do you want me to --

MR. CLEAR: Yes, go ahead.

THE SPECIAL MASTER: Okay.

Q (By Mr. Clear) Dr. Mesghinna, can you locate Big Horn Flats in -- it's about in this area here?

(Witness approached map of (Arable Sprinkler Lands.

A Let me show you what is left. It's not too important.

What we have up there is all in this area here --

THE SPECIAL MASTER: Across the Big Horn -- or Wind River and south of it and south of the westerly portions of North Crowheart; is that correct?

THE WITNESS: Yeah, southern portions of North Crowheart. It is somehow in the center of the reservation. It is that high altitude area.

THE SPECIAL MASTER: Well, it's the western most area including Bull Lake?

THE WITNESS: Yeah, just southeast of Bull Lake.

THE SPECIAL MASTER: Okay.

THE WITNESS: But there are few acreages which I

believe are 968 acres which are not shown in there. They are in another place.

THE SPECIAL MASTER: Very well.

THE WITNESS: But they receive water from the Little Wind.

THE SPECIAL MASTER: Very well.

MR. WHITE: Your Honor, with respect to these two exhibits, C-252 and C-251, could we have a continuing objection as to the witness testifying from exhibits not in evidence --

THE SPECIAL MASTER: Yes.

MR. WHITE: -- and again the ten day rule.

THE SPECIAL MASTER: Yes.

THE WITNESS: Okay.

THE SPECIAL MASTER: Let me say something at the risk of interrupting your thoughts. If we're going to start holding trials as close as we have in the last month and as we are anticipating, has the ten day rule become a nullity? Shouldn't we reduce that to a five day rule by common consent or by an order of this court?

MR. WHITE: I don't care what rule it is, Your Honor, as long as it is enforced and applies

itself to all parties.

THE SPECIAL MASTER: You have to live with it, too.

MR. WHITE: Maybe we ought to have a new rule. That would be fine with us.

THE SPECIAL MASTER: Let's think about that for the remainder. Let's go from ten to five days for a month or two and see if it is agreeable. I'll issue an order of that.

Make a note of that, Leo. Let's see if we don't draft the propiety of an issuance of an order relating to the ten day rule or the five day rule to expedite this thing on notice of that trial and treat all parties fairly.

All right. Proceed.

A Okay. When I discussed about Big Horn Flats, I would like for simplicity sake and for the sake of clarity -- for the sake of clarity, I would like to divide my discussion into two, and I will discuss on the first one.

The first one includes only 2,670 acres of irrigable acres. Those 2,670 acres are located on this one, is easier, or here, a portion of it is here, a portion of it is here.

(Indicating several times.

THE SPECIAL MASTER: On the map.

A I am excluding this now for the time being. A portion here, and a portion here, and the other portion is one that I showed near Ethete --

THE SPECIAL MASTER: Down by the Big Horn draw where it catches Ethete?

THE WITNESS: Yeah, that's the 968 acres.

Q (By Mr. Clear) When you're saying, "Here, here, and here," that's hard to read in the record. Maybe if you circled those -- let me go back --

THE SPECIAL MASTER: I don't know if that's -- Mr. White has seen them; we're all aware of what they are.

Well, all right. They're being circled in black.

A Circled in black, No. 1, and circled in black, No. 2.

THE SPECIAL MASTER: On 251.

A The rest 968 acres is near Ethete.

These acreages comprise -- these three different areas comprise 2,678 acres. No canals on this. We're just pumping water for No. 1 and No. 2 from Big Wind and for the rest of the area near Ethete

from Little Wind. So all these areas comprise 2,670 acres and we are claiming water for these 2,670 acres.

Okay. And we have costs for this and we have water claim for this and it is in my summary report. And we have drainage plans for each of these areas that I just discussed, which are shown in Exhibit -- U.S. Exhibit WRIR C-259 and also in the area near Ethete. Okay?

THE SPECIAL MASTER: Let me interrupt you one more time.

THE WITNESS: Okay.

THE SPECIAL MASTER: Well, not yet. Go ahead; I'm sorry.

A Unless there is any other question concerning the specific three areas that I just discussed, I can go ahead and discuss about the rest of Big Horn Flats.

THE SPECIAL MASTER: Okay. All right, fine.

A Okay. The rest of Big Horn Flats, which is about probably 17 to 18 thousand, -- I can't remember exactly the acreage -- we are not claiming water now.

* * * * *

THE SPECIAL MASTER: You are not claiming any water for the remaining 18,000 acres?

THE WITNESS: Yes.

THE SPECIAL MASTER: Why is that, is it because most of the land is Class 3 and 4 anyway?

THE WITNESS: No, that's not the reason. I will explain that reason in a little bit.

THE SPECIAL MASTER: All right.

THE WITNESS: Let me give a little short background information on this area (witness indicating). Water can be supplied to this huge Big Horn Flats from three sources. There is a possibility of three sources. One of the sources that we see around here that comes from the Little Wind River can supply water to the Big Horn Flats. So this canal is starting from the Little Wind River and comes all the way to here (witness indicating) by gravity.

The other option to supply water to this area is to divert water from Bull Lake, and when it reaches near the back of Big Horn Flats, to pump it to Big Horn Flats.

THE SPECIAL MASTER: That crosses Windchester Draw and south of Windchester Butte?

THE WITNESS: It goes something like this

(witness indicating).

THE SPECIAL MASTER: Oh, it goes up north. I see.

THE WITNESS: Yeah. Then it comes here, probably there would be a pump necessary in here to pump out from that point.

The other alternative is to direct a pump from the Big Wind to these areas (witness indicating). Okay, so these are the three alternatives. Speaking of engineering, it's possible to supply water to this area, but when we first started to work on these areas, we found out that the costs, the preliminary costs, were a bit different from other costs, meaning higher costs. Then we were advised to, you know, leave it aside, and that's the reason that we have not included it in our claim.

However, I would like to make it clear that when it comes to engineering, this is possible to supply water, there is no problem. It can be done.

THE SPECIAL MASTER: Costs are the factors that --

THE WITNESS: Yes.

THE SPECIAL MASTER: -- warranted shutting this to one side?

THE WITNESS: Yes. Probably the most viable way, although this is not conclusive, viable way of suppling water from this area would be from the Little Wind, but the Little Wind does not have enough water to supply this water (indicating), so we have to, indeed, construct --

THE SPECIAL MASTER: A dam?

THE WITNESS: Yes, a dam.

THE SPECIAL MASTER: Has there been any feasibility study at all of what dams can be constructed on the upper reaches of the Little Wind to facilitate this?

THE WITNESS: Yes. There has been some kind of approximate studies.

THE SPECIAL MASTER: Are you familiar with them or can you cite them for us?

THE WITNESS: Okay. I think I believe it is in this Wind River water supply study (witness indicating).

THE SPECIAL MASTER: Coming up in the material -- all right. Can you identify the document you are holding, just reference to it?

THE WITNESS: It could be in another, but I could still find it. This is the Wind River Basin

Water Supply Study, U.S. Department of Interior, Water and Power Resources Service.

THE SPECIAL MASTER: Does it have a number?

THE WITNESS: Preliminary field draft, June, 1980.

THE SPECIAL MASTER: Okay, I thank you for that. I would like you to give me, if you can, Dr. Mesghinna, a figure for -- and right now an answer to this question of mine: With the costs of the construction of pipe network and pumps and pumping stations and canals and related work in the drainage of the Big Horn area, were it not for the fact that it warranted it being set aside now and it would be going ahead and given the green light as a viable excellent area with cost-benefit ratios, how much water per year would be required to irrigate it? Can you answer that?

THE WITNESS: Well, I can give it probably an approximate figure because I haven't gone into a detailed study on this. As I have stated it earlier, we have got it down early in our studies.

THE SPECIAL MASTER: All right. If you could define, and instead of giving me a ballpark figure, bring your figure with some degree of certainty and

accuracy, I would appreciate an answer to this question, and you can do it later if you wish, or I'm sure it will be brought out on the State's side. If it isn't, I'll bring it out, so we can leave that for now and have it aswered at a later date.

MR. WHITE: Your Honor, it will probably be brought out by the Tribes.

MR. SACHSE: Your Honor, I can assure you on the Tribes' cross-examination of the witness, we intend to ask that question.

THE SPECIAL MASTER: I think it's appropriate all of you know what I'm thinking and why I ask the question. If the Tribes, because of costs, opt to exclude this in one of their claims, there ought to be some basis for a just formula to take water that is south of the Big Horn River and credit it to an area north of the Big Horn River that may not have as fine right to water as this might have had had it been more feasible. We will get into that a little later, if necessary.

All right, go ahead, Dr. Clear -- or, Mr. Clear. Go ahead, please.

MR. CLEAR: Your Honor, when he was talking about Big Horn Flats, he mentioned the three areas

that the United States was claiming, and I think just for the sake of the record, the third area was on another map, U.S. Exhibit WRIR C-260 (sic), and I would like him to circle the area and put a No. 3 on it so it will be --

THE SPECIAL MASTER: That's a circle with a "3" in it on that one?

MR. CLEAR: Pardon?

THE SPECIAL MASTER: A circle with a "3" in it?

MR. CLEAR: Right.

(Off-the-record discussion.

MR. CLEAR: I said U.S. Exhibit WRIR C-260. It should be WRIR C-252.

Q (By Mr. Clear) Are you through with Big Horn Flats now, Dr. Mesghinna?

A. Yeah, I'm through.

MR. CLEAR: Your Honor, could I have a short break to talk? I think we are done in a certain phase now and I would like to talk to him.

THE SPECIAL MASTER: Ten minutes or so? All right.

(Whereupon a ten-minute recess (was taken.

* * * * *

THE SPECIAL MASTER: Okay, shall we come to order, please?

Okay, Mr. Clear.

Q (By Mr. Clear) Now, Dr. Mesghinna, during the testimony by the people from HKM, there was substantial amount of discussion of the parcel size of acreage limitation on the side roll sprinkler systems on those arable lands. How did you handle that in your irrigation design system.

A Okay. When HKM made the land classifications, they made two different land classifications. One is for sprinkler irrigation, and specifically for side roll irrigation system; and the other is for gravity irrigation.

Okay. So in a sense there could be few areas that are not irrigable by sprinkler or not irrigable by, you know, gravity irrigation or vise versa. However, there is one thing that we have to see. Almost all irrigable lands by gravity are irrigable by sprinkler.

But when HKM made the land classification, they made it for side roll sprinklers, not for sprinklers like hand move sprinklers. So they

made the limit -- a limit as to 40 acres of land by side roll is more feasible.

We stick to that about 40 acres; we used side roll. But those lands which could become Class 6 lands in using sprinkler classification can be Class 3 or Class 2 in surface irrigation. But if we use hand move instead of side roll, that will make it irrigable land; okay?

Q Um-hum.

A So we have taken it into account and we used hand move sprinklers for fields which are less than 40 acres, and we have made it that way.

I believe there is in their report, and I'm not sure, a footnote that shows that indeed that is true, what I am saying.

Q I am handing you Exhibit C-43 which is Land Classification for North Crowheart Unit -- well of all the units done by HKM and specifically to a table called Arable Lands by Class.

A Okay. There is a footnote that I was referring to. It is there, the one circled in that, which says:

All gravity arable lands are all capable of being irrigated by sprinkler methods and

continuous hand move or side roll. . .

This is what I am saying, so anything that has not been classified as sprinkler irrigable is gravity irrigable, hand move. So that's how we corrected the problem.

I would like to add a small thing in here. There will be some areas even greater than 40 acres that will use hand move sprinkler, which is still -- it is still okay. It doesn't matter.

Q How many times have you visited the Wind River Reservation in conjunction with designing your projects here?

A Well, myself and with some other people who work under me have been three times there and my people have also been there several times. In fact, they are now there; I don't know if they have left today back home.

At any rate, the first time I went there, I visited the overall area, future lands and also the historic lands, to acquaint myself with the practice, with the irrigation practice there, and to see what kind of crops grow, what kind of facilities are there, and so on,

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and to see the land in general, how it looks.

Also I went there to see how HKM were doing their land classification, intake rate tests, boring, classifying soil, and so on.

The second time I went there it was after we received all the necessary data and after we have put our, what you call fields on our maps. Then I went actually there together with my people to see every area, if we are right indeed in putting the fields in according to what we have put and that is to correspond our office work with the fieldwork..

So as we have been there we have changed our fields here and there, you know, because something that you don't see in the plans you can see also in the fields and so on and for that reason I have been there and also have been there to see the general route of the canals and so on, and diversion structures.

The third time I went there was I think last October and it was to see specifically areas like diversion sturcture areas where it is going to be specifically, which area and so on, and to see the forms of the river and so on,

mesghinna-direct-clear

you know, if it would bring any problems or something of this sort and also to see the general area. Some fine points that you'll have to make and to change, you know, some of our fields here and there, you know, in squaring off in all these things. However, also my people have been there to see the historic lands and also again after the States people put black in some areas of our on-farm system, to see and check indeed, if that is the case. So we sent our people there and they have checked that and came up wit the final maps.

Q One last little thing on your plats here. Could you step over to the table and just identify for the record that these are your plates?

(The witness complied.

Q Let's see -- U.S. Exhibit WRIR C-252 --

A Yeah, this is WRIR 252, No. 3 of the Big Horn Flats Unit, which has around 968 acres in it and there are two pumping stations there just near Ethete.

Q You don't have to explain what it is; we just want you to identify these for the record.

A That is proposed irrigation project Big Horn Flats.

The next one is U.S. WRIR C-260, the drainage plans for proposed irrigation project Big Horn Flats Unit.

U.S. Exhibit WRIR C-258 is drainage plan for proposed irrigation project North Crowheart Unit.

MR. CLEAR: Sorry, we had these a little out of order, Your Honor.

THE SPECIAL MASTER: That's the northeast corner?

THE WITNESS: Yeah, the last.

THE SPECIAL MASTER: All right.

A U.S. Exhibit WRIR C-261 is drainage plan for proposed irrigation project South Crowheart Unit.

U.S. Exhibit WRIR C-262 is drainage plan for proposed irrigation project Arapahoe Unit.

U.S. Exhibit WRIR C-263 is drainage plan for proposed irrigation project Riverton East Unit.

U.S. Exhibit WRIR C-250 is proposed irrigation project North Crowheart Unit.

THE SPECIAL MASTER: What's that last exhibit?

MR. CLEAR: Two fifty, Your Honor. Proposed irrigation project North Crowheart.

THE WITNESS: That's the portion of North Crowheart Unit on the other side.

THE SPECIAL MASTER: Okay. That's all right.

A U.S. Exhibit WRIR C-253 is proposed irrigation project South Crowheart Unit.

* * * * *

THE WITNESS: U.S. Exhibit WRIR C-204 is Proposed Irrigation Project, Arapahoe Unit. U.S. Exhibit WRIR C-255 is Proposed Irrigation Project, Riverton East Unit.

THE SPECIAL MASTER: Are we going to go on now, Mr. Clear, to -- Well, go ahead.

MR. CLEAR: Yeah. Let me take these down, Your Honor. I think we are done with them. Are you finished with these, Wold?

THE WITNESS: Yes.

Q (By Mr. Clear) Okay, Dr. Mesghinna. We went through your 11-step program and you have explained to me and the Court the irrigation and drainage systems that you have devised for the five areas. I think it's time now we go through and plug in the numbers there and advise the Court of the costs and the water duty that you found. How would you like to approach this, go through evapotranspiration and -- well, would you give us your figures on the development figures?

MR. WHITE: Your Honor, I believe that in order to shorten the time, since all of Mr. -- or Dr. Mesghinna's figures that I'm aware of appear in his report, we would stipulate the figures he would testify

about with respect to those areas that appear in the report.

THE SPECIAL MASTER: Is the report about to be offered into evidence?

MR. CLEAR: I will offer it into evidence; then if they will stipulate --

MR. WHITE: We are not going to stipulate to their accuracy.

MR. CLEAR: Of course not.

MR. WHITE: We will stipulate that, if asked, he would answer the same figures as in the report.

THE SPECIAL MASTER: The same figures as in the report for each of the units?

THE WITNESS: Yes.

THE SPECIAL MASTER: That's fine as long as you don't give us a big tough hassle when introduced into evidence.

MR. WHITE: Well, I'll give a little hassle, but --

THE SPECIAL MASTER: We would like two copies of that, if you can.

Q (By Mr.Clear) Dr.Mesghinna, I'm going to hand you what has been marked for identification as U.S. Exhibit WRIR C-256.

A. Yes.

Q. Are you familiar with that?

A. Yes, I'm familiar with that.

MR. SACHSE: Your Honor, I think I need to make the record clear on this. The Tribes are willing to join in that stipulation except as to Big Horn Flats. The testimony that Dr. Mesghinna has already given shows that in terms of engineering, he considered a great deal more acres as feasible in Big Horn Flats than are shown in the report. The report makes no mention of these additional acres except through the map in the back of the report which corresponds to WRIR C-- whichever number it is.

THE SPECIAL MASTER: To which it applies?

MR. SACHSE: Right. So the Tribes, when the report is actually entered into evidence, may well object to the pages of the report that have to do with Big Horn Flats.

THE SPECIAL MASTER: The objection is noted.

Q. (By Mr. Clear) You are familiar with this report?

A. Yes, I'm familiar.

Q. Does this report represent what your testimony would be as to the cost and the total water duty

on the five projects you have testified to?

A. Yes.

MR. CLEAR: Your Honor, I will offer into evidence now U.S. Exhibit C-245, which is --

THE SPECIAL MASTER: Can we have two copies, one for the official court record and one for our purposes in working?

MR. CLEAR: Yes.

MR. WHITE: Why don't you go ahead and offer the maps at the same time and get it all over with?

MR. CLEAR: Well, then, Your Honor, I would also offer -- well, we have just offered 245, the report. We also offer U.S. Exhibit WRIR C-249, the North Crowheart Unit Conceptual Irrigation Development Plan; 250, the North Crowheart Unit Conceptual Irrigation Development Plan --

THE SPECIAL MASTER: What was the one before 250?

MR. CLEAR: I'm sorry, there are two North Crowhearts. 249 will be North Crowheart Conceptual Irrigation Plan, Plate 4; 250, North Crowheart Unit Conceptual Irrigation Development Plan, Plate 5; 251, Big Horn Flats Unit Conceptual Irrigation Development Plan, Plate 6 -- those numbers are found

in the corner of the --

THE SPECIAL MASTER: All right.

MR. CLEAR: 252, Big Horn Flats Unit Conceptual Irrigation Development Plan, Plate 7; 253, South Crowheart Unit Conceptual Irrigation Plan, Plate 8; 254, Arapahoe Unit Conceptual Irrigation Development Plan, Plate 9, 255, Riverton East Unit Conceptual Irrigation Development Plan, Plate 10; 257, Drainage Plan, Proposed Irrigation Project, North Crowheart Unit, and I believe that would be marked Plate 4D; 258, the Drainage Plan for the Proposed Irrigation Project, North Crowheart Unit, and that would be marked Plate 5D; U.S. Exhibit WRIR C-259, Drainage Plan for Proposed Irrigation Project, Big Horn Flats, which would also be called Plate 6D --

THE SPECIAL MASTER: 6D?

MR. CLEAR: 6D, for drainage. They parallel the irrigation plans.

260, Drainage Plan for Proposed Irrigation Project, Big Horn Flats, 7D.

THE SPECIAL MASTER: All right.

MR. CLEAR: 261, Drainage Plan for Proposed Irrigation Project, South Crowheart Unit, which

would be Plate 8D; 262, Drainage Plan for Proposed Irrigation Project, Arapahoe Unit, which would be 9D; 263, Drainage Plan for Proposed Irrigation Project, Riverton East Unit, which would also be called Plate 10D.

THE SPECIAL MASTER: 10D, all right. That concludes the offer of this evidence.

Mr. White?

MR. WHITE: Just a very few questions, Your Honor. Could I use the podium, please?

MR. CLEAR: Yes.

THE SPECIAL MASTER: These are questions dealing with these exhibits, Dr. Mesghinna.

THE WITNESS: Okay.

MR. WHITE: I'm sorry?

THE SPECIAL MASTER: I just said these will be questions dealing with the exhibits.

MR. SACHSE: Your Honor, I'm happy to have Mr. White go first on his voir dire, but I want the Court to note the Tribes also wish to voir dire.

MR. WHITE: I'll take maybe five minutes. There will be plenty of time for Mr. Sachse.

THE SPECIAL MASTER: Fine.

MR. WHITE: Your Honor, I don't think I will need to voir dire, I think I can just make my

objection for the record.

I would object to the admission of the exhibits just offered on several grounds: First, there has been no foundation established for the fact that the lands shown as irrigable lands, fee, are,in fact, fee lands, and we know, in fact, we have had four fee lands. So if they were admitted -- or the offer were amended to exclude the offer of the fee lands' annotations on the map, that would remove that particular objection.

Secondly, the maps contain a legend of the irrigable trust and irrigable lands fee. And, as this witness has indicated, he has covered two of the bases on the way to going from irrigable -- he's covered only one of the two bases on the way from going from arable to irrigable. He's covered the engineering, but not the economics. It's quite premature to call these irrigable. As the Court ruled in the Boundaries and Dates trial for the Wyoming exhibits, if these were simply annotated to show allegedly irrigable lands, we would have no problem there.

The same thing is true in the report. Many places in the report the lands are described as irrigable, having only gone through the engineering

and not the economic evaluation. If the report were amended to show that the lands were allegedly irrigable, again, we would have no problem.

Finally, we would object to all of the exhibits save two of the maps, one for Big Horn Flats and one for Riverton East, on the basis of the 10-day rule. The maps and the original copy of the report were furnished to the State on Monday, which wouldn't even meet the 5-day rule. Several replacement pages to the report were submitted yesterday to the State, which is far beneath the 10-day rule. And we have to state to the Court, however, two of the maps, one dealing with Big Horn Flats and one Riverton East, had no changes from those received in January. There were, however, a total of 72 changes among the various fields shown on those maps. And that's the basis of our objection, Your Honor.

THE SPECIAL MASTER: All right. Let me deal with the objections.

MR. CLEAR: Your Honor, I think we talked about the fee lands and sticking in allegedly irrigable lands; we can state on the record that's fine with us.

THE SPECIAL MASTER: Also, we know a little bit

more about what we are doing now than we did at the time of the boundaries and dates thing, and it was good we made the notations that we did at the time. The figure here as irrigable land presumes that the second tested maps before the acre charge per acre could be assessed, because if some of the acres are knocked out as being irrigable on Dr. Mesghinna's plan, then costs will be elevated in direct relation to the number of acres that will be excluded from his overall costs, and it may not end up being that big.

MR. WHITE: That's the point I want to measure, Your Honor.

THE SPECIAL MASTER: We have it in the record, and it's good it's made in the record. So all of these are admitted.

MR. SACHSE: Your Honor --

MR. WHITE: I think Mr. Sachse wanted to voir dire.

MR. SACHSE: I haven't had a chance to voir dire before you rule.

THE SPECIAL MASTER: I'm not going to rule. When and if the Court admits these into evidence, it will be on the expressed condition the maps, except as you noted, Mr. White, the figures of

irrigable acres are modified by the limitations thereto that were just made by Mr. White in his objections.

MR. WHITE: The two maps I'm referring to did not go to the question of whether it was irrigable or not; that was the question of the 10-day rule.

THE SPECIAL MASTER: That's right. Go ahead, Mr. Sachse.

MR. SACHSE: I may have a few questions.

VOIR DIRE EXAMINATION

BY MR. SACHSE:

Q Dr. Mesghinna, on Page 42 of your report you list the net acreage for each of the five units that you have included in your irrigation plan. If you will turn first to the North Crowheart where you have the net acreage as 38,773, were any acres excluded on the advice of the economists and for economic reasons rather than engineering reasons?

* * * * *

A All the ranges that have been excluded are due to economic reasons.

THE SPECIAL MASTER: Are due to economics?

THE WITNESS: Yeah. It's not engineering. Engineering you can reach Stagner Ridge without any problem.

Q (By Mr. Sachse) Is the same true for South Crowheart, Arapahoe, Riverton East and Big Horn Flats?

A Yeah, most of the areas are like that. You know, we can supply water to anyplace you want as long as -- I mean it's the cost that prohibits it in the final analysis.

MR. SACHSE: With that understanding Your Honor, that there -- and I'll bring this out further on cross-examination -- but for this voir dire with the understanding that the acreages listed here would be larger except for some acreages included on the advice on -- the advice of the economists and were not excluded for any engineering reason, we have no objection to the admission of the exhibit.

THE SPECIAL MASTER: We will take it that it meets some of the tests of the second and

not all but some.

All right, I'm ready to rule on these, if anybody else is not to be heard or wishes not to be heard. I will rule as follows on the exhibits just offered by Mr. Clear, and described by him at the end of each number, so we can use that in our report index:

Beginning with U.S. WRIR C-245, which is entitled The Report of Dr. Mesghinna Regarding Conceptual Irrigation Development Plans and Irrigation Water Requirements for the WRIR of Wyoming, No. WRIR C-245, 249, C-250, 251, 252, 253, 255, 257, 258, 259, 260 and 261, 262, 263, are hereby admitted into evidence and -- Leo, you have any questions? You have your descriptions?

MR. SALAZAR: Fine.

THE SPECIAL MASTER: Okay.

(Whereupon, U.S. Exhibits
(WRIR C-245, 249, 250, 252,
(253, 255, 257, 258, 259,
(260, 261, 262 and 263 are
(hereby admitted into
(evidence.

MR. CLEAR: You did go through 245 to 263. I have it and Mr. Echohawk does not.

THE SPECIAL MASTER: Oh, yes. The ones I repeated just now. I have only one break. I don't know what 256 is, but it is not in evidence, so --

MR. SALAZAR: It's that one right here. We did that one quite a long time ago.

THE SPECIAL MASTER: Oh, yes. That was admitted, long time ago. Thank you, Leo.

DIRECT EXAMINATION (CONTINUED)

BY MR. CLEAR:

Q There appears to be some confusion as to what I asked. Dr. Mesghinna, does your report, WRIR C-245, contain your professional opinion as to the cost and water duty of the five projects you testified to here?

A Yes.

Q Thank you.

MR. CLEAR: I have no further questions for Dr. Mesghinna, Your Honor.

It's ten to twelve, Your Honor, Should we --

THE SPECIAL MASTER: Yes, it is. I would like to ask a question or two about what is called diversion requirement in acre feet.

THE WITNESS: Okay.

THE SPECIAL MASTER: Is this in effect a total diversion of 209,000 acre feet to sustain everything you testified to?

THE WITNESS: Yes, for the 3,760 acres we need 209,372 acre feet of water per year per season.

I would like to make a --

THE SPECIAL MASTER: I'd like you to make an observation.

THE WITNESS: Do you have a calculator?

THE SPECIAL MASTER: That's more water than flows in the river, isn't it?

MR. ECHOHAWK: No. Oh, no.

MR. WHITE: About half more, Your Honor --

THE WITNESS: Okay. This total diversion that we see in here which is 209,372 acre feet seems to be big, much, but if we compare it with the kinds of diversion requirements or water duty in the whole Reservation, this is quite very low. The water duty in the Reservation runs from anywhere ten acre feet per acre to about five acre feet per acre, but this diversion that we have given here for water duty is only 3.9 acre feet per acre.

mesghinna- the special master-

THE SPECIAL MASTER: 3.9 acre feet per acre?

THE WITNESS: Yes. So the reason why we have made it in such a very efficient way is because we have designed it in such a way we have high efficiency using sprinkler irrigation all over and then pipe networks to carry water to that. We eliminate all losses between the pump station and what you call the on-farm, and on-farm also we use sprinkler system in order to make it very efficient.

So this 3.9 acre feet, which is approximately the water duty of the overall 54 -- 53,760 acres is quite low as compared to what is going out right now.

THE SPECIAL MASTER: Table 24 gives a summary of costs as well as acreage and diversion.

THE WITNESS: Yes.

THE SPECIAL MASTER: At the bottom I see acreages and diversions. Where are the costs on Table 24?

THE WITNESS: Yes, on Table 24 there is the first column says, Description -- mesghinna-tne special master

THE SPECIAL MASTER: Yes.

THE WITNESS: On the left side corner, and continues if we continue that row it gives us the five different units.

THE SPECIAL MASTER: I see, and you broke that down per acre?

THE WITNESS: And I broke that down per acre and then I added first on-farm system, then pipe network followed by pump and pumping, and then canals and related structures, then drainage and then included engineering and contingencies. That would mean we have included 25 percent of the cost, of the total cost of pipe network, pumps, canals and drainage.

THE SPECIAL MASTER: Yes.

THE WITNESS: And we have added, for example, North Crowheart $345 per acre, and then we added all that and get total investment of --

THE SPECIAL MASTER: You add your total cost of operation to give you 2149 more per acre?

THE WITNESS: Okay, not quite that. The total investment is a one-time cost. It's 1,837 mesghinna-the special master

per acre, but those total operation costs -- those costs come every year.

THE SPECIAL MASTER: I see now. If you take the total investment costs per acre on 53,000 acres, you're punching there with the computer, you're 53,760 acres --

THE WITNESS: Okay. I think you are looking for the investment cost.

THE SPECIAL MASTER: I'm looking for the bad news at the bottom line.

THE WITNESS: Let's take North Crowheart, 37,768 acres, with 53,760, because the costs of the other units are different from North Crowheart --

THE SPECIAL MASTER: So you just averaged your total investment per acre, have you?

THE WITNESS: Yeah, so if we have to find the total costs for North Crowheart alone, it will be 1,876 times 1,038 would be 38,773, which would -- comes to 71.2 million dollars.

THE SPECIAL MASTER: For North Crowheart alone?

THE WITNESS: Yes. That is the investment cost.

THE SPECIAL MASTER: Now, can you help us determine the value of an acre foot of water when money is needed to -- please strike that. We're getting into a different field.

Let's go on. If the 71 million dollars is the total first shot investment cost for North Crowheart system, what is it for South Crowheart? It will be more, won't it?

THE WITNESS: No, it will be much lower.

THE SPECIAL MASTER: I beg your pardon?

THE WITNESS: That will be 9.5 million dollars.

THE SPECIAL MASTER: Nine and a half million. What would it be for Arapahoe?

THE WITNESS: That will be 7.73 million dollars.

THE SPECIAL MASTER: Are these 1981 dollars?

THE WITNESS: No, these are 1979. All costs are 1979, indexed on to 1979.

THE SPECIAL MASTER: What is the total cost of the total investment cost of Riverton East?

THE WITNESS: Okay. 7.65 million dollars.

THE SPECIAL MASTER: And for Big Horn Flats.

THE WITNESS: 5.52 million dollars.

THE SPECIAL MASTER: All right. Thank you very, very much, Dr. Mesghinna.

Yes, Mr. White.

MR. WHITE: A few short things before we adjourn, which I assume that is the next order of business.

First, Your Honor, I wanted to advise the United States that cross-examination of Dr. Mesghinna may be, and I'm emphasizing may be, quite short; probably half a day.

THE SPECIAL MASTER: That would be beautiful.

MR. WHITE: It could be as long as a couple of weeks.

THE SPECIAL MASTER: We hope for the first and dread the last.

MR. WHITE: There are several things that we could do to shorten it. I believe that Dr. Mesghinna has some sort of a numbering convention where he numbers all his fields. That way we could refer to the fields by number.

If he does have that, if he could share it

with us, things would move quite quickly.

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MR. WHITE: The second thing is that we did not have all of the facts and data upon which Dr. Mesghinna based his decision for all his fields; and instead of having to go through them field by field and pulling material out of his voluminous notebooks, if he could provide us his facts and data and calculations which are included in those notebooks to us, then it would cut things down quite a ways.

Finally, if the United States would stipulate that the deposition which Dr. Mesghinna gave in January, or the transcript of that deposition, could be admitted in evidence with the stipulation were he to testify now to the same questions he would give the same answers; if we could do those three things, numbering system, facts and data out of the notebook and the transcript of the deposition, I think we are well on our way to speeding --

THE SPECIAL MASTER: I assume there is no problem on the first two. Shall we discuss the third?

MR. CLEAR: Your Honor, this is again getting back to the old -- I imagine the numbering system is no problem.

THE SPECIAL MASTER: Number one, we're okay. How about No. 2?

MR. CLEAR: Let's ask the witness, it's his property.

Is there any problem with you giving the numbering system to each field?

THE WITNESS: Okay, I can give them --

That will take a lot of time to copy.

MR. WHITE: We can make a Xerox copy of it.

THE WITNESS: Let me show you how it looks. Do you want me to show you?

MR. WHITE: Yeah, let's see it, Wold.

THE SPECIAL MASTER: It would help in the cross-examination. It would be good to have a look at what we are talking about.

MR. WHITE: Otherwise, Your Honor, it's going to be an awful mess. Your Honor, why don't you take a look at this book.

MR. CLEAR: I think it's helpful to see some of the problems we are running into.

THE SPECIAL MASTER: I was hoping to avoid them. I don't know if I can make a contribution to resolving them. I'll come down and have a look.

MR. WHITE: Well, you have to rule on this.

THE SPECIAL MASTER: Let's go off the record for just a minute.

(Off-the-record discussion

(while counsel and the Special
(Master are conferring with the
(witness.

THE SPECIAL MASTER: Mr. White has just informed me he will take a month on cross-examination of Dr. Mesghinna. I'm hereby serving notice that I will not permit a month; I will not permit a week of cross-examination. Mr. White said he could do it in as little as half an hour with given stipulations, and there were three of those. Two of the three have been already met, and they're in the process of getting the information for the third --

MR. CLEAR: Well, Your Honor --

MR. WHITE: I don't think that's right.

MR. ECHOHAWK: I don't think that's right because under the rules if we are going to turn over all this information --

THE SPECIAL MASTER: You are.

MR. ECHOHAWK: -- I believe we are entitled to fees and expenses for Dr. Mesghinna's --

THE SPECIAL MASTER: I don't want to get into fees and expenses now. I don't want to get into that. I want the scheduled procedures now. We worry about fees and expenses afterwards when you can move for the payment of them, enter that accordingly at that time.

I want now to let the record show that the witness and the United States, more accurately, has agreed to allow a copy to Mr. White and the State that is marked clearly by Dr. Mesghinna which shows the numbers of each field, and in addition thereto, the holes upon which there was a reliance for the cross-section data from earlier witnesses upon which Dr. Mesghinna relied.

THE WITNESS: And the pump stations are also numbered.

THE SPECIAL MASTER: The pump stations are numbered, and Dr. Mesghinna has agreed to allow copying of the pages from his workbook dealing with costs of the pipe and costs for the canals and the costs of the --

THE WITNESS: Pumping stations.

THE SPECIAL MASTER: -- pumping stations.

THE WITNESS: Wait, the canals, I have not yet agreed.

MR. CLEAR: He has not agreed to the canals yet.

THE WITNESS: What I can do, when I go home, I have to call them and give them each costs of the canal. I don't have the details of it. I didn't expect to go through cross-examination this time.

THE SPECIAL MASTER: Of course not.

MR. CLEAR: Are the canals involved in your computer program at all?

THE WITNESS: All the costs are done in terms of -- by hand.

THE SPECIAL MASTER: We hope this will solve some of your problems, Mr. White. I know it hasn't solved them all. How about the third point, is there any possible agreement on the admission into evidence on the deposition of January?

MR. CLEAR: I don't think so, Your Honor. I read this once, and I'm not sure I want to proceed in that manner. There have been changes in opinions -- or details.

THE SPECIAL MASTER: Can't those changes and opinions be recognized, modified in the balance of --

MR. CLEAR: Your Honor, this is a very long deposition, it went from Tuesday morning, 9:00, to Saturday morning, and I'm not about to stipulate everything he said in there will be what he would have said now if the same questions are answered, but there may be portions we can work out.

THE SPECIAL MASTER: Why would you be so reluctant to let Dr. Mesghinna's statements of three short months ago go into the record today?

MR. CLEAR: There are several things. At depositions you make certain stipulations ahead of time that the lawyers -- for instance, when the State is taking a deposition, the lawyers for the Government don't make certain objections because he has wider latitude in a deposition than he does on cross-examination in a trial. Your Honor, there is a point -- there are certain types of depositions. There are discovery depositions, which is just to find out information. There are also depositions you take in preparation for a Motion for Summary Judgment. Now, if I felt that Mr. White at the time he was taking Dr. Mesghinna's deposition in January -- and now we are in the case at that point -- were to use that deposition to be introduced at trial or to be used basically in a Summary Judgment Motion, I at that time would have asked Dr. Mesghinna questions to get information from him favorable to its position.

Now, I am not willing at this time to allow those depositions to be used in place of cross-examination.

MR. WHITE: Your Honor, that's the problem. We had a long deposition which I thought we could move in and avoid a lot of cross-examination,

but the deposition just sort of lays the groundwork. If you allow me a week on him, all I'm going to do is get the groundwork laid.

THE SPECIAL MASTER: Dr. Mesghinna?

THE WITNESS: The groundwork, really, I have done it over the last one and a half days, more or less. But there has been several changes after the deposition, you know, and I don't see the deposition will be of much of a help really for any one of us.

MR. CLEAR: I think --

THE SPECIAL MASTER: Just a minute, please.

You don't think the introduction of the deposition will be of much help to any of us?

THE WITNESS: I don't think so. That's the reason I went into quite detail on this matter so that everybody would be informed on what I'm saying. It would be clear on the minds of everyone. And, as long as we get rid of this, the groundwork and pumps and plus do something with the canals, I think you're all set. I don't see any reason you have to go beyond that.

THE SPECIAL MASTER: In your opinion you would think they have all the information they need from your work papers and from your testimony to ask what questions they wish to ask?

MR. WHITE: I'm glad he knows, Your Honor, what questions I'm going to ask.

MR. MEMBRINO: His direct examination laid out what his conclusions are.

MR. CLEAR: What Mr. White is asking us to stipulate to is something that he wants me to stipulate as to what Dr. Mesghinna will say. I think it's up to Dr. Mesghinna to --

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MR. WHITE: The point is, Dr. Mesghinna has had a chance to review the transcripts and to make any changes he wanted to. If there have been any changes since then, the United States should state that. I think this is something you cannot order; I think this is something they can agree to do. Their failure to agree points up the problem.

THE SPECIAL MASTER: In conclusion I thank all of you gentlemen for the contributions made toward trying to solve our problems we may have on your cross-examination. It is now well after noon, and I am going to adjourn these proceedings now until we meet again on the next scheduled day.

(WHEREUPON, the proceedings (recessed at approximately (12:12 p.m.

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REPORTERS' CERTIFICATE

State of Wyoming)
: SS
County of Laramie)

We, Mary Nelson and Monika Fleischli, Registered and Certified Shorthand Reporters and Notaries Public, hereby certify that we did at the time, date and place, as set forth, report the proceedings had before the Honorable Teno Roncalio, Special Master, Presiding, in stenotype; that the foregoing pages, numbered 4199-4341, inclusive, constitute a true, correct and complete transcript of our stenographic notes as reduced to typewritten form under our direction.

We further certify that we are not agents, attorneys or counsel to any of the parties hereto, nor are we interested in the outcome thereof.

Dated this 24th day of April, 1981.

MARY NELSON
Registered Professional Reporter

MONIKA FLEISCHLI
Certified Shorthand Reporter

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