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File 159
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case # 4993

File # 159

4410

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 5/20 19 81
Margaret V. Hampton CLERK
DEPUTY

VOLUME 52

Afternoon Session

Wednesday, May 6, 1981

ORIGINAL

THE SPECIAL MASTER: Please come to order.

MR. CLEAR: Go ahead.

Q (By Mr. White) Dr. Mesghinna, during your direct testimony you discussed messic and frigid soils. Do you recall that discussion?

A Yes, I recall that discussion, sir.

Q What effect does frigid soil have on cropping -- excuse me, on crop consumptive use?

A It doesn't have a direct relationship. It doesn't have a direct relationship.

When we talk of frigid and messic soils, when we talk in terms of those parameters we are talking in terms of ground temperature. But as you might know, as you know, evapotranspiration is an ambience rather than ground temperature. The effects that it will have is during your planting time, because when you plant your soil it should have certain temperature in order for the plant to grow. So the temperature has to be at some temperature -- I mean the ground temperature has to be above a certain temperature, that varies for different crops.

Q So the irrigation requirement would be afffected

by the date of planting then; is that correct?

A Yeah, because if we assume, let's take for example any crop, let's take corn. If you plant corn when the temperature is quite low your consumptive use will be quite low, but the corn may not grow to the maximum point. So it has some effects although it is not -- I can't say it is directly related to -- because what I am trying to bring about is the ambient temperature has some effects on ground temperature, you know, it's a function of it, really. I mean if you have a hot season, the ground temperature will be hotter -- I mean warmer, although that is not one to one.

Q Are you saying then that frigid soil might affect yield or patterns or crop adaptability but not necessarily irrigation requirement?

A Let me say it this way: Frigid soils have shorter growing seasons than messic soils. I think that will answer the question.

* * * * *

Q. What use, if any, did you make of available data concerning the location and extent of frigid and messic soils within the Wind River Indian Reservation in establishing your growing season?

A. If you remember, I have delineated part of my climatic zone in terms of the information between area -- the area between Lander and Riverton. Those -- that straight line across through there.

Q. The straight line?

A. I have delineated that area.

Q. What facts and data did you discover --

A. Okay.

Q. -- within the -- concerning the Wind River Indian Reservation concerning frigid and messic soils?

A. Okay, what they tell you in that data is messic soils have over 120 days of growing season, and the frigid soils - you can correct me here if I am wrong in the figure - have a growing season between 90 and 120 days. Okay. And when we adapt the crop adaptability, we have taken this into consideration.

Q. From what source did you obtain the data that you utilized concerning frigid and messic soils?

A. As I've indicated, the source of the data is the mesghinna - cross - white

Soil Conservation Service, and I can get it all -- the whole publication, if necessary.

Q. Could I look at that, please, to make sure we are thinking about the same thing?

A. Of course.

In fact, it is not very far.

Q. Okay, the document you're referring to is entitled "Irrigable Soils of Wyoming" prepared by the Wyoming Water Planning Program of the State Engineer's office in cooperation with the State Department of Agriculture, 1974?

A. Yes.

Q. Is that the most current data which you used --

A. Well, this is only a small part of what I have used. This is additional data, really.

Q. -- with respect to frigid and messic soils?

A. I don't work -- I haven't worked really on frigid and messic soils, but I have used this one in connection of the developing my climatic zone map. The straight lines that I have mentioned have been taken from this and the map is here. By the way, I have the map that shows where the frigid soils are and where the messic soils are.

Q. Could I see your map, please?

A. Of course, sir.

The Wind River Indian Reservation is shown in orange and the lines that divide the messic and the frigid soils is on the blue line.

Q. Is this a map out of the Water Planning Report that you have just referred to?

A. Yeah, I think it is from that map -- from that publication.

Q. Is it true that that map is vintage 1974 or 1975?

A. Well, it has to be if the publication is 1974.

Q. Did you use any data based on field investigations made by the Soil Conservation Service in the years 1979, '80, '81?

A. No, I haven't used.

Q. Okay.

A. Again, there shouldn't be any misunderstanding with our climatic zone map. That shows only the -- it is terms of ambient temperature.

Q. Yes, I understand.

A. Yes.

Q. But for that one boundary you did use frigid and messic soils, is that right?

A. It helped in putting -- it was an additional factor, as I have stated in my direct testimony. We

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considered several things, of which this one was a small additional tool,making up our climatic zone map.

Q. Who provided that information to you, your map and the report, was that HKM?

A. I think, yeah, it was through HKM.

Q. Wold, let's take a look at Table 12, Page 15 of your report, your canal conveyance efficiencies.

THE SPECIAL MASTER: Would you ask the question again, please? I'm sorry.

MR. WHITE: I would direct his attention to Table 12, Page 15 of his report, Your Honor.

THE WITNESS: Page 16?

MR. WHITE: I have it on Page 15 of mine.

THE WITNESS: Okay. Yeah.

Q. (By Mr. White) Okay, I would like to make sure I understand what the table means. You indicate there that the conveyance efficiency for the North Crowheart Canal is 77 percent in July, is that correct?

A. Yes, sir.

Q. Does that mean that 23 percent of the water diverted through that canal in July is lost, doesn't arrive at the pumps?

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A. Yeah, it is being lost through several things, of which the two important things are seepage and operational waste.

Q. And isn't it true that you told me that your diversionsstthrough that canal during July were roughly 750 c.f.s.?

A. Yes, roughly about 750 c.f.s., that is a design more or less. It's --

Q. All right.

A. Go ahead.

Q. And if you divert 750 c.f.s. during July, isn't it true that your 23 percent conveyance loss amounts to around 10,700 acre-feet?

THE WITNESS: How -- Could I ask you to say that question --

THE SPECIAL MASTER: I think the answer is obvious. We can all compute it.

THE WITNESS: Okay.

Q. (By Mr.White) You compute it by multiplying 750 times .23 times 1.98 times 31, is that correct?

A. Something of that sort.

* * * * *

Q (By Mr. White) Isn't it true that your canals are unlined canals?

A Sure, I have indicated it in the report.

Q Isn't it true that those conveyance losses would be significantly decreased if you lined your canals?

A Well, they will be decreased obviously because you have a lined canal.

Q Right. And if you decreased your conveyance losses, isn't it true that you could decrease your diversions as well?

A Of course.

Q Why didn't you?

A Decrease your efficiency?

Q No, decrease your diversions, your headgates.

A Oh, okay. If you decrease your conveyance you'll decrease your diversions.

THE SPECIAL MASTER: Why don't you ask him --

MR. WHITE: I wasn't quite sure.

Q (By Mr. White) You decrease your --

A You decrease --

Q I think we understand one another. If you lined your canals, you wouldn't have to

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divert so much water; is that correct?

A That's exactly true, sir.

Q Next question is why didn't you line your canals?

A When you plan a project you plan for certain things, you have certain criterias, you have certain limitations, of which the most important factor is financial limitation. And if you -- In this project what we have done is instead of gravity irrigation we have used sprinkler irrigation for this amount of water, one, whereas in many projects they use gravity irrigation and if the deficiency is low the irrigation will be high.

The second part is the distribution efficiency between the canal and the fields or between the pumps and the fields, and we have made that all closed pipes. Okay.

So the only thing -- So in there I would like to add we have increased the efficiency to 95 percent there rather than using subcanals in what you call laterals that would give a lot of losses of water. So the only thing which is the shortest distance

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of all the things that I was talking, like if you talk about distribution or transmission lines it will be probably thousands -- I mean hundreds of miles if you add just North Crowheart. But we have only 57 miles of canals which is uncanaled.

Q Unlined?

A I mean unlined. So we cannot, you know, we cannot see everything, we have to see also the costs.

Q But isn't it true that based on the information shown on Table 12, if you lined your canals, depending on the month and depending on the canal, your headgate diversions would be between 23 percent and 40 percent less than you have designed them for?

A Well, you always have operational waste.

Q Well, let's drop it from, let's say, take five percent.

A It will be --

Q Eighteen percent to 35 percent.

A Why don't I tell you this: The efficiency will increase and that's what I said, but that one we have already taken care, you know, by using mesghinna-cross-white

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A Why don't I tell you this: The efficiency will increase and that's what I said, but that one we have already taken care, you know, by using

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pipelines and so on. You know, if we decrease in one area we are increased in two areas, that's what I am trying --

Q Are you saying then you did not plan for lined canals because of financial constraints?

A That is one of it, yeah, because you cannot line -- you cannot make everything completely resistant of everything, you know.

If, you see, for example, the project near us, Midvale Irrigation Project, you know you see all kinds of losses there due to canals and laterals and so on here and there. We have substantially increased from that project, for example, when we are designing this project.

Q Is it true then that if you lined your canals the project might not be financially feasible?

A No, I am not saying that. That is the assumption that we have taken.

Q That's the assumption you've made?

A No, no, no.

Q Well, start again.

A What I am saying is we say that the best way to conserve water is by trying to make everything

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as much as it can, I would say, as much as we can to decrease the losses of water. Why don't you compare, this is easy to compare, let's see the Midvale Irrigation District, okay?

THE SPECIAL MASTER: Does Midvale have lined canals?

THE WITNESS: No, they don't have. Some of it is lined, some of it is not.

THE SPECIAL MASTER: Do they have pipes in their system?

THE WITNESS: No.

THE SPECIAL MASTER: Open ditches?

THE WITNESS: Mainly open ditches.

THE SPECIAL MASTER: Okay, go ahead.

THE WITNESS: Let's compare, see. Where will you find nowadays with -- I'm really serious about this -- with 3.8 acre-feet per acre for such big projects? We have only about 3.8 acre-feet per acre in this project while the Midvale Irrigation District is over five acre-feet per acre, you know. So this has been, you know, substantially decreased, the water duty, by using sprinklers and

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and transmission lines, pipelines.

So I mean this is a good comparison, really, you know, without going too far around discussion.

Q (By Mr. White) Isn't it true that the Midvale Project was constructed some time ago?

A Oh, yes.

Q Isn't it true that if the project or the Bureau project were constructed today it would have lined canals?

A I don't know, I wouldn't say that. Maybe, probably. I think they -- they are lining their canals recently due to water limitations and so on, but they still have also what you call open ditch as their laterals and so on.

Q Dr. Mesghinna, I hand you what's been marked for identification as Plaintiff's Exhibit FM-9, which is an excerpt from the Bureau manual which I'm sure you recognize. Well, I better ask you. You recognize that excerpt, don't you?

A Sure.

Q And I direct your attention to the canal lining policy at the bottom of the page. Do you find

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that?

A Yeah.

Q Isn't it true that under that policy full justification for using an unlined water way can be required?

A Let me read it.

Q Go ahead, read it.

THE SPECIAL MASTER: I'd say that's only half of a sentence that you read to him, Mr. White. In those instances where the recomendations do not call for lining of pipe, then what you said is correct.

THE WITNESS: Yeah, I have read this, Mr. White.

Q (By Mr. White) Okay. And over in the next page, the top paragraph, second page of that exhibit discusses that justification; isn't that correct?

A They are saying justification for using unlined waterways is sometimes very complicated because of the large number of factors to be considered.

Q And then it says: Consideration must be given to seepage rates with and without lining. Is mesghinna-cross-white

that correct?

A Yes.

Q And then it goes on but let's stop there for a moment.

A Okay.

Q What consideration did you give the seepage rates with and without lining?

MR. CLEAR: I think he's gone into his justification for all of this.

THE SPECIAL MASTER: I object to the question. The Witness may be asked what considerations he made to determine to build -- or what pipe to put in, what considerations did he consider in putting in unlined canals rather than lined canals, those questions are permissable.

MR. CLEAR: I think he's already asked and answered that.

MR. WHITE: Was his objection sustained or --

THE SPECIAL MASTER: I sustained the objection.

THE WITNESS: I can answer the question, you know, this is one of the strong points we mesghinna-cross-white

have. So why don't I make it clear on --

MR. WHITE: You should cordinate with your lawyers on that.

THE WITNESS: This is -- we can settle the matter very easily.

* * * * *

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A Let me start this way. Before we design our system, we study the historic conditions in the area. We know that -- we found out in Historic Federal Indian Project Lands the diversion requirements are high, above five acre feet per acre. Secondly, then we see the other projects outside of the BIA -- I mean outside of the Federal Indian Project Lands and those are -- the one which is the most important and biggest one that can be compared with our project is the Midvale Irrigation District. From there we found out that the diversion requirement is also higher on the average if you take the last probably 10, 15 years, it would be, you know, those data, it would be above five acre feet per acre.

Okay. So, we have these things in mind now. Then we see, we try to consider our new projects. We have the project, what do we ask ourselves? One of the most important things to do now-a-days whether it is in America or somewhere else in the world especially in arid regions of the world we have to conserve water. How can we conserve water? As you said, one of the ways of considering --

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Q Conserving?

A -- conserving water is by lining a canal. What are the other ways? By using sprinklers rather than gravity irrigation you can substantially increase your efficiency and decrease your diversion requirements.

What is the second? The second thing is the transmission lines that go from the canal to each of the fields. Those -- we said, okay, it will be hundreds of miles of these canals so let us line these meaning that let us use conduits, pipelines for this.

So the shortest thing, the shortest distance compared with all of these things is the canal. Then we said, okay, we can leave the canal unlined but we line everything else. So what did we come up with? We come up with the substantially lower diversion requirement as compared to adjacent projects in the area so this was the consideration.

THE SPECIAL MASTER: So instead of five and a half acre feet per acre, you have computed your projects at what?

THE WITNESS: At about 3.9, I guess, at the most.

Q (By Mr. White) Isn't it true that the Midvale Project District continues to line their canals?

A Yes. Of course, because the canal is getting old and as it gets older you have to maintain it better.

Q What will the duties of water be if you know once they have their canals lined?

A I wouldn't know that.

Q Isn't true that Midvale is generally a gravity system?

A Yes.

Q And isn't it true that Midvale has very few sprinklers in it?

A Sure, I know that.

Q Are you suggesting, Dr. Mesghinna, that the net depletion to a stream using sprinklers is less than using some sort of gravity system or flood irrigation?

A Depletion means so many things for me. Would you clarify that?

Q Diversions minus return flows.

THE SPECIAL MASTER: Savings.

A I would say that the deep percolation from sprinklers is lower than gravity irrigation in general.

Q Which means what with respect to net depletion?

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A You mean depletion, the amount of water that returns to the rivers?

Q The net depletion to the stream as a result of the irrigation activity.

A Well, what it means is if all the water returns to the streams, you will have --

Q Would be zero depletion?

A No, no, no. There is no such zero depletion.

Q Well --

A I don't think there is any zero depletion --

Q You said if all the water is returned to the stream. There was diversion, I assume that's what you meant, that's zero depletion, isn't it?

A No, what I'm saying is if I divert a certain amount of water and part of it is consumed by the plant and part of it goes to deep percolation and then goes back to the streams, that's the point -- that's the amount of water that I'm talking about, the amount of water that returns to the streams, return flow. I'm talking of return flow.

Q I'm sorry.

A I'm talking of return flow.

Q Okay.

A So, gravity systems would have, I believe, just from the outset would have higher return flows than gravity -- I mean than sprinkler.

Q Would have greater return?

A The very fact that you're using less water in sprinklers, you know, as compared to gravity.

Q Isn't it true, Dr. Mesghinna, that if you did line the canals you would enjoy a further conservation of water, some 50 to 70,000 acre feet a year?

A Well, let me --

Q Or do you know?

A Let me tell you something. Even if I use pipe instead of the canal, closed pipe for conveyance instead of a canal I would conserve even more than what you're saying, you know, so it is relative.

THE SPECIAL MASTER: So you are saying it is all relative?

THE WITNESS: Yeah, it is all relative. Because the more you make your project gold plated the more water savings you will make. That's obvious.

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THE SPECIAL MASTER: Do you think that the logical thing in years that would follow successful launching of these projects that these canals perhaps ought to be lined?

THE WITNESS: Well, what I'm trying to say is we have to make some kind of a compromise. Which part do we line? Do we line the canals or the distribution system? Or should we change it to gravity system?

THE SPECIAL MASTER: We appreciate that. You have made your options here and you have explained why.

THE WITNESS: Yes, uh-huh.

THE SPECIAL MASTER: And you have taken and elected the route you have shown, hundreds of miles of pipe whereas you have the short, relatively short canal. But as a matter of fact I was wondering if this canal after five or ten years of operation ought to begin to have sections of it lined during the nonirrigating season as part of good operation and maintenance.

THE WITNESS: Yes, this is part of it, you know, in fact, we have what we call -- although you haven't reached that point I guess so far in

the cross examination, we have what we call the engineering and contingencies. And we have the contingencies for something like this, you know, when you find something unexpected when you find something that probably you have to line your canal and so on.

You have those contingencies and so on. So everything is taken care in our plans.

Q (By Mr. White) Is it your opinion then, Dr. Mesghinna, that the cost or the dollar values given for engineering in contingencies is adequate to cover not only the engineering and contingencies which you and I have discussed on previous occasions but also the lining of canals?

A No, no, no. No, I think you misunderstood me.

THE SPECIAL MASTER: I'm not sure that he misunderstood you at all. I think he knows perfectly well what you said, if I may say so. You go ahead and answer his question.

A Okay. What I'm saying is suppose in the route of the canal we find, let's say, a big hole in the route, sinks. What do we do? We have to line the canal there so the contingencies are for something of this sort, unexpected things.

What we might have overseen. That's the reason we have -- otherwise, it is not assigned specifically for lining the canal.

Q Isn't it true then, Dr. Mesghinna, that the cost values given in table 24 on page 42 of your report do not include the costs for lining the canals at any time in the future except if you should happen to run into what you referred to as something like a sink?

A Well, I think it is clear. This canal is unlined canal and the costs are for unlined canal.

Q Now, let me get back to the question I asked some time ago and isn't it true that if you lined these canals, you would enjoy a further conservation of water of between 50 and 70,000 acre feet per year?

MR. SACHSE: Objection.

THE SPECIAL MASTER: For these five projects?

MR. WHITE: Yes, sir.

MR. SACHSE: He's asked this question about three times --

MR. WHITE: I have never gotten the answer.

THE SPECIAL MASTER: He has asked it once and he got an answer, and I think I'll sustain the objection.

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MR. WHITE: Your Honor --

THE SPECIAL MASTER: You asked that question and you got your answer.

MR. WHITE: Could I have that answer read back because I believe that he didn't indicate whether that was true, untrue, or he didn't know.

MR. SACHSE: Your Honor, the witness answered the first time that there would be a savings in water loss if the canal was lined. He declined to give an exact number of acre feet and there is no reason why he should off the top of his head give one, and if Mr. White has a number of acre feet that would be saved that he wants to try to prove later in the case, he can do it through his own witnesses.

MR. WHITE: Well, I think I ought to be given at least the opportunity of that answer being read back because I don't believe that Mr. Sachse has correctly characterized it.

THE SPECIAL MASTER: Well, I think he did but I'll let you read it back but I think it is wasteful, extreme waste of time.

Can you find it, Lamont?

(Brief pause.

THE SPECIAL MASTER: Go ahead and answer the question.

A You see, if you line a canal doesn't mean that you escape from seepage by the way. There is always seepage in canals, the joints and so on. At any rate if we are very successful in lining a canal, I don't think we'll save more than 30,000 acre feet.

* * * * *

Q (By Mr. White) Okay. Now, Dr. Mesghinna, I hand you what has been previously admitted or copies of what have previously been admitted as C-231, 235 -- we're back to drainage -- and ask you if those are the Toedter maps which you relied upon in developing your drainage costs based on drain depths -- excuse me, drain spacing, size, and length, which are in turn based in part on depth to barrier?

A Yeah, these are the maps, I believe.

(Brief pause.

THE SPECIAL MASTER: The hearing that was set for three o'clock this morning has just been reset in Judge Kerr's Courtroom so we don't have to move at three o'clock.

Q (By Mr. White) Dr. Mesghinna, I direct your attention to one of those Toedter maps, which is a copy of what has already been admitted as Exhibit C-234, and ask you whether or not your Field 9-20 in the Arapahoe Unit falls within study area A-1 on Exhibit C-234?

A Yes, it is, A1-A1-2.1-20 is Field 920.

Q And 20 means that the depth to barrier that

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you assume for that field was 20 feet?

A Uh-huh.

Q Is it true that you relied on the HKM data with respect to depth to barrier?

A Yes.

Q Is it reasonable to rely, of a person of your expertise, on that sort of data in determining depth to barrier?

A Why not?

Q Well, let's see.

(Brief pause.

Q Dr. Mesghinna, I hand you what's been marked for identification as Plaintiff's Exhibit FM-10, and tell you that it is a copy of materials provided to the State of Wyoming through discovery by the United States, and ask you if it isn't true that drainage Hole No. 32 on that plate which lies within your Field 9-20 shows in its log a depth of 1.5 feet to shale?

THE SPECIAL MASTER: Depth of how much?

MR. WHITE: 1.5 feet, Your Honor. One and a half feet.

THE SPECIAL MASTER: Can you tell where

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that hole is on this exhibit, please, or just describe it by --

MR. WHITE: It's right there, Your Honor.

THE SPECIAL MASTER: Thirty-two?

MR. WHITE: Yes, sir.

THE SPECIAL MASTER: All right.

MR. CLEAR: Your Honor, I think we've been through the depth to barrier.

THE SPECIAL MASTER: We have indeed, but he has a right to test this Witness on his use of this material, and I'll let a few questions be asked.

MR. WHITE: The purpose of questioning --

THE SPECIAL MASTER: You've been over-ruled, Mr. White.

You may answer.

THE WITNESS: Where that is, I haven't found it.

(Brief pause.

Q (By Mr. White) Okay. Have you now located Hole No. 32 on FM-10?

A Yeah, it is on line A, and I have to try to locate the boring that corresponds to it. This map is not really very clear.

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Q Isn't it true that No. 32, the D with the 32 in it, which you circled on FM-10 is within the boundaries of Field No. 9-20 in the Arapahoe Unit?

A Let me check.

Q Okay. While you're looking, you might want to check E, which is immediately --

THE SPECIAL MASTER: One at a time would be a good idea.

MR. WHITE: I'm sorry.

THE WITNESS: Although it is very hard to exactly pinpoint the place from these maps, it is approximately somewhere there.

Q (By Mr. White) Isn't it true that on the second page of FM-10, the log for Hole D-32 shows sandy brown shale, one and a half feet to nine feet?

THE SPECIAL MASTER: When you say "Sandy brown shale" --

MR. WHITE: Yes, sir.

THE SPECIAL MASTER: I can't read it.

MR. WHITE: These are the best copies we got from the United States, Your Honor. I can show you my copy, which is clearer.

THE SPECIAL MASTER: That's all right. We've been at it an hour now, let's take a five minute break, a little recess.

(Thereupon a five
(minute recess was taken.

* * * * *

MR. SACHSE: May it please the Court. Before the witness answers --

THE SPECIAL MASTER: Well, are we -- I haven't rapped in yet.

We are now resuming the hearing.

MR. SACHSE: May it please the Court. Before the witness answers, it seems obvious to me at this point that this was an improper question and the witness should not be permitted to answer it for the following reason: That when Mr. Toedter testified as to his establishment of depth of barrier and then his furnishing Dr. Mesghinna the depth of barrier, Mr. Toedter indicated over and over under cross-examination that there were often five or six holes that would be used and that one might show a very shallow depth, that others nearby might show deeper depths and that he would use his professional opinion to decide what was the valid depth to give to that property. He showed how he often averaged holes or how he picked the deepest or the shallowest, depending on his professional judgment. And it is clear to me that from Dr. Mesghinna's prior testimony and from the search that has been going on in the last five minutes that this was an area of work that was done by

HKM that has been testified to by HKM that has been cross-examined in connection with HKM and that to give Mr. White the opportunity to pick out the one or two rejected shallow holes and then question this witness who was not responsible for the soils study as to why that hole was rejected and some deeper barrier picked does not add to the search for truth.

MR. WHITE: Do you want me to respond?

THE SPECIAL MASTER: Mr. Sachse, if your objections would have been timely -- I hope you can appreciate that when an objection is not timely made, it makes the duty of a judge or a master all the more difficult to rule on an objection.

MR. CLEAR: Your Honor, we did make the objection --

THE SPECIAL MASTER: You did and it was overruled, but it wasn't quite the one --

MR. SACHSE: Well, I make --

THE SPECIAL MASTER: Just a minute. -- with the detail and the accurate recollection of earlier testimony that Mr.Sachse has now, with all respect to your objection, timely made. I appreciate that this is not the witness to answer those things. I have permitted the question only because I think it's

still proper that it may be answered for whatever it may be worth. It is not a reflection upon the competence of Mr. -- or Dr. Mesghinna. It is brought out to show some reliance upon some information that may not be valid that will come up again in this case, I have no doubt, regarding these depth to barrier holes, the number of them, the taking of particular areas rather than defined irrigated fields. We haven't heard the last of this, so I'm going to overrule your objection, Mr. Sachse, with all respect to you, and you may answer.

A. Okay.

Q. (By Mr. White) Isn't it true that the log for Hole D-32 in Field 19-20 shows sandy brown shale, 4 1/2 feet to 9 feet?

A. If you would remember, before I said that that area is approximately the same, and I was not sure that that area was there. So it is with regret that I would say that area or Hole No. 32 does not show in Mr. Toedter's map as 20 feet depth to barriet, it shows a 7-foot depth to barrier.

Q. Okay, for Field 9-20, which of Mr. Toedter's areas is that field in?

A. That field is in -- Okay, the hole is somewhere

here. That's A-32.

THE SPECIAL MASTER: Where are you pointing?

MR. WHITE: It is in A-3.

THE WITNESS: Yes, A-3.

THE SPECIAL MASTER: Thank you.

Q (By Mr. White) So you used the depth to barrier of 7 feet for that field?

A. For that field area, yes.

Q. And isn't it true then that Hole D-32 by the Bureau shows sandy brown shale, 1 1/2 to 9 feet there?

A. Yes, it shows that, Mr. White, but I think you would appreciate this field, or anyone in here would have appreciated this field, if one has to know through what kind of estimations we go when we determine a certain thing. There could be no four or five borings in one area. One of them might show in a limited area, in a very small area, 1 foot depth to barrier, but in the surrounding area it might show like 20 feet, 10 feet, 5 feet, 7 feet, and so on. So because of that depth of barrier in there, you cannot assume really this area has a depth to barrier. You cannot generalize, that's what I'm saying, because you have just one area. So I am

sure Mr. Toedter has gone through this and he has seen several borings. In fact, I have seen several borings right now there and, indeed, they show greater than 7 feet, I believe, most of the borings that I suggest now, the logs that I have seen.

Q Well, let me ask you this: At the point in Field 9-20 where it is 1 1/2 feet to shale, what sort of drain depth and spacing are you going to have?

A Well, first of all, by definition, we don't have a soil that has less than 6 feet depth to barrier.

Q How do you know that when in Field 9-20 it is a foot and a half to sandstone?

MR. CLEAR: Your Honor, now, he's -- he's now -- Mr. Toedter went into this about how Mr. Toedter concluded those. He's not asking something from Mr. Toedter's maps. What he's asking now is how did Mr. Toedter reach his conclusions.

THE SPECIAL MASTER: I think Mr. White appreciates the fact that he may be getting close to enough of these. One or two more.

MR. WHITE: The point I'm trying to make is Mr. Toedter testified to an average for a fairly large area. Now, we are getting down to small fields and I'm testing the reasonableness of Mr.

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-- or Dr. Mesghinna being required to rely on that sort of information on an average for a larger area.

Q (By Mr. White) Now, let's turn to the Field 9-19. Isn't it true that there is -- the same plate, FM-10 -- isn't it true that the hole marked as E, which I believe you have already circled in red just north of D-32, falls within your Field 9-19?

MR. CLEAR: What hole was that?

MR. WHITE: E as in Echohawk.

Q (By Mr. White) Do you find E on there, Wold?

A. Yeah, I found E, but I found -- it's hard from these maps to correspond to this.

THE SPECIAL MASTER: It is, indeed.

Will it help if one were to observe from an old dog-faced infantry view that it is about a quarter of a mile due north?

MR. WHITE: It is the bottom of 20. Here it is right there at the bottom of 20.

THE SPECIAL MASTER: The very bottom of Section 20.

Has he got it?

A. Okay, I have seen that area. It corresponds, it touches Field No. 19.

Q (By Mr. White) On the second sheet of FM-10,

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isn't it true that the log for Hole No. 3 shows sandy shale, 2 feet to 9 feet?

THE SPECIAL MASTER: Isn't it true that it shows --

MR. WHITE: Sandy shale, 2 to 9 feet.

A. At about 9 feet.

Q. (By Mr. White) Two to 9 feet, between 2 and 9 feet?

A. Sandy shale.

Q. Yes.

A. Not --

THE SPECIAL MASTER: Not clay.

THE WITNESS: Not shale.

MR. WHITE: I said sandy shale.

THE WITNESS: Yeah, yeah.

THE SPECIAL MASTER: What does it say just under that?

THE WITNESS: Below the sandy shale at about -- if I can read this correctly, about 9 feet, I guess. Sandy gray shale about 9 feet. Isn't that true?

MR. WHITE: Yes.

Q. (By Mr. White) What's the depth to barrier when you hit sandy shale at 2 feet?

A. Well, I have to know the soil above it, what kind

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of hydraulic permeability it has above it.

Q Well, it is on the log.

THE SPECIAL MASTER: He would have to know the ratio --

THE WITNESS: I have -- exactly, I have to know the ratio of hydraulic permeabilities.

* * * * *

THE SPECIAL MASTER: Mr. White, perhaps we have devoted enough time to depth to barrier, you're the judge of your time.

MR. WHITE: I'd like to spend some substantial time on it, Your Honor, because I think it may be well the most important --

THE SPECIAL MASTER: I thought earlier you had only two more questions.

MR. WHITE: No, not on this one, Your Honor. We could go for days, but I'd like to do enough of it so you get a strong flavor for problems of using averages when it comes down to dealing with fields by fields because I think it's a significant area that needs to be addressed.

THE SPECIAL MASTER: You be the judge of the evidentiary question of what limits this witness has to answer questions dealing with matters that were not in his dominion.

MR. WHITE: Your Honor, if there was evidence that the arable land base which he used was in fact the arable land base which is in evidence I think that Mr. Sachse's observations would have substantial merit,

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but the evidence is quite to the contrary, the evidence is that the Witness does not know whether or not the arable land base which HKM gave to him is the one to which Mr. Kersich testified before you. In fact, we were able to point out an area where there was a substantial discrepancy.

THE SPECIAL MASTER: Well, I don't remember every word of the weeks of testimony on the many, many holes that were drilled and the augering, but I came away with a conclusion that like most of us, that that too is a work of imperfectness and variations, as long as they are in a given tolerance, it's part of the real world.

The fact that they rejected the thousands of acres they did before they even considered what was left is proof, I think, of the good many tests that were made to eliminate areas that did not have proper depth to barrier or hydraulic conductivity.

(Brief pause.

THE SPECIAL MASTER: Gentlemen, you remember the early months of this hearing, the hours we spent fighting about what's

legibile -- oh, you weren't here, Mr. Clear. Your predecessor, Ms. Sleater made a career of objecting to matters like this because they just are not readable. Now, I agree with her.

MR. WHITE: Your Honor, we made virtually the same degree of objecting to the illegible copies provided to us, which these happen to be some.

THE SPECIAL MASTER: We'll do the best we can.

Q (By Mr. White) Dr. Mesghinna, isn't it true that -- First of all I hand you what's been marked for identification as FM-15, and ask you whether or not the hole marked D-3 at the very top of the map falls within your North Crowheart Field 24104?

MR. SACHSE: Your Honor --

MR. CLEAR: Your Honor, I have an objection here. There's been no testimony that Dr. Mesghinna has relied on any of these maps being used now.

MR. WHITE: That's exactly the point of the cross-examination, Your Honor, he should have.

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THE SPECIAL MASTER: Go ahead with your objection.

MR. CLEAR: And he's being asked to say the hole says -- this hole is such and such, is so deep and has a depth to barrier, and he's never seen this before.

MR. SACHSE: Your Honor, --

THE SPECIAL MASTER: That doesn't exclude him asking the question and he can use this on his case in direct if he wishes to establish a matter attacking the credibility of what's on the record as arable lands. I suspect he intends to do that.

MR. CLEAR: This is not arable land, this is depth to barrier, which he's gone in to some extent.

MR. SACHSE: I have a separate objection to this, which I hope this time is timely because I'm objecting the minute the question was raised. And my objection is substantially the same as my previous objection.

What we've just seen is Mr. White use FM-10, an exhibit that had over 40 holes, to demonstrate the depth to barrier in a

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relatively small area of land, and pick out two of the 40 holes to try to give the impression that the depth to barrier must be judged by those holes.

Now, he did the same thing with Mr. Toedter, who is a soils engineer who had done the work and was an expert in this field and who demonstrated over and over again the way all the holes must be taken into account.

He's now proceeding to do the same thing with an exhibit that shows 21 different holes, and again with a witness who has not done the soils work as to which this pertains. Now, it's very clever cross-examination by Mr. White --

MR. WHITE: It's also proper.

MR. SACHSE: Let me finish -- to try to do with Dr. Mesghinna what he failed in doing with Mr. Toedter, which was to try to show, because one hole is in a shallow area of land it has to be rejected, even though if the majority of the holes show that the majority of that land is deep.

And to allow him to continue this line of mesghinna-cross-white

cross-examination with this witness is improper.

MR. WHITE: Can I respond to that, Your Honor? I think it's important.

THE SPECIAL MASTER: Yes, you may respond to that.

MR. WHITE: There are a couple of points that Mr. Sachse overlooks, and one of them is that the arable land base to which Mr. Kersich and Mr. Toedter testified and about which I cross-examined them, was not shown to be the same arable land base which Mr. Mesghinna has been given by HKM.

The second thing is that the cross-examination of Messrs. Toedter and Kersich went to the reasonableness of their arable land base determinations. What we're talking about now is not a large arable land base determination, we're talking about whether these particular fields should be included within BIA because they do not have a depth to barrier of six feet, but instead have areas within them having a depth to barrier of a foot and a half or two feet.

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MR. CLEAR: Now he's asking them to

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testify as to depth to barrier.

MR. WHITE: Now, the point is that the United States has put this Witness in this situation, they have left him out here hanging because they've made absolutely no connection and they couldn't, between the arable land base with which he's been asked to work and the arable land base that the other witnesses have testified to. And as a result, I think that it is quite proper, and I understand that Mr. Sachse and Mr. Clear don't like the cross-examination, but I think it's quite proper to point out that with respect to Mr. Mesghinna's fields, it was not reasonable for him to be required to rely on the HKM work because he's he's got fields which he's been blindsided with essentially, he has fields that have depth to barrier that are remarkably shallow. It's not his fault, it's the fault of the way the case was put together, and the fault that he was required to rely on information that he did not develop himself in his usual painstaking way.

THE SPECIAL MASTER: Gentlemen, it will be my burden, when the case is closed to determine

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the relevancy of the evidence, to determine what weight to give to the evidence and to draw conclusions therefrom. That's going to be more important than a ruling that something should have been sustained where it was overruled. I will overrule your objection only to permit this answer for whatever it may be worth to me in making that final adjudication.

I'm the person that has to meld and bring together and interrelate all of the testimony and I still don't follow that Dr. Mesghinna's working with an entirely different land base than was provided to him by HKM.

MR. WHITE: No evidence that it's the same one.

MR. SACHSE: I want to respond to that.

MR. CLEAR: There was --

THE SPECIAL MASTER: Just a minute, I'd be happy to hear your responses if you'll just speak one at a time.

MR. CLEAR: There are questions raised on cross-examination and I believe it was particularly in respect to these HKM maps.

THE SPECIAL MASTER: You mean the flooded mesghinna-cross-white

area from the Boysen Reservoir?

MR. CLEAR: Not only that, Your Honor, but there were some areas, I think -- I think these were 52 to 56. There were some areas down here, they were called Parcel 40 on Dr. Mesghinna's maps. We went over there last night and the areas in the 40 parcels are shown in here. What happenes was both Dr. Mesghinna and Mr. White, when they were reading Dr. Mesghinna's map --

MR. WHITE: I object to Counsel testifying.

MR. CLEAR: -- mistook a railroad track for being a section line, and when we -- on redirect we will show that all those areas are included on these maps or are in evidence through other means.

THE SPECIAL MASTER: Even if some aren't, those are tracts or portions are minutia compared to the general fact that he's working with same land base given to him as arable acres on which he must then run the test of whether they are practicably irrigable acres or not, and I believe I can --

MR. WHITE: The --

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THE SPECIAL MASTER: Just a minute, Mr. White, I'm going to come on your side of this if you give me a chance to, and I believe that I can make the judgment as to the relevancy and to the importance. They may not be proper questions on cross-examination, but I'm nevertheless going to overrule the objections and allow this one to be answered by the Witness. I may overrule the next one on the basis of an entirely new subject, duplication and redundancy.

MR. WHITE: The next one will be on a different field, Your Honor.

THE SPECIAL MASTER: Okay. You may answer.

MR. WHITE: You remember the question?

THE WITNESS: No.

MR. WHITE: Your Honor, could we take a short break?

THE SPECIAL MASTER: Let's take a ten minute break and recover our glum and normalcy.

* * * * *

THE SPECIAL MASTER: Okay. Ladies and gentlemen, shall we resume.

Q (By Mr. White) Dr. Mesghinna, how many acres were in field 19 -- 9-19 and 9-20 in the Arapahoe unit that we were previously discussing?

A Okay. Let me try to go over this.

Do you have -- can I borrow a scale from someone?

MR. WHITE: Sure.

MR. CLEAR: What?

THE SPECIAL MASTER: A scale.

MR. WHITE: I saw an engineering scale -- Henry, have you got one?

(Off the record discussion.

MR. WHITE: We don't have one.

Do you mean a little triangular engineering scale?

THE WITNESS: Yeah.

THE SPECIAL MASTER: There's not one in the courtroom, I don't think.

A Well, I can say approximately it might be about 240 acres.

Q (By Mr. White) That's in which one? In both of them put together?

A Say 19.

Q Okay.

A But I wish I could measure it.

THE SPECIAL MASTER: I think that's close enough.

Q (By Mr. White) Don't you have the field, the acreages listed by field?

A Yeah, but I don't think I have the right list before me. I think it is 235.

Q 235?

A Uh-huh.

Q How about in 20?

A I think 223.

Q Dr. Mesghinna, referring to FM-15, isn't it true that hole number 2 which you have circled towards the top center or at the top center edge of the exhibit lies within North Crowheart field 23-78?

A If I may be excused I have some comments on the previous borings that we discussed in Arapahoe. I'm not done with them --

Q Well, why, since it is my cross examination, maybe your lawyer can ask you that on redirect.

MR. WHITE: Your Honor, could we go ahead and do this?

THE SPECIAL MASTER: Well, the unanswered -- the question has been asked and which there was no answer dealt with D-3.

MR. WHITE: I'm sorry --

THE SPECIAL MASTER: -- and I permitted an answer to D-3 and I was wondering when we would get to it.

MR. WHITE: I apologize. I can do whatever you want.

Q (By Mr. White) Let's just go back to D-3 --

THE SPECIAL MASTER: You can pose the question if you wish.

Q (By Mr. White) Isn't it true that D-3 is in field 24 — 104 on North Crowheart?

A Yes, it is there.

Q Isn't it true that the soil log for Exhibit D-3 shows hard grey sandstone three to eight feet?

A At what depth did you say?

Q Three feet to eight feet?

A Yes, but if we go back and see at D-3 the people who classified this land shows that this is class 3 land, and I can't read it very well but I don't see any deficiency. Can you read the deficiency of the soils there?

Q But isn't it true that the original classification was struck out and a class 6 was inserted above it? Just -- or are you talking about the land classification fraction just below D-3?

A Uh-huh.

Q Isn't a line through that, a line was struck through that and class 6 was written into the left?

A I'm not sure about that.

THE SPECIAL MASTER: I'm not sure he's competent to answer either because he sure didn't do these maps back in 1963.

Q (By Mr. White) Well, nevertheless, doesn't D-3 show hard grey sandstone three to eight feet in field 24-104?

A Yes. I can read that.

Q You can't read that?

A I can read that. Yes, it says. But if I am allowed to comment on this --

Q Go ahead.

A You see, the whole point of the matter is you probably are looking on field by field but we don't work field by field on drainage and I have made that clear several times, and I would like

to make it clear again. We work on the area based on areas that have a boundary in a given area. You know, it is not just field by field, all the drainage. We can't go on like that. It is impossible to do that kind of work. There is no way that one would do even in the stage design. You know, in the stage of final design and specifications you won't go through this. I'm sure you understand that.

And secondly, some of these borings have been, you know, well, this is on the previous ones that I have found out that those soils did not have any deficiencies at all. They were taken as class 2 or class 3 soils with no soil deficiencies.

Q How do you know that?

A It is written there. I can show you.

Q How do you know that that line through that fraction doesn't mean that the classification was rejected and a class 6 classification assigned to it?

MR. CLEAR: Your Honor, --

THE SPECIAL MASTER: It is argumentative. It is argumentative, Mr. White.

THE WITNESS: I don't want to argue on this matter but --

MR. WHITE: Okay, don't.

Q (By Mr. White) Well, Dr. Mesghinna, we have looked at holes with depths to sandstone of a foot and a half, two feet, three feet, isn't your average root zone depth four and a half feet?

MR. CLEAR: Your Honor, we have looked at a map showing some holes on it which Dr. Mesghinna has not prepared and as far as we know has not seen.

THE SPECIAL MASTER: Nobody is being fooled. There is no jury to be misled by these remarks so --

MR. WHITE: The purpose is to point out that he was not given it, right. His work was structured and he didn't have an opportunity to look at things other than what HKM served up, and that's right, he hasn't looked at them before.

THE WITNESS: I have a comment on this, you know.

MR. WHITE: Go ahead.

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Q (By Mr. White) Go ahead.
A On the Arapahoe, the two holes, D and E, I guess, those two holes have no deficiency at all. I think this map was made by USBR, and they have struck out those deficiencies, they have said that there is no deficiency on the soil. They have given them as Class 2 and Class 3 soils with no drainage problems, you see. They have taken several borings and it so happens one boring in one area was found to be, you know, shallow, and they struck out that boring and they used the other borings. That's what I'm trying to say. And over and above that we don't work field by field, we work on a bigger area as I have explained several times and I don't want to say it again. In fact, I'm just killing time.
Q Isn't it true that you plant, irrigate field by field?
A Plant, irrigate field by field?
Q That you're going to plant crops and irrigate field by field?

THE SPECIAL MASTER: That's an argumentative and questionable question. You might do it row

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by row too or foot by foot, I don't know whether that term has much value; plot by plot, unit by unit.

Q (By Mr. White) Dr. Mesghinna, staying on Exhibit FM-15, do you find Hole No. D-17 also in Section 2?

A Yes, I can see it.

Q Isn't it true that Hole No.. 17 lies roughly on the boundary between your Field 24.105 and 24.106 in the North Crowheart?

(Brief pause.

A Yes, you are right, sir.

Q Isn't it true that the log for D-17 shows gray sandy shale at four feet?

A Isn't it lower than that? It's lower than that, it is between five and ten feet I guess.

THE SPECIAL MASTER: I can appreciate how difficult that is to read, gentlemen.

MR. SACHSE: Your Honor, the Tribes wish to renew --

THE SPECIAL MASTER: I recognize your objection and you are permitted to make it again and you have a continuing objection should there be anymore of these this afternoon.

MR. WHITE: I'm going to have some more.

MR. SACHSE: I want to add another ground to the objection. It's clear that we're using maps that are difficult to read, a witness who didn't do the work and who's being asked to comment for the first time on the basis of one hole out of 20 or 30. The whole process is not just neutral, it's a misleading process.

THE SPECIAL MASTER: I appreciate that.

MR. SACHSE: That it moves away from expertise to speculation, it shouldn't be permitted.

THE SPECIAL MASTER: I appreciate your objection, and I have with reluctance, over-ruled them, Mr. Sachse. And I have said I think earlier we would listen to one more, and I would do the overruling, but not on those grounds, but on the grounds of redundancy and repitition because the point has been made.

MR. WHITE: It might --

THE SPECIAL MASTER: Argument has been made by Counsel, and despite what they think is an improper ruling on my part, and I haven't

permitted it to be made.

MR. WHITE: Your Honor, if you're going to not allow me to go forward, it might be a good idea to do it now and I can make my offer of proof.

THE SPECIAL MASTER: I was going to say, Mr. White, whatever it reads, three foot or five feet, we can recognize that it is another example of the point you are making in this cross-examination, and I would now rule that any further questions be denied on this particular subject matter from these series of maps on the basis that that would constitute a redundancy and repitious pursuit of matters that add nothing to the -- to our case.

So you can proceed to other areas if you want, Mr. White, or if some of you people want to call it early it won't hurt my feelings.

MR. WHITE: Why don't I make an offer of proof on this area, Your Honor, and then we can go into a couple other areas.

THE SPECIAL MASTER: All right. I may be calling you back, Dr. Mesghinna, long after your case is completed, both on behalf of the United States, and if you recall, by

the State of Wyoming, because I want to ask you some questions about the investigation and get the answers into the record. Are you familiar with the things I have in mind regarding possible settlement of disputes and mutual development of the resources to maximum capacity water for everybody's benefit?

THE WITNESS: Yes, I would be glad to help on that matter.

THE SPECIAL MASTER: All right. That will come after a conclusion of our evidentiary case.

MR. WHITE: Your Honor, if allowed to respond to ---

THE SPECIAL MASTER: Allowed to continue.

MR. WHITE: If allowed to continue to respond to this type of question concerning fields which have holes in them indicating a depth to barrier of less than -- Well, the first portion of the offer of proof, four and a half feet, second portion of the offer of proof, less than six feet, Dr. Mesghinna would indicate that in addition to those fields which he has previously identified, there would be, in the Arapahoe Unit, at least two additional

fields having less than four and a half feet to barrier or holes within them having less than four and a half feet to barrier.

In the North Crowheart, approximately 20 or 21 fields --

THE SPECIAL MASTER: Holes.

MR. WHITE: I'm sorry?

THE SPECIAL MASTER: Holes.

MR. WHITE: Fields with holes in them with depths to barrier showing less than four and a half feet.

In South Crowheart, eight fields showing holes within them having depths to barrier of less than four and a half feet.

In Riverton East, one such field.

With respect to holes or fields having holes in them indicating a depth to barrier less than six feet, North Crowheart would include approximately 15; South Crowheart, 6; Riverton East, again 1; Arapahoe Unit; 3, and those holes or those fields having holes less than 6 feet are additive, in addition to the fields having holes showing a depth to barrier of less than four and a half feet.

In addition -- Well, I'll stop with the offer

of proof there, Your Honor.

Could I have about five minutes to get some notes together and I think I would have about another oh, no more than about another hour this afternoon and then a short period for about an hour and a half tomorrow morning.

THE SPECIAL MASTER: We'll be in recess for five minutes.

* * * * *

THE SPECIAL MASTER: Shall we resume, please.

Q. (By Mr. White) Dr. Mesghinna, within your Table 24 on page 42 of your report I believe C245, where do you include cost for land leveling and land preparation?

A. First of all this is sprinkler irrigation. It is not gravity irrigation.

Q. Uh-huh.

A. So the land leveling and so on, there is no, as such, land leveling in the sprinkler irrigation, not to the extent what we talk in surface or gravity irrigation.

Q. But there is some, isn't there?

A. There is some clearing and so on and so on and you are right about that. And that has been included by the economist.

Q. So those values are not included in your table?

A. Yes.

Q. Okay --

THE SPECIAL MASTER: Have been included --

THE WITNESS: By the economist.

MR. WHITE: Mr. Dornbush will have them, Your Honor.

THE SPECIAL MASTER: By the conomist. Thank you.

Okay.

Q. (By Mr. White) Dr. Mesghinna, you have previously given some of the Q values you used for the pump field layout. In other words, the design flow quantity. Do you have a listing of all of those values being values which you used?

A. Will you say the question again?

Q. In your pipe network system --

A. Uh-huh.

Q. -- you developed Q values?

A. Uh-huh.

Q. For which are design flow quantities --

A. Uh-huh.

Q. For your pump field laterals, is that correct?

A. Yes, sir.

Q. You have given us some of those?

A. Uh-huh.

Q. Do you have a list of all of them?

A. Well I believe I have given you everything.

Q. Okay. Well, we'll cough up everything we think you have given us tomorrow and we'll find out.

A. Okay.

Q. How about the pipe diameters? Have you given us all of those?

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A. Pipe diameters?

Q. Yeah.

THE SPECIAL MASTER: Pipe what, Sandy?

MR. WHITE: Diameters, Your Honor.

THE WITNESS: We have never given you pipe diameters, I believe.

Q. (By Mr. White) Do you have them segment by segment?

A. We have the whole books, you know.

Q. But do you have those with you in the courtroom?

A. Yeah.

Q. Oh, okay. Can I take a look at those to see what they look like?

A. Sure.

I don't think you like this. It's too big.

Q. I can tell it's breaking your heart.

THE SPECIAL MASTER: I thought you gave us a formula on direct called a Haeden-Williams formula and it is Xf equals Q times X for the lower 152. Now that's pretty rough notes from a layman and that dealt with your pipe.

THE WITNESS: You are exactly right, sir. That's the formulas that they have to use in order to come up with the pipe network design.

THE SPECIAL MASTER: And you said that six-inch mesghinnacross-white

pipe would be your smallest pipe on the system?

THE WITNESS: Yes, sir.

THE SPECIAL MASTER: Excuse me. I'm not trying to help you with your case, I'm not really. Go ahead and answer his question.

THE WITNESS: I think you have helped the matter. That was the case.

THE SPECIAL MASTER: Okay.

Q. (By Mr. White) Okay. What do you have there, do you have the pipe diameters by segments?

A. The pipe diameters in here are on calculations.

Q. Okay.

A. And just for North Crowheart it is almost half the book, as you can see.

Q. Can I borrow that for just a second?

A. Of course.

Q. To look at it?

(Brief pause.

THE SPECIAL MASTER: While Mr. White is looking might I ask a question or two, Mr. White, or would that detract you?

MR. WHITE: Let me listen in, Your Honor. I'm always curious about your questions.

EXAMINATION

BY THE SPECIAL MASTER:

Q. Did you testify that you did use some forty-eight inch steel pipe or that you did not because that would add too much to the cost of the pipe?

A. I testified that I used forty-eight inch pipe, I believe.

Q. And what did you say regarding fourteen to thirty-six inch asbestos cement pipe?

A. Yes, sir, fourteen to thirty-six.

Q. You used some of that?

A. Asbestos cement and from six to twelve inch PVC pipe.

Q. PVC?

A. Yes.

Q. What does that mean?

A. Plastic pipes.

CROSS-EXAMINATION (Resumed)

BY MR. WHITE:

Q. Dr. Mesghinna, I see that you have already given us some of that material but not others. Would you keep your mind on this kind of material for not only North Crowheart but the others and that will save us a lot of time if we can burn a copy of that

material which you haven't given us?

A. Uh-huh.

Q. That section also included the pipe length calculations too, did it not, the material in there, your calculations in that section you just showed me?

A. Yes. What I was asked was I gave you the diameters and so on and how the pipes are laid and everything and I gave you the Qs necessary to determine the pipe diameters.

Q. I understand but I want to know the pipe diameters you used.

A. In fact I gave you an example on how to determine the pipe diameters there.

Q. This is not an exercise, Dr. Mesghinna, in our determining, it is a question of what you determined and that's what I'm asking you about.

A. Yeah, well.

Q (By Mr. White) Does that information which you shared with us include the roughness coefficient that you used?

A Yes.

Q With respect to pumps and pumping plants I was confused about whether you included the costs of parking lots. It seems like a silly thing, but it was something that kept bothering me. Did you or did you not include those?

A Mr. White, on our pumping plants we have included almost everything beyond what is needed in a design of a pumping plant.

THE SPECIAL MASTER: We have included or we have excluded everything?

THE WITNESS: Let me --

MR. WHITE: I think he said it was included.

THE WITNESS: I'll go over this.

Q (By Mr. White) Did you include parking lots?

A Let me go over this one by one because you're talking of really complicated and complex items, you see. I can't remember everything by heart.

Q Well, do you remember whether you included parking lots?

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A To a certain extent, yes.

Q Okay. I guess I'll have to ask you what you mean by a certain extent.

A Okay. This is the reason I say I have to explain it.

Q Go ahead.

A Our pumping plants include -- give me one minute.

Q Sure.

(Brief pause.

A Our pumping plants include pumps and prime movers. It also includes structures and the equipment.

Now in structures and equipment the following items are included -- When we say structures and equipment -- I mean structures and improvements, substructure, meaning the lower part of the -- where the water is connected so the canals can pump out.

The super structure of the building where you have a building, yard facilities such as fence, lighting and parking; building facilities such as water, sewage, lighting and heating.

Now, I believe in my testimony, in my direct

testimony and also I believe in my summary report I have indicated that we have used the Bureau of Reclamation guidelines in part. What it means is that we did not rely 100 percent on the USBR works. We also relied on works from what's been done here in Wyoming, directly from this area on pump costs and so on.

So for the structures and equipment, if there is more than one pump in the same location, the cost of structures and equipment will be multiplied by .75. What I am trying to say is, you know, if you have -- if you build a structure for one pump station and you have another pump right there, you don't have to build exactly the same size of building and structure, you have to make -- I mean you have to make at least half of that for both of them, you know. So to take care of that we have multiplied it by .75 percent.

The other thing that we have included is the accessory and electrical equipment.

Q What are those costs?

A Those include the motor control equipment and

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wiring station service equipment.

Q Motor control equipment --

A And wiring station service equipment. I think what these are -- the starters, transformers on the poles to reduce the voltage to the necessary voltage.

Q What cost did you include for those two items of accessory and electric equipment, or did you use the figures one through five?

A We used a graph and then we had our own graph final.

Q Do you have your figues six, your graph six?

A We have a graph of our own, Stetson Engineers developed a graph out of these items and experience of the company and also out of the works that have been done here in Wyoming near us, which is not much different that the work we are doing.

Q Do you have a copy of that graph with you?

A You mean the Stetson Engineers' graph?

Q Yeah, what you and I were talking about, figure 6.

A Yes, I have that graph with me.

Q May I take a look at it, please?

A Sure, sir.

(Brief pause.

Q What is scaled along the vertical axis?

A That is Q times TDH.

Q And the horizontal?

A That is percentage.

Q Okay. And its percentage of?

A Let me explain this.

Q Okay.

A It will take some time. What it is if you see the first graph in the US Bureau of Reclamation, there is a graph that shows field cost, dollars per c.f.s. on the vertical side and on the horizontal side total head meaning total lift in feet.

And this by entering the total head in feet and multiplying it by the number of c.f.s. will give the cost in dollars of the pumps and prime movers.

So from the data that I have given you, Q and TDH, of all the pump stations, of all the units, you can get Q times TDH by entering that Q times TDH on Stetson's map figure. You get a percentage, nine percent, eight

percent, ten percent, whatever it comes.

Now, if you divide the cost of pumps and prime movers by that percentage you will get the cost of pump and pumping plants for 1979. In it the graph includes also the indexing of the cost of pumps and pumping plants from 1968, in which the graphs of the USBR were made, to 1979 by Stetson Engineers.

So this is the complete picture of how it works.

Now, if you compare our cost of pumping plants with pumping plants that are designed in Wyoming, I think there is a big difference.. And that can be proved.

Q What -- What do the cost of the manifolds and the valves appear within your graph, are they included within the graph as well?

A Yes, sir. Let me go and finish what I was reading.

Q I'm sorry, I thought you were done.

A Well, I was asked another question about my graph and I went over my graph.

I discussed that we have included the accessory and electrical equipment. The next mesghinna-cross-white

thing we have included is pumping plant miscellaneous. Now, what does pumping plant miscellaneous equipment include? It includes handling equipment such as cranes and hoists, equipment for service facilities such as air compressors and receivers, pump priming equipment on watering and drainage pumps and motors.

We included these costs which is quite a high cost, but we know that the operation and maintenance crew will have a portable equipment, you know, can easily be solved with portable equipment for the whole area without having for each and every pump station.

So the reason why I'm saying this is other cost is partly this and others.

The other thing we have included in our cost is the manifolds and valves. The cost of manifolds and valves has been assummed at 50 percent of the costs for pumps and prime movers, which is used by the USBR, guideline of the USBR, so these are the things that we have included.

In my direct testimony I have indicated

also when Mr. Sachse asked me a question, I also indicated that we nave not included one of the figures which is figure 5 on the Reclamation structures, that says pumping plants switchyards. Other than that we have included everything. And we have reasons for not including that. The reason why we are not including it, I can say if you want me to say it.

* * * * *

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Q. (By Mr. White) Keep going. You're doingaa great job.

A. Yeah, you're going -- well, I might ask you to ask it before you answer me.

The reason for that is, if you see, they give you an example on how to calculate these things somewhere in the pages which you and me have gone over in my deposition. It is on page -- well, I don't see any page.

Q. I know where the example is.

A. Okay. You know where it is.

They give an example for that pump station which has a lift of 140 feet and 50 cfs which is really a large amount of water. They give 41,000 of field cost for that switch yard that I just mentioned and that one is what percentage of the total cost? That is about fifteen percent of the total cost. So we assume that since we have overestimated the rest of the things in all, instead of having super structures of concrete walls and so on you can simply use a shed. You don't have to have a parking lot, switchyards, sewage systems, you know. I mean we are talking, you know, of a pump, irrigation pumps. Because one thing that we have to be realistically is the USBR guidelines are made for big pumping plants

where you have big ones and people can stay there, you know, watching the pumps and so on, you know. But then what we have used, just to finalize my discussion, we have compared it with other works and we found out that we are way, way over the work, the designs and the cost that has been done by other firms. In fact, the ones that I mentioned here in Wyoming --

THE SPECIAL MASTER: Way, way over or way, way lower?

THE WITNESS: Way, way over. This is over.

THE SPECIAL MASTER: In your costs?

THE WITNESS: In our costs, yes.

I can verify this, you know, very easily.

THE SPECIAL MASTER: To what do you attribute that?

THE WITNESS: Yes. There is a work that has been done by an agency which I think you are familiar. I can bring -- let me try to find it.

MR. WHITE: I take back my representation I would be done in an hour, Your Honor.

THE SPECIAL MASTER: That's all right. We can go for a few minutes.

THE WITNESS: Huh?

Q. (By Mr. White) Never mind.

THE WITNESS: I'm trying to help to expedite things.

Work that has been done by West Side Irrigation Project Study at Big Horn County and Washakie County, Wyoming shows their cost per horsepower much much lower than ours, at least by fifty percent lower than ours for their pumping plants.

Q. (By Mr. White) And you base your feeling that your costs are very conservative --

A. Oh, yes.

Q. -- based on West Side?

A. Yeah, and also we have asked several manufacturers, and when you compare the cost of the pump, you see, the cost of the pump according to our estimation is only ten percent of the whole structure and that is quite unbelievable, you know, for a ten thousand pump, a pump that costs $10,000. We spend $60,000 for its structure and so on and I think from the logical point of view anyone would say that this is overcosted, you know. As I have said it earlier, before this time, you can go really -- and I'm not underestimating anything, but you can go for a ten thousand pump, you go really with five or six thousand probably at the most $10,000 under facilities

rather than going to sixty thousand.

Q. Well, Dr. Mesghinna, instead of being so conservative with these sorts of items including cost items that you apparently don't feel are really necessary, instead of including those costs, why didn't you line the canal and reduce the amount of water you had to divert?

THE SPECIAL MASTER: I think that's argumentative and -- well, we'll skip that.

THE WITNESS: Do you want --

MR. WHITE: You don't have to answer the question.

THE SPECIAL MASTER: You don't have to answer it. We've walked that canal.

Q. (By Mr. White) Let's talk about canals here for a little while and let me ask you at what frequency did you propose to include canal check structures?

THE SPECIAL MASTER: Canal check structures?

MR.WHITE: Canal check structures.

THE WITNESS: Do you mean our check structures are included? Do you mean the check structures at each pumping station?

Q. (By Mr. White) Sure. To check your structure, to give you a little pool of water.

THE SPECIAL MASTER: Perhaps for the benefit of -- for my benefit you might define a check structure.

Q. (By Mr. White) Wold, would you state for the record what a check structure is?

A. Well a check structure is nothing but a structure that keeps -- when you have a canal and water is passing by and there is a pumping station on the side of the canal and what the check structure does is gives the -- it guides the water to give enough head for the pump to pump out water. That is at every pumping station and --

Q. Do you have any intermediate check structures between pumping stations?

A. No, we have not assumed.

Q. Have you designed the check structures -- well, let me start again.

For what ponding, increased ponding depths, did you design the check structures?

A. I think the most important thing is if I give you an idea of how the canal and the pump station looks, because check structures in the kind of designs that we have that we have proposed are not really pertinent. They are within the pump stations, you see.

Q. Okay. The cost for the check structures are within the pump stations?

A. Yeah. Let me give you -- yes.
Q. If that's the answer,that's fine. I'm looking in the canal costs and I didn't see them.
A. Uh-huh.
Q. So that's included in your curve?
A. On the curve, yeah.
Q. Okay. I think you've indicated to us previously that canal excavation costs was assigned by you the value of a $1.06 per cubic yard, is that correct?
A. Yes, sir.
Q. Does that include anything besides excavation such as hauling, placing, spreading, compacting?
A. I believe I have given the compaction and spreading and the things to Mr. Henry of your --

MR. WHITE: Mr. Henry?

THE WITNESS: I mean Mr. Sostrom.

Q. (By Mr. White) Was that your work item No. 3?
A. Probably, yes. I think so.

MR.WHITE: I've got one here.

Your Honor, I apologize for working with material that's not of evidence. Tomorrow morning, however, we are going to try to put everything in we've gotten from Wold so we are sure that we are all talking about the same thing.

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THE SPECIAL MASTER: No problem. No problem.

Q. (By Mr. White) Is that work item No. 3: Placing, spreading, rolling, top soil for seed bedding?

A. Yeah. That's -- Again, that is -- we are making the canal more fancy by putting top soil, you know, on the side of the canal.

THE SPECIAL MASTER: Yeah.

THE WITNESS: You put top soil on it --

THE SPECIAL MASTER: To keep the erosion away?

THE WITNESS: Keep the erosion away and we are assigning money, a tremendous amount of money for that.

THE SPECIAL MASTER: Do you line a canal with some gravel?

THE WITNESS: We have gravel surface for the canal on one side.

Q. (By Mr. White) On the outside, is that right?

A. On one side.

THE SPECIAL MASTER: On the bottom side.

Q. (By Mr. White) Well, in addition to work item No. 3, where else did you include those things such as --

A. Cost of excavation?

Q. -- those items?

A. That is working --

Q. Yes.

A. Here for example, compaction of embankment.

Q. Okay.

A. You see you have the -- you excavate the canal. When you excavate the canal then we have assumed, by the way, two roads on both sides of the canal and that is also an overdesign in a sense because many people use one road. So --

Q. But not real efficiently, isn't that correct?

A. Yeah. Well, you know, every project has its own deficiency, but this project is really loaded with things on it. At any rate --

Q. With one exception.

A. The lining.

(Laughter in the courtroom.

A. Well so we put -- when you put the embankment on both sides ten feet, twelve feet, whatever the widths of the roads are, then we compact the soil you see so that when equipment and so on pass through it there won't be any problem and after compacting it we generously put three inches of gravel all the way from end -- from beginning to end on one side of the road. That is work.

Q. Do you mean on one of the two roads you put gravel on?

A. Yeah. You see there are many other roads or excavation works for the structures and so on that we have put on this thing and I think I have given that to Mr. Sostrom.

Q. Wold, on that worksheet that you and Henry talked about over the telephone, where are your syphon costs included?

A. Our syphon costs must be included in the pipelines and the structures.

THE SPECIAL MASTER: What does the syphon cost include? Just the pipe itself that you turn over, I mean that's all a syphon is, isn't it, just a little --

THE WITNESS: Well a syphon costs millions of dollars.

THE SPECIAL MASTER: Millions of dollars?

THE WITNESS: Yes. We have assigned them millions of dollars. That's what I'm saying. This project really is overcosted. You know, I'm not really kidding about this.

THE SPECIAL MASTER: You say this project is overcosted?

THE WITNESS: Yeah. I mean not really overcosted but we have been on the safe side. We have used

Bureau of Reclamation standards --

THE SPECIAL MASTER: And you feel that they are, however, they are possibly higher than the truth -- than the facts will be upon its completion?

THE WITNESS: Yeah, because it's better to be careful than come back with problems later on.

THE SPECIAL MASTER: You sound like you have prepared requests for appropriations from Congress.

(Laughter in the courtroom.

THE WITNESS: It might end up that way, sir.

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Q (By Mr. White) Are there any other costs included within the pipeline for structures category aside from siphons?

THE SPECIAL MASTER: Under canals and related structures?

MR. WHITE: Yes, sir. This is working off a sheet that you don't have, Your Honor, and we'll have it tomorrow.

THE SPECIAL MASTER: All right.

(Brief pause.

THE WITNESS: Yes, sir, there are some other things included there.

Q (By Mr. White) Could you tell me what those are, please?

A Although it is very hard to go through everything.

Q You have a list of them?

A We have costs of cost drainage. In North Crowheart alone we have assumed 41 cross-drainage.

Q What do you mean by cross-drainage?

A Cross-drainages are by-pass pipelines under the canal.

Q It's to keep water that's draining off of the mesghinna-cross-white

upper fields --

A From the upper areas.

Q -- from coming into the canals?

A Coming from rainfall and so on and so on and keeping it from destroying the canal that it passes through.

Q Instead of by-passing the canal with that natural drainage, you put that drainage into the canal, isn't it true that if you could manage the fluxuating nature of that drainage you would reduce your headgate diversions at the river?

A Well, it doesn't mean we haven't thought over that. We have thought over that and we have considered it. The problem is that water is unpredictable and also that the water does not come during most of the time, does not come during the --

THE SPECIAL MASTER: The season that you need it, sounds like Wyoming.

THE WITNESS: Season when you need it, so that's the reason we have excluded it. But if you drain it out, whatever it comes.

Q (By Mr. White) What size of structures did you

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have in mind for canal wasteways?

A Canal wasteways?

Q I'm sorry, can we go back, I don't think you answered the last question, the other items that you had included within pipeline for structures. You told me the cost of cross-drains. Were there other items in there as well?

A Yes, I think there are many.

Q Can you give me those, please?

A You have a big item of road crossings.

THE SPECIAL MASTER: Drop crossings?

THE WITNESS: Road crossings. You see, when a canal passes through a road we have to make sure that we have -- we have to assign some cost on it and --

THE SPECIAL MASTER: Bridge structures?

THE WITNESS: Yes, just -- almost like a bridge, you're talking like a bridge. And just to give you as an indication of that, of this, we have about 17 road crossings in the North Crowheart Canal alone. Seven of the road crossings are major road crossings like small county roads, we call them major.

THE SPECIAL MASTER: You call them midget?

THE WITNESS: Major road crossings.. I think probably I am tired towards the end of the day. And the rest of the ten we just assign them ourselves, those roads are not there but we put them in ourselves to be safe, that to go from one set of fields to other fields you have to cross the canal, so that we have assigned costs for those, potential roads, we might say.

So for those road crossings we have used pipelines, you know, complete -- No, corregated pipelines.

Q (By Mr. White) Okay. Now, what size of structures did you have in mind for your canal wasteways?

A Okay. Canal wasteways are quite complicated to design it and also to put it wherever it is necessary.

The wasteway is also -- The canal waste-way is also concrete, reinforced concrete structure is our assumption. When the water enters into the wasteway, which is parallel

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with the canal itself, the wasteway, then it is, it comes to a collecting point and from that collection point it is taken out by pipes, concrete pipes. From those concrete pipes we discharge it into creeks if there is a creek right by. If not, we have to construct a ditch and take it to the creeks.

Just to give an example, in the North Crowheart Canal we have three main wasteways. One is at Dry Creek, the other one is at Five Mile Creek and the other one at the end of the canal to drain the canal out. And also at the end of Pavillion Canal. In fact, there are four.

Q Are those four wasteway locations shown on your plates -- copies of which have been marked FM-1249-A for North Crowheart?

A As you are well aware of, Mr. White, you cannot put everything in the plans, it will be very crowded, you know. We have put the main, important structures that we believe should be there, and --

THE SPECIAL MASTER: Did you say all four of them are in the North Crowheart area?

THE WITNESS: Yes, all that I have discussed.

THE SPECIAL MASTER: Are there other wasteway plans in any of the other facilities?

THE WITNESS: Yes, each canal has its own wasteway. There is no canal without a wasteway, this is a prerequisite for a canal.

Q (By Mr. White) Wold, do you have a list or any other indication where I don't have to ask you about the locations of all these? Do you have them listed in tabular form or do you have a map where you have them annotated on?

A No, I don't have that.

Q Okay.

A But I --

THE SPECIAL MASTER: Where would they next show up, on design specifications?

THE WITNESS: They will show up on our calculations.

Q (By Mr. White) Where does the wasteway structure cost fit into those cost categories that you gave Henry over the telephone?

A Okay, let me try to find it.

(Brief pause.

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A Okay. Let me read for you some items because wasteway has several costs, many different kinds of costs.

Q Let me ask you, are they lumped together anywhere in here?

A Yeah, I'll give you, if you just -- Okay. Let's check, for example -- Let's take in a wasteway you have excavation cost, cost of excavation is in those excavation for structures. You have back field, back field for structures. There must be an item, I guess for back field.

Q Item 6?

A Yes. And then there is back field item -- I mean compaction item.

THE SPECIAL MASTER: Compaction?

THE WITNESS: Yes, for structures. And then there is reinforced concrete, concrete structure.

THE SPECIAL MASTER: Reinforcement, steel and cement?

THE WITNESS: Uh-huh, yes. Do you have it?

Q (By Mr. White) Yes, Wold.

A The other one I have said earlier, unit pipelines, so you have pipeline costs. Some part

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of it is included in the pipeline cost.

The other thing, you might need a gate, metal gate, and the metal gate has its own item, it's in the items that I have given you. And then you have also riprap, riprap material. When the water comes out from the wasteway, when it gusts out, we don't want to destrcy the creeks and so on, the enviornment of the creeks, so we put rocks of riprap.

THE SPECIAL MASTER: Riprap?

THE WITNESS: Yeah. So it includes all this, the wasteway includes all this.

THE SPECIAL MASTER: I have a question that's glaring and has to be asked. Is the science of the construction irrigation system such that you can construct canals without the lining but you must have this reinforced concrete lining in the wasteways?

THE WITNESS: The reason why we have wasteways of concrete is because they will destroy the concrete -- I mean they will destroy the canal itself.

THE SPECIAL MASTER: That is because of mesghinna-cross-white

the flow, the volume of flow, once it moves in and it's gushing, a runaway type thing?

THE WITNESS: Of course. Because it's a very dangerous thing. What happens -- why don't we discuss this so that it will be clear to all of us?

Suppose the electric energy is completely cut off, something happens to the generator or someone makes a mistake and so on. Then all the pumps will stop, but the canal is flowing, and if the water is not diverted to the pumps, the canal will flow and it will, by the time it goes more, it will be more and more water, and the canal cannot hold it anymore, so what happens is it will destroy the whole area and the canal will be destroyed.

So in order to be safe on this matter, what we do is in case these things happen, let's put a wasteway at some different sections of the canal. Then we --

THE SPECIAL MASTER: What planning is there in the contingency of that kind to get to the headgate as soon as you possibly can and cut the diversion, the main source?

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THE WITNESS: The faster you do it the better it is, really, because really it may not be -- it's not even good even though you have the wasteways, the effect is not good of that thing. I mean when the water goes down the stream it might destroy some fields and so on, you know, somewhere, you know, somewhere. So the faster we do it the better it is, and I believe --

THE SPECIAL MASTER: I think you explained that, it's the volume of water that requires it, it's the emergency nature of their use, I guess.

THE WITNESS: Exactly.

Q (By Mr. White) Did you say approximately ten percent of the diversions will be shunted through wasteways?

A Yes.

THE SPECIAL MASTER: Is that over a ten-year period?

THE WITNESS: No, no, no.

Q (By Mr. White) No? Well ten percent of what then?

A What we are saying is there will be ten percent mesghinna-cross-white

waste somewhere due to mismanagement, due to someone sleeping somewhere because he doesn't do his job, you know. This is unavoidable, and if you see the works of Midvale Irrigation District, you will see that thing there. Every year they publish this data. And --

THE SPECIAL MASTER: Of that which is not 18 percent which will come back into your main flow.

THE WITNESS: It will be -- it will be used downstream; no water is really lost.

THE SPECIAL MASTER: No, in the state of nature that's true, no water is really lost. Even the seepage, the canal goes to feed the Wind River Alluvium and Lord knows that feeds a thousand wells someplace, so it's all creating some good for somebody. But it's not going to grow any crops.

THE WITNESS: That's true.

THE SPECIAL MASTER: And that decreases the efficiency of your system.

THE WITNESS: That's true.

THE SPECIAL MASTER: Not yet, maybe a 100 years from now, 50 years.

THE WITNESS: Probably, yes.

Q (By Mr. White) Dr. Mesghinna, what values or did you use a percentage of diversions to size your wasteways?

A Yeah, I have indicated it in my direct testimony, Mr. White, that I have used ten percent.

Q Wait a minute, I just asked you that and you said no.

A No, no. The purpose of it --

THE SPECIAL MASTER: A ten percent waste, and he explained what it was, and he said, no, he explained the difference.

THE WITNESS: Yeah, I --

Q (By Mr. White) Let me make sure I got it straight. You designed the wasteways to pick up ten percent of diversions?

A Unh-unh-unh, not only that. More than that.

Q Okay. What was the purpose of the design?

A Okay. Let me explain. It is better if I explain in the maps here.

THE SPECIAL MASTER: All right.

A I have a wasteway here in the Dry Creek. Let's assume something drastic happens in the area, the whole Wind River area. And let's say that

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the generator fails, so there is no electricity, the pumps are not working. What happens? The pumps will not take the water, it will be, you know, closed, otherwise it will destroy your pumps and so on. So the water will flow in here, there will be additional flow that comes in unless the water is diverted in each of the pumps in here. The water that was supposed to be diverted before the Dry Creek Canal have to come, obviously have to come through the canal if the canal can hold it. So this canal is not -- this canal will not be able to take all the water that comes from there, so what we do is this water that was supposed to be diverted by the pumps, we waste this, including what we said also, the waste-way, I mean the waste of ten percent. Because what I am trying to say is the canal -- Let's see, the canal is not -- does not have the same size all the way. The more you go towards the end it becomes smaller and smaller and smaller, so it cannot carry the big flows that 850 c.f.s. is when it reaches in the middle it. So if the pumps do not take that water, the mesthinna-cross-white

flow, the water has to proceed, so before it proceeds to that, before it destroys the canal we have to waste it out, that's what I am saying.

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Q (By Mr. White) Having you prepare the design and calculation for the Dry Creek wasteway?

A Yes, sir.

Q Can I look at that, please?

MR. CLEAR: Your Honor, maybe we should take a ten minute break or break for today. He's been on a long time for the --

THE SPECIAL MASTER: What do you think, gentlemen, do you want to go to 5:00 or do you want to wind up in a few minutes?

MR. WHITE: My guess is I've got about ten minutes left and then tomorrow we'll bring in those exhibits. I was going to suggest, Your Honor, that we try to break, oh, within the next ten or fifteen minutes for the day.

THE SPECIAL MASTER: Let's work till 4:15 and call it a day.

MR. WHITE: Then call it a day.

THE SPECIAL MASTER: Okay. We'll go for another fifteen minutes.

(Off the record discussion.

THE WITNESS: What I am trying to say, let's see, how many pumps are there before Dry Creek. Let me see.

A Okay. What I'm trying to explain is we have a wasteway at Dry Creek and I believe the pump, the last pump station is pump station number thirteen. So starting the water, the water that comes for pump one up to pump thirteen, pumps one, two, three, four up to pump thirteen in case the electricity is shut off the pumps here are not going to take that water. They will be shut off. So the water that comes in here cannot pass through this siphon. The siphon is not designed to take that water. So before it reaches the siphon we have to build a wasteway that will take out these flows.

Also the wasteway -- the waste, the amount of waste that is supposed to go -- I mean assigned for this acreage in here will go out through the wasteway so that --

Q You've got two amounts that you add up?

A Yeah.

Q Okay.

THE SPECIAL MASTER: I see.

Q (By Mr. White) In addition to the riprap that you described, what other channel protection features do you have? Let's take, for example,

Dry Creek below your wasteway.

A I think that's a good question. As you know Dry Creek is almost, we can call it, a wet creek. You know, almost --

Q A what creek?

A Wet. Wet, it has water.

THE SPECIAL MASTER: Almost year round?

THE WITNESS: Yeah.

A And the amount of water that we divert as waste to that canal is probably one-eighth or one-seventh of the peak flows that flows through that creek. So we're talking really a very small amount of water as compared to the nature -- natural flow that flows through it. So we didn't fail to put any protection through all that canal.

However, in Five Mile Creek we have gone a long way to protect the area because we found it necessary to put riprap and also a long pipelines to the area.

Q Was your channel protection work on the Five Mile Creek similar to that that was done below the Wyoming Canal and Five Mile Creek, are you familiar with that work?

A I am not really familiar.

Q Dr. Mesghinna, --

A Yes.

Q Drainage again.

What are the dimensions which you used for the open drains and outlet ditches, specifically what are your bottom widths?

A I can tell you the depth which is more important, I guess.

Q Okay. Do you -- but you can't tell me the bottom width?

A But I can tell you but I have to go through a long thing.

THE SPECIAL MASTER: Do you want to save it until tomorrow?

THE WITNESS: I can tell it.

Q (By Mr. White) Well, why don't you tell me tomorrow and then we'll finish tonight by saying you told me this morning that you could provide a tabulation of field by field dimensions and acreage and you have that, is that correct?

So we don't have to go through that --

A Uh-huh.

Q -- is that right?

A Yeah, I have said that.

Q And you showed me this afternoon a portion of your notebook for North Crowheart that all the information you needed on pipes, and you said you had similar sections for each of the other units, is that correct?

A Yeah, but are you asking me to give you that?

Q No, I'm asking you to give it to me -- you have given us some of it but certainly not all of it.

A Oh, my gosh. No way.

THE SPECIAL MASTER: How many pages will that involve?

THE WITNESS: It is -- this is talking almost about this whole book.

MR. WHITE: We are going to copy it, Your Honor. It is not going to be any difficulty.

THE WITNESS: No matter what, I have given you all the necessary things to do this.

MR. WHITE: Well, Dr. Mesghinna --

THE SPECIAL MASTER: Talk to your lawyers on that.

MR. WHITE: Dr. Mesghinna, the point is you keep saying you have given us the necessary things to do the calculations ourselves. What I'm saying is I want to see the calculations and the results

that you have made and that's why I'm asking the Court --

THE SPECIAL MASTER: What he's also saying is apparently other witnesses have apparently given him a lot more than you have as we saw yesterday. If I may inject a point of humor toward the end of a weary day.

All right. Next, Mr. White.

MR. WHITE: And I think you also indicated that -- let's see, you've got the graph out on your pumps and pumping plant. Do you have a wasteway design for each wasteway that you included such as --

THE SPECIAL MASTER: Wasteway design?

MR. WHITE: Yes, sir. Such as the two-page wasteway design that you had and the calculatipns you had for the Dry Creek wasteway that you showed me?

MR. CLEAR: Your Honor, this trial is turning into a discovery proceeding --

MR. WHITE: Wait a minute.

MR. CLEAR: I think we gave them everything conceivable.

THE SPECIAL MASTER: It may be and if it is,

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we'll do our best to bring it back in line. The question was on the wasteways.

MR. WHITE: Yes, sir. He's testified that there are wasteways which are not shown --

THE SPECIAL MASTER: And you have asked him, does he have a design for the wasteways and that's a fair enough question.

A We have a design but this design is based on experience and knowledge of a company that is competing with other companies.

THE SPECIAL MASTER: So you get the work if the work is ever given --

THE WITNESS: Yeah. I mean --

THE SPECIAL MASTER: All right. I understand that that's probably why Mr. White wants to know.

MR WHITE: I want to know whether or not I can see and copy your wasteway designs that are included within the plans that you testified about here in court.

THE WITNESS: I can give you the results of it as to whatever you want in terms of how much concrete, how much excavation and so on but the design is something that I think is life and

death for us.

THE SPECIAL MASTER: He may be saying to you that we lawyers are -- Gimble's never tells Macy's is what he's telling us.

MR. WHITE: Well, what I'm saying, Your Honor, is if he included that design in the project that he's testifying about whether he's real proud of it or not, I'm entitled to see that design.

THE SPECIAL MASTER: That may not be true, Mr. White. We'll go into that tomorrow.

MR. WHITE: I'm asking for it now.

THE SPECIAL MASTER: You're entitled to know the amount of concrete in it and the amount of component parts in it, but you are not entitled to look at it.

MR. WHITE: The design that he is using?

THE WITNESS: Sure.

THE SPECIAL MASTER: It might be the same --

THE WITNESS: The same thing with the pipe lines. I can give you the results; I can give you anything but --

THE SPECIAL MASTER: The number of feet and the size, you know.

MR. WHITE: Are you saying, Your Honor, that

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you will not allow me to see the design of the wasteways?

THE SPECIAL MASTER: I'm saying I'm going to have to anticipate there are going to be some vigorous objections to your seeing it and we'll have to look at the arguments. And it is probably the case this will become a proprietary matter which can make it --

MR. WHITE: I want to make sure we make a record on that.

THE SPECIAL MASTER: I'll let you make a record on it because I could be wrong but I could be right.

THE WITNESS: The same thing on the pipes. I have given you almost everything really in fact I gave you the pipeline layout. I think it is a simple matter of using calculators and I gave you all the equations, you see, to come up with that.

MR. WHITE: What you're saying, Dr. Mesghinna, is isn't this correct --

THE WITNESS: And he --

MR. WHITE: -- you gave us enough information that we can by calculating come up with the

same results you did?

THE WITNESS: Of course you can.

MR. WHITE: But you're not willing to give us the results that you came up with?

THE WITNESS: The point is, you see, there are -- in design there are many, what shall I say --

THE SPECIAL MASTER: Trade secrets.

THE WITNESS: Trade secrets that we use and we have especially, really on this thing, pipeline network and so on --

THE SPECIAL MASTER: The request also, Mr. White, would have to be considered in light of the evidence and what I do so far by way of the obtaining of information, the months and months of depositions and the mountains of material already in the record, and it all adds up to the fact that there has been an awful lot of material obtained already.

MR. WHITE: It will make it a lot easier, Your Honor, if you just rule tonight that I could not have his pipe network design, and I couldn't have his wasteway design. We wouldn't have to argue about it tomorrow.

THE SPECIAL MASTER: What stage of design are

we if he's already concluded on a page or two of the report that these are generalizations made about them? You're entitled to those -- if you want to know how much material of each kind, you're entitled to that. You're entitled to peripheral material but a design regarding that wasteway -- if there is a specific design of those wasteways by this company and them and your consultant both anticipate to get this business and if and when the day ever comes when the Tribal Counsel decides they want to build this project, which in itself is a question, I can see the point that they are going to raise objections to delivering you the design specifications.

I don't think you've gone as far as working prints yet by any means. If there were then I know I would have to deny them. So it is a case of where are we on the scale between conceptual discussions of designs and working papers ready for the first construction phase.

MR. WHITE: Your Honor, I would like you to look at the Dry Creek wasteway design pages and calculation pages which Dr. Mesghinna

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showed them --

THE SPECIAL MASTER: Has already provided you --

MR. WHITE: -- showed it to me and I think you will see what I'm talking about. What it does, it shows the general shape and what went into it. I think we are entitled to look at them. I think you would --

THE SPECIAL MASTER: Have you answered? You've already showed them to me?

THE WITNESS: Yeah, I have showed them to you.

THE SPECIAL MASTER: You've already seen it.

THE WITNESS: Okay. Let me make things easier for you. How about if I give you -- I don't know if my lawyers will --

THE SPECIAL MASTER: Will let you.

THE WITNESS: -- will let me do it. How about if I give you all the amount of concrete, the amount of riprap material, the amount of excavation, everything that enters into each wasteway that you want. Do you want that too?

MR. WHITE: I would like that but I want --

THE SPECIAL MASTER: You see, Mr. White, what has that got to do with whether or not the reservation is entitled to a right of water on this area? What difference does it make what the design is of the wasteways? That's why I think you're reaching into areas that are a far departure from the reference to me from Judge Joffe --

MR. WHITE: Well, let me tell you why, Your Honor, let's take wasteways as an example or we can take pipe networks --

THE SPECIAL MASTER: That's exactly what we're talking about, the wasteways plans. It is not an example, it is a fact.

MR. WHITE: Let's assume that the wasteways that's designed for Dry Creek that we talked about is perfectly adequate, no problem.

THE SPECIAL MASTER: Perfectly adequate?

MR. WHITE: We say there's no problems with it, it is perfectly adequate and the costs associated with it are reasonable. But let's assume on the other hand that if we are allowed to look at that design, we would say that design has got one of two problems with it, either the design

is inadequate and therefore the costs are low or the design is adequate but there is a gross underestimation of the amount of material and the amount of work that goes into the construction of that wasteway, and therefore the costs are inadequate. It all ties into the costs, Your Honor, and without looking at the design there is no way to critique the costs used by Dr. Mesghinna and it's the coststhat go into the economic portions of the analysis that gets to --

THE SPECIAL MASTER: Well, let's resume in the morning at 9:15.

We stand adjourned for the day.

(Recess, 4:16 p.m.

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REPORTERS' CERTIFICATE

State of Wyoming)
: SS
County of Laramie)

We, Lamont Miller and Merissa Racine, Registered Professional Reporters and Notaries Public in and for the First Judicial District, State of Wyoming, 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 4573-4773 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 6th day of May, 1981.

LAMONT MILLER
Registered Professional
Reporter

MERISSA RACINE
Registered Professional
Reporter

Lamont Miller - Notary Public
COUNTY OF LARAMIE STATE OF WYOMING
My Commission Expires March 29, 1983

MERISSA RACINE - NOTARY PUBLIC
COUNTY OF LARAMIE STATE OF WYOMING
My Commission Expires Mar. 10, 1984