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Trial Transcript, Vol. VIII, Afternoon Session

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File 115
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Case # 4993

File # 115

4366

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
2/6 81
Margaret L. Hampton CLERK
DEPUTY

VOLUME VIII

Thursday, January 29, 1981

Afternoon Session

ORIGINAL

MR. MEMBRINO: I think the government is ready to proceed, Your Honor.

THE SPECIAL MASTER: All right. We will come to order.

MR. MEMBRINO: I believe where we left off, Your Honor, the State was about to begin its voir dire of the tendered exhibit.

MR. MERRILL: Your Honor, before Mr. White begins his voir dire of these exhibits through Mr. Page, I was wondering if I could ask whether or not the United States will make some of its witnesses available next week during the break between trial. There are several witnesses who will appear as part of the United States' case in chief, according to their endorsement, that we have not yet obtained the final opinions and conclusions from, and I was wondering if Ms. Sleater would make some statement regarding the availability of those people next week.

MS. SLEATER: We have had numerous off-the-record discussions with the State of Wyoming, and we have previous to this time had numerous and sundry other agreements with them.

It appears that it would not be possible next week to make any of the witnesses -- there are only three that have not been redeposed by the State of Wyoming, and I would point out that there is no right to final opinions anyway.

There is a right to discovery, as Your Honor had ordered which we complied with. In fact, we were in depositions with the State of Wyoming from January 5 on until 1:00 A.M. on the Friday before this hearing began.

At this time the one week before two weeks of trial, it's very necessary for the United States to go on with its work with the witnesses, getting its exhibits in order, and next week would just be impractical for us to provide witnesses and I have previously explained this to Mr. Merrill, and I'm very surprised he brought it up on the record because when I talked to him last night, he indicated he understood the problem, and he was in full agreement that that was fine with him.

So I don't know why this has come up at this time, but I will not be making those three people available next week.

MR. ROGERS: I would like to state for

the record that the Tribes would object to any further depositons in this matter at all. The Special Master has previously ordered that discovery would end at the beginning of trial, and up until that time there were depositions still going on of certain witnesses as Ms. Sleater has said, and Dr. Mesghinna was deposed until 1:00 A.M. Saturday morning the week before trial.

The State has deposed every one of the government's expert witnesses, as well as those of the Tribes',and I think that is sufficient discovery.

MR. MERRILL: Your Honor, I'd point out two things in response: Number one, the Tribes have, since we closed our discovery of their witnesses, endorsed additional people whom we have not deposed.

THE SPECIAL MASTER: Are the three you asked for some of those additional that have been endorsed?

MR. MERRILL: No, Your Honor. These are the continuation of depositions of experts who have been previously endorsed by the United States.

I don't want to mislead the Court into thinking these are new witnesses because that is not the case.

In that case I seek then only an assurance from Ms. Sleater that she will not call either Tom Stetson or Michael Keene or Ron Billstein during the hearings the week of February the 9th, which is the next week of hearings scheduled in this case.

Should she be disinclined to make that assurance at this point, I will direct the Court's attention to an agreement that the State and the United States made last week, but absent that assurance, I don't think we'll need to refer to the agreement.

MS. SLEATER: Your Honor, the United States at this time has no intention of putting those three people on the stand on February 9.

THE SPECIAL MASTER: Very well.

Mr. Membrino? Oh, voir dire.

MR. WHITE: Yes sir.

VOIR DIRE EXAMINATION

BY MR. WHITE:

Q Oliver, how is that voice holding up?

A I think it's okay.

Q Oliver, would you please open up Exhibit C-31A and take out table 2? That's the packet of tables.

MR. WHITE: Before I ask the witness the first question, Your Honor, I would like to inquire of the United States the purpose for which these exhibits are being offered. Are they being offered for the truth of their contents or some lesser purpose?

MR. MEMBRINO: They are being offered for the truth of their contents, Your Honor.

MR. WHITE: We then will have doubtless objections, Your Honor.

Q (By Mr. White) With respect to table 2 in C-31A --

A Yes.

Q -- what do you mean by Quaternary depth deposits? What does Quaternary mean?

THE SPECIAL MASTER: Are you referring to table 2 of 31A?

MR. WHITE: Yes, sir. I have table 2 which is entitled at the top, "Estimated Potential Well Yields for Quaternary Deposits."

THE SPECIAL MASTER: Very good.

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A That term is a geologic time, a system name. If you would refer to the columnar section there, it is given under system -- it represents a period of geologic time.

Q It's the surface deposits?

A That's right, essentially.

Q What symbols are used for Quaternary deposits on the geologic map which is C-33?

A Well, they have various symbols. Qa, I recall, is the alluvium. "Q" stands for Quaternary, and "a" for alluvium. I believe they use Qt for terraces.

Now, on the lens, I don't recall. I could point them out.

Q Why don't you wander up there so we can know we are speaking the same language.

A Qa is the alluvium of the flood plains and related low terraces.

Qsa is referred to as slope wash and alluvium.

Qt is terraces and pediment deposits.

Ql last, land slides, steep-slope colluvial deposits.

Qtr is Travertine deposits.

Qtr, glacial deposits.

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Q Is that all?

A That's all. Not all of those are listed on that table 2.

Q Which of the Quaternary deposits that you have described from Exhibit 33 are included within the Quaternary deposits -- I'm sorry, I always have trouble with that word -- Quaternary deposits in table 2 of C-31A?

A On table 2 we are looking at Qa, and in some cases Qsa, the combination alluvium and slope wash --

Q I'm sorry. Go ahead.

A Well, on some of the minor creeks -- I believe it's restricted to the minor creeks -- the mapping didn't distinguish between the slope wash and the alluvium in the channels. It was the degree of mapping essentially, so they had the combination term.

Q Let's run through those alluvium units on table 2, and can you tell me which of the types of deposits, the alluvial deposits, that you have described are included within the alluvium for each of those units from which you derived those potential well units?

A In the Wind River it's Qa.

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Q Okay.

A I would like to refer to the map.

Q Oh, please go ahead.

A Because they mix in some cases. In the Little Wind, Qa; Mill Creek, Qsa; Sage Creek, Qsa; Owl Creek, Qa; Crow Creek, Qa; Popo Agie, Qa and Qsa; Cottonwood Creek -- I can't locate Cottonwood Creek, which is Qa and Qsa; Muddy Creek, Qa and some Qsa; Five Mile Creek, Qa; and Kirby Draw, Beaver Creek, Qsa.

* * * * *

Q (By Mr. White) (Continued) What about the terrace deposits and glacial deposits, what symbols would be representative of those, the areas in which you derived these yields or the G.S. derived these yields on Exhibit 33, geological map?

A Well, on the G.S., I cannot speak specifically which terrace deposits.They were speaking in general. There are major terrace deposits here, located up in this area, Riverton area, along the Crowheart area, Wind River. Your glacial deposits are -- are not restricted in this area here.

Q Southwest and central portion of the reservation?

A That's right.

Q Now, in which of those areas, if you know, do terrace deposits yield from a few to a few hundred gallons per minute?

A It would be the terrace deposits that are overlaying by the irrigation, and those specific ones.

Q Which ones are those? First of all, they would be represented by a symbol Qt?

A Correct.

Q And for purposes of the record, when we speak of page-voir dire-white

Qt or Qsa or any of the Qs, it's a capital Q with the following letters being small letters in subscript?

A That's correct.

Q That helps the reporter.

So it's Qt areas under present irrigation, present irrigated lands?

A Not necessarily; present or maybe past or in general.

Q Well, now, which terrace areas are referred to in your table 2?

A It would be -- it's a general term for terrace deposits on the reservation, and from my understanding, it would not be restricted necessarily to a specific terrace deposit.

The terrace deposits are generally have a permeability or relative high permeability if there's a source of water to it and they were thick enough, you could get this type of yield.

The USGS figures are general; mine are specific.

Q For the purposes of this case, how would you use the value of a few hundred GPM for terrace

deposits? Do you have an opinion or is this not your opinion for the yields from those terrace deposits?

A It's not my opinion.

Q The terrace deposits are not your opinion?

A It's not my opinion, but the opinion of the U.S. Geological Survey, which is professionally accepted.

Q That is an opinion that you relied on?

A Yes, it is.

Q Okay. In what areas of the reservation are you relying on the USGS opinion to produce a few hundred gallons per minute in terrace deposits as you've depicted on table 2?

A I would --

Q Or do you know?

A Pardon me?

Q Or do you know?

A Specifically they have not been defined. We looked at the major outcroppings or major deposits, terrace deposits.

Q Is it fair to say then that you cannot say with any specificity or indicate with any specificity those areas that were to yield

a few hundred gallons per minute from terrace deposits?

A That would be correct.

Q Let's talk about glacial deposits. Those would be the areas that are Qgr?

A Qg.

Q Qg, I'm sorry. Again, the values which are on table 2 are not your professional opinion?

A That's correct.

Q They are the opinion of GS?

A That's correct.

Q And where does GS say that, or in what location does GS indicate that 50 gallons per minute can be obtained from glacial deposits?

A Again, in this situation it is a general yield, they do not specify. Your glacial deposits are restricted to the western area, the foot of the Wind River Mountains. Your major glacials are around Bull Lake and up in the area of Dinwoody Lake.

Q So with respect to glacial deposits as to terrace deposits, you're unable to indicate those specific deposits which would yield 50 gallons per minute; is that correct?

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A It would be -- have just two major deposits, it would apply to those two major deposits.

Q Is it your professional opinion that 50 gallons per minute could be derived from the glacial deposits which are located in Range 3 West, Township 3 North and Range 5 West, Township 4 North?

A Yes, where they are saturated.

Q Where they are saturated. Where are they saturated?

A I don't know.

Q You don't know?

A That's correct.

Q So we're sort of going beyond the area of your investigation --

A That's correct.

Q -- as to specific locations where those yields could be obtained?

A That's correct.

Q Thank you. Isn't it true that you also do not know any areas where those yields, indicated yields in terrace and glacial deposits have actually been obtained?

THE SPECIAL MASTER: Actually been

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obtained?

MR. WHITE: Actually been obtained, where they've actually gotten those kinds of yields.

THE WITNESS: No.

Q (By Mr. White) With respect to the alluvium units shown on table 2, then you have a variety of deposit types, is that correct, ranging from Qa or -- excuse me, there are just two, Qa and Qsa?

A That's correct.

Q And in some of those alluvium units you used Qsa and some you used Qa, and some you used both?

A That's correct.

Q What -- Would you know what the value for the Popo Agie would be if you used only Qa as you did for Crow Creek, Owl Creek, Sage Creek, Mill Creek, Little Wind River? Do you know what the yield would be just out of Qa on the Popo Agie?

A Well, it would not necessarily be any different than what is stated here.

Q Do you know?

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A Do I know what?

Q Have you formed an opinion that it would be the same if you eliminated Qsa from the Popo Agie?

MR. MEMBRINO: Your Honor, if I may. I'm concerned that this questioning is going to be out of the scope of table 2. The table is entitled Estimated Potential Well Yields from quaternary deposits. This is -- this is exactly what Mr. Page has displayed here. He wasn't called upon, nor did he need to -- to arrive at this information to identify specific sites or to break down the relative proportions of the sources for the water in the quaternary deposits. I think the exhibit speaks for itself, and I think it speaks accurately. I don't think -- I don't think it should be impeached because it doesn't go beyond what it purports to do.

MR. WHITE: We're trying to find out what it does do.

THE SPECIAL MASTER: We appreciate the objection. We'll overrule it for now, but I think it's getting close.

MR. WHITE: I understand. I'm trying to see what this exhibit does represent, whether

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we're mixing apples or oranges.

Q (By Mr. White) Do you know or have you formed a professional opinion that by eliminating those portions of alluvium from the Popo Agie represented by Qsa on Exhibit 33 that the yield would, potential yield expressed in table 2 would still be 20 gallons per minute?

A It would not necessarily change that yield.

Q Is the same true with respect to the Cottonwood Creek, Muddy Creek, Kirby Draw and Beaver Creek?

A That's true.

THE SPECIAL MASTER: They're so negligible now, all they say is a few. It's pretty hard to tell if that's effective.

MR. WHITE: I'm sorry, Your Honor, I'm just trying to find out that information which is necessary for me to make an objection and to prepare for cross examination.

THE SPECIAL MASTER: Well, when the table 2 shows that the potential yield in gallons per minute would be few from the Cottonwood, Muddy and Fivemile, the question asked, if there would be a different yield leaves little room left, but I'm not going to object to the question. Go ahead

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and answer it.

MR. WHITE: I think he did. He said the same thing would be true.

MR. MEMBRINO: I'd also like to point out that the purpose of voir dire is not to prepare Mr. White for cross examination.

THE SPECIAL MASTER: Mr. White prepares himself whether you let him or not.

MR. WHITE: I need a lot of help, Your Honor.

THE SPECIAL MASTER: Go ahead.

Q (By Mr. White) Up at the top of table 2 it says estimated. What do you mean by estimated, do you associate any particular margin of error or degree of reliability with the word estimated?

A No.

Q Okay. From a hydrogeologic standpoint, what do you mean by estimated?

A It means that they were determined, not necessarily wells pumping those rates where you can say you have a well pumping 900 gallons a minute was estimated or calculated or determined from the hydrologic and conditions of aquifer properties, and I use the term estimated versus a well

that's actually being tested and proven.

Q So you would expect that you could put a well in these various alluvial units and come up with measured discharges roughly equivalent to the potential yields even though there isn't a well there right now, is that what that means?

A Would you restate that again?

Q Does the potential yield mean that it's your opinion that if you put a well into these various alluvium units, you would come up with, you would have a well that could produce the kind of discharge that's represented by the potential yield in the right-hand column?

A And the range of potential yields, yes.

Q Does the word "potential" in the heading mean sort of projected?

A No.

Q Or estimated?

A It means we don't have a well in there that's doing it. If you put a well in, it's potential.

Q So it's based on your professional judgment then?

A That's correct.

Q On the right-hand column, the heading is potential yield. Does that word "yield" mean the same thing

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as charge?

A That's correct.

Q In preparing table 2, did you make any assumptions with respect to the water quality of the yields or discharges shown in the second column?

A No.

Q So then you have no opinion as to the suitability of these yields for any particular purpose; is that correct?

A Not in relation to this.

Q Okay. Now, are the yields shown on table 2 the yields which would be developed by a solitary well in each of those alluvium units or a number of wells such as in well fields?

A It is a little of both. Let me explain.

Q Okay.

A It's a solitary well, but I allowed for some theoretical interference. For example, in the Wind River that highest value, 900 gallons per minute, that's in the Crowheart area and the U.S. Geological Survey on a single well had estimated, I believe, 1,250.

Q That was in table 2 of water supply paper 1576-I?

A I don't think it was in table 2.

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Q Okay.

A I'm not --

Q Let me ask you about that. I've always been curious.

A If it's table 2 that -- okay.

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THE WITNESS: Yes, it's twelve in the front.

Q (By Mr. White) So when you backed off from 1200 to 900, that was an attempt by you to be rather conservative in your estimates?

A That, and I might have used slightly different aquifer characteristics, permeability values for very specific ones.

Q I still could not understand. Does table 2 mean you could have an unlimited number of wells yielding this amount?

THE SPECIAL MASTER: He said a little of both, Mr. White, singles and some yields.

THE WITNESS: Okay, I can answer that. It means that proper well spacing to limit the mutual interference of the wells, you could have that.

Q What assumption did you use in developing table 2 with respect to the well spacing that would be required to allow you to maintain these yields from the wells -- are the alluvium units involved?

A I did not assume a well spacing, I assumed limiting the interference, and I am recalling

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this, I believe, to a foot of interference.

Q Could you explain to the Court what you mean by one foot of interference?

A When you have adjacent wells and they are pumped, a cone of depression is formed. This cone expands out to a point where it's intercepted sufficient recharge to equal the recharge. That means that the well, you have the greatest drawdown or the greatest drop in the water level. It diminishes as you go out. So if you have another well in that cone, you are going to have a drop of water well due strictly to that other pumping well, and that would, in turn, go back on that.

Q That assumption also includes that you have uniform continuous and homogenous saturated material, doesn't it?

A Oh, yes, it does.

Q Have you confirmed that assumption in these particular alluvia?

A You will notice the range is twenty to nine hundred. That twenty not only takes into account if you've put the well on the edge, it also takes into account the saturated thickness.

Q Except as shown by an asterisk on table 2, did

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you develop the potential well yields or discharges yourself?

A Yes, I did.

Q What is the source for the potential yield of a few gallons a minute for Cottonwood Creek?

A That is the U.S. Geological Survey's asterisks.

Q What particular reference did you use?

A Oh, water supply paper 1576-I.

Q I hand you a copy of 1576-I, and I suggest you not be misled by the paper clips, and tell me where you found that particular estimate.

(Brief pause.

A It may take a few minutes.

Q While you are looking --

A I believe it's in the text.

Q While you are looking through there, I would ask you the same thing for all of your other asterisked items on table 2, so if you pick up something else along the way, just let me know.

(Brief pause

A It's on page 149 and it reads, "Alluvium in the valleys of Fivemile, Muddy and Cottonwood Creeks is relatively fine grained. Sand and

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silt are predominant; clay, gravel, and pebbles are present in lesser amounts. Yields of a few gallons per minute are available from some of these rocks."

Q Do you know the basis upon which the USGS made that projection or estimate of the yields?

A Not specifically.

Q How many creeks did that involve on page --

A It included Cottonwood, Muddy and Fivemile.

Q How about the values for Kirby Draw, Beaver Creek for terrace deposits, glacial deposits?

A On Kirby Draw and Beaver Creek, I 47 says, "Part of the alluvium was well-sorted sand and very fine gravel that would probably yield as much as twenty gallons per minute."

Q Do you know the basis on which the USGS reached this conclusion?

A Probably on the property of the aquifer -- I mean, the grain size present from well logs.

Q Did they use the Johnson graph to do that, do you know?

A I have no idea.

Q So you don't know --

A I don't know the specifics.

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Q You don't know the analysis?

A I can just draw a conclusion from what they say.

Q How about the terrace and glacial materials?

A Terrace is I 47. Do I need to read it?

Q No, you don't need to read it, Oliver. I'm sorry. You really don't need to read anything, let's save your voice. Just tell me what pages they are on.

A I 47, paragraph 1.

Q That's for both terrace and glacial?

A No, that's terrace.

MR. MEMBRINO: Your Honor, I think the sources sited by Mr. Page is enough information for Mr. White to consider having him point it out. He is taxing his voice and it is simply redundant to the exhibit or the material he submitted, and --

THE SPECIAL MASTER: I appreciate that, Mr. Membrino, but I still have to allow an inquiry to probe into the truth of the exhibit. Mr. White might be pretty much at the end of it, I think.

MR. WHITE: I am, Your Honor. Go ahead.

THE WITNESS: I 13 in the table here

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under what is table 1, potential water supply.

Q (By Mr. White) Okay. Again, is it true that you do not know the facts and data upon which the USGS relied upon making those determinations?

THE SPECIAL MASTER: He answered that. You don't have to answer that again.

Q (By Mr. White) Okay. Back on table 2, would you -- well, excuse me.

As I recall your testimony, you indicated that you developed the values that are not marked with an asterisk, and I would like to ask you to describe the general methodology that you used. If I may, I'll get back 1576-I before I lose it because it's out of the State Engineer's library.

A I need another copy of that.

Q Would you tell me that methodology, please?

A Yes. One moment, please.

(Brief pause.

Q (By Mr. White) Would you like to take a little break?

THE SPECIAL MASTER: That just sets him back, I'm afraid.

MR. WHITE: I don't want to be accused

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harassing the witness, Your Honor.

THE WITNESS: It seems to get worse when I stop talking.

MR. WHITE: Well, keep talking until the break is over.

THE WITNESS: Essentially the technique involved determining the saturated thickness of the alluvial deposit. This was obtained from water level information in the wells, in existing wells; then with the saturated thickness, a determination of the permeability of the deposits. This permeability was determined from existing well test information, and from that we determined the transmissivity, and in that water supply paper, 1576-I, the USGS had a relationship between specific capacity and permeability or transmissivity, whatever.

Q Is that one of the graphs?

A No, it's a formula.

Q Could you point out that formula to me?

THE SPECIAL MASTER: In view of his condition and fairness, if you can do anything to kind of compress it, I would be grateful to you.

MR. WHITE: I will, Your Honor, if he

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can just tell me the page number it appears on. I will ask him more leading questions, then.

THE WITNESS: On page I 37.

Q (By Mr. White) That's on page I 37 about a quarter of the way from the bottom?

A That's correct.

MS. SLEATER: Your Honor, at this time may I approach the witness and give him some hot coffee?

THE SPECIAL MASTER: He has a pitcher full of it, I think.

MR. WHITE: Not of hot coffee, Your Honor.

MS. SLEATER: I think the heat will probably help his throat.

THE SPECIAL MASTER: I object to the precedent that he gets it and I don't, but that's the story of my life.

MS. SLEATER: I'm sorry, Your Honor. Next time I'll bring two.

THE SPECIAL MASTER: No problem.

MR. WHITE: Bring three, Your Honor.

MS. SLEATER: I will bring a pot.

MR. WHITE: Why don't you swig on that

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coffee a little bit, if you would like to.

THE WITNESS: That's okay. I got a pill in my mouth right now. Let me disolve it.

Q (By Mr. White) Okay. With respect to the Wind River alluvium unit that shows on table 2 --

A That's correct.

Q -- what saturated thickness of the alluvial deposit did you use?

A I believe -- I'm trying to recall this. Can I refer to some notes if you want the specific numbers?

Q Sure.

A It was five to forty feet.

THE SPECIAL MASTER: Was that answer five to forty feet?

MR. WHITE: I believe so.

THE WITNESS: Pardon me, eight to thirty-two feet.

* * * * *

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Q. (By Mr. White) What was the water level in the existing well that you used?

A. I didn't use a single existing well, and they varied, anywhere from a foot below the ground surface to what I'm aware there are some less --

Q. I'm sorry?

A. I'm aware there are some less than a foot or a foot and deeper.

Q. What was the source then of your saturated thickness value if you did not base it on the information available from an existing well?

A. I did base it --

Q. I'm sorry. I thought you said you didn't.

A. The source of my saturated thickness?

Q. Yes.

A. What we did -- and by "we" I mean our staff under my direction -- we looked at every well that we had a driller's log, something to indicate whether they penetrated the unconsolidated deposits, the alluvial deposits, and penetrated the Wind River or a more consolidated rock underlying it, where we also considered logs that never totally penetrated, and we looked at these on a basis from -- we plotted these on a basis of upstream to downstream; in other

words, in various reaches.

Then where we didn't have something we interpolated between these and we obtained our saturated thickness from these actual well values and interpolations between them.

Q. How many well values did you have?

A. I do not recall.

Q. Is it also true that you cannot remember at this time the particular wells that you --

A. That's correct.

Q. What value forpermeability did you use with the Wind River alluvium unit?

A. We had three values spaced out from the Crow Heart area --that was that USGS test, and Table 2 you showed me -- I believe we converted their information into a permeability value, using that formula that you had.

I pointed out we had our pump test at the vicinity of the Pilot Butte, which I should correct the record now. The water pumped from -- the water located next to the pipe is used for injection at Steamboat Butte.

THE SPECIAL MASTER: I think you are in such a condition that we ought to give some thought to

either deferring your testimony until your throat is better, because I think you are in pain.

THE WITNESS: It's just annoying.

THE SPECIAL MASTER: If you are not in pain, we can stand the annoyance.

MR. WHITE: Oliver, at any time you want to stop, you let us know. We certainly appreciate your effort to keep going.

THE SPECIAL MASTER: It's okay with me to continue.

MR. WHITE: Let's go then.

A. So we had a pump test there which was more extensive than the USGS pump test, and we obtained a permeability of 1300 gallons per minute -- I'm sorry-- 1300 gallons per day per square foot.

Now, I'll see if my notes will have the USGS values that we determined -- then the USGS in the Riverton area had another pump test, and with those three points -- okay, yes, in the Riverton area we interpolated the USGS pump test for a permeability of 300 gallons per day per square foot in the Crow Heart area there. We interpolated it at 2400 gallons per day per square foot, and ours is about mid-way

in between, was 1300 gallons per day per square foot.

We looked at those and we interpolated between them -- okay, to give a variance downstream based on the premise that generally your coarser materials are deposited upstream.

You could expect a higher permeability in those deposits. Your finers would be deposited down towards Riverton, so with those three values, we interpolated between to give us a variable range down the river.

Q. (By Mr. White) That's what I was curious about. I wanted to know whether or not you had broken the river into segments.

A. We did.

Q. What value of transmissivity did you develop for the Wind River alluvium unit?

A. Transmissivity is a product of the permeability saturated thickness, so for these various compartments or units -- let me backtrack.

Q. Okay.

A. We broke the river into compartments on our storage calculations, not the well yield because we got variable well yields down the river, in other

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words, but we used those permeability -- we took our estimated and determined measured saturated thicknesses, our permeabilities. That product gave us the transmissivities.

Q. You said you had a range of transmissivities then?

A. That's correct, yes.

Q. With respect to the Little Wind, what saturated thickness did you develop?

A. We had saturated thicknesses ranging from nine to 25 feet.

Q. What permeability values?

A. We used a constant permeability of 1800 gallons per day per square foot, and I believe that was based again on a USGS pump test. We had no other information on permeabilities in there.

Q. What was the source of the saturated thickness? Was it the same source --

A. The same way we determined for ourselves in existing driller's logs and well data.

Q. Is it true that you were unable to recall the number of wells which you used for the specific identity of those wells?

A. That's correct.

Q. Thank you. What saturated thickness did you

develop from Elk Creek?

A. Eighteen to 26 feet.

THE SPECIAL MASTER: Mr. White, may I inquire is it your intention to go through the remaining five categories from Elk Creek through Popo Agie with exactly the same questions?

MR. WHITE: Yes, sir.

THE SPECIAL MASTER: What is the purpose of those questions if the information is already in the US Geological Survey and will be identical to the previous two? What is the purpose?

MR. WHITE: I'm sorry, Your Honor. These are areas where he said he did not rely on USGS surveys but made his own estimates, and I believe we are entitled in voir diring the exhibit to learn the values which he used and the sources of those values where he did his own work.

THE SPECIAL MASTER: Well, I would hope that you could establish a sufficient belief from the first of these --

Q. (By Mr. White) It's not that I don't believe you, Oliver. It's just that I would like to know what value you used for Elk Creek?

A. Again, 1800 gallons per day.

Q. You don't need to give me the units if you don't want to.

The source is the same as for the Wind River and the Little Wind?

A. Yes, I see both 1800 used. I believe there were pump tests by USGS in each one. It would be listed in Water Supply Paper 1576-I.

Q. Would that be in Table 3 of 1576-I?

A. No, I think it's 2.

Q. Okay. It's 2 then?

A. Well, they are not labeled. They are creeks, but --

Q. I can figure out which creek is which.

A. Essentially, other than our pump tests, they were derived from this information.

Q. On Sage Creek what value for saturated thickness did you use?

A. Twenty to 30 feet.

Q. And permeability?

A. A thousand.

Q. The same sources?

A. No, that was based on my professional opinion. I did not have a pump test in there.

Q. Saturated thickness on Owl Creek?

A. Twenty.

Q. Permeability?

A. A thousand.

Q. Same sources?

A. My professional opinion.

Q. Crow Creek, saturated thickness?

A. Eleven to 20.

Q. Permeability?

A. A thousand.

Q. The same sources?

A. Professional opinion, yes.

Q. Popo Agie, saturated thickness?

A. Ten.

Q. Permability?

A. A thousand.

Q. Professional opinion or a pump test?

A. Professional opinion.

Q. The last question on Table 2, what degree of accuracy did you award to the values shown on the right-hand column?

A. I haven't assigned a degree of accuracy.

Q. Do you have an opinion as to the accuracy of those values?

A. I considered them accurate, but I don't have a

number.

Q. Let me ask you is it greater than 50 percent?

A. I can't answer you. I don't know.

Q. Any additions or deletions you want to make with respect to your answers concerning Table 2?

A. I don't believe so.

* * * * *

Q (By Mr. White) (Continued) Let me renege on what I said and let me ask you one more question about table two.

The potential yields that you listed here, isn't it true that they are estimated to last only for the period that the pump test upon which they were based?

A No.

Q So the pump test was for 120 minutes only? These potential yields are good for more than 120 minutes?

A No. On the case of -- they were determined, permeability based on that general relationship, that formula. It was not -- and I considered their factor in there conservative on my pump test I conducted on the Wind River, which lasted 24 hours. I determined -- let me back track. That equasion has a K factor in it, which is -- that you constantly multiply by. They have 1,500 in there.

Q What did you use?

A I used their 1,500, but my test on the Wind River came out at around 2,200, and as a rule of thumb, I've used -- professionals in my

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field used around 2,000. It varies, of course, with each area. So I felt that was conservative, 1,500, it gives you a conservative enough well yield to offset the result of this short test time.

Q So you used 1,500?

A I used the 1,500.

Q Can you find table one in Exhibit 31-A, please?

A Right.

Q Are the sources on the bottom of table one, sources from which all the information on table one was derived?

A Information on table one is derived from these sources with the exception of the last column, development potential. Not all this information is in each source.

Q But the information, all the information on table one is found in one of those four sources?

A With the exception of development potential, and I must add this, distribution, the distribution column.

Q How did you try to show on table one any qualification or limitations which were contained in the reference material, the references sources?

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A Well, you see the wording, prints under well yield, A, yield water to springs. There are the limitations. I believe where the source had a limitation it should have been included in here.

Q Isn't it true that the potential well yield information came out of 1576-I, Water Supply Paper 1576-I?

A Much of it did.

Q Isn't it true that that information is based on limited local well data and is not generalized?

A Information is based on the U.S. Geological Survey's conclusions from the information they had.

Q But isn't it true that that information is based on limited local well data, on data concerning the quality of well field water and data concerning water in the same or similar lithological units in nearby areas? It is not generalized to the formations or stratagraphic --

A Speaking of groundwater quality --

Q I'm talking about potential well yields as well as general groundwater quality.

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A It was based on the information they had available. Whether it was -- how limited it was, I'm speculating.

Q I direct your attention to page I-21, Water Supply Paper 1576-I, and ask you if you would read to yourself footnote 3, and determine whether or not I've correctly read that and whether or not that footnote applies to the information contained in the columns on table one, entitled Potential Well Yields and General Quality of Groundwater?

THE SPECIAL MASTER: Potential Well Yields and what?

MR. WHITE: General Quality of Groundwater.

THE SPECIAL MASTER: It would be two columns?

MR. WHITE: Yes, sir.

THE WITNESS: I only see that footnote applied to potential water supply.

Q (By Mr. White) Didn't the potential water supply column in 1576-I contain the information that's split between potential well yield and general quality of water on table one?

A Okay, yes, I understand.

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Q Have I accurately characterized that footnote?

A Yes.

Q And that footnote should then apply to the columns on table one for potential well yields and general quality of groundwater?

A I am checking to see if I made some modifications.

Q Sure, take your time.

MR. MEMBRINO: Your Honor, I have a suggestion at this time. I think the purpose of the voir dire, although we've used it for other things, for example, cross-examination preparation, is simply to determine the admissibility of the exhibit. Now, Mr. Page --

THE SPECIAL MASTER: To determine what?

MR. MEMBRINO: The admissibility of the exhibit. Mr. Page is referring to geological sources that are relied upon by people in his profession. The question of their credibility does not extend to the question of admissibility of this exhibit. And if we could confine our discussions to the voir dire, given Mr. Page's condition, I think we could move this along a little faster.

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MR. WHITE: Your Honor, I don't know what to do about Mr. Page's condition, but I am entitled to know whether or not table one accurately sets forth the information that is listed in the sources that's reported on the bottom of this table. And this is an example of where a footnote that very much limits the validity of the information in the table was excluded from the table, and the offer is for the truth of their contents. And the truth of the contents ought to indicate it's based on local data.

THE SPECIAL MASTER: I have permitted questioning thus far for that reason, and that reason along. I think you're pretty close to the limitations, but go ahead for the time being. I'll overrule it for the time being.

THE WITNESS: To answer your question, on the footnote, it applies to this portion taken from this. There are some references from Owl Creek, regarding Owl Creek which was from a different report. So, in other words, it's not verbatim in all cases.

Q (By Mr. White) Do you know what portions of the table should have the limitations?

A Let's say Bighorn Dolomite. There's a statement reported it contains little or no water in the Owl Creek area. I would, without precisely recalling it, I would believe that came from Water Supply Paper 1519.

Q Page 10?

A That's correct. So some of this information is interspersed into this table.

Q Okay. Generally what sort of information is included in table one that's found in Hydrologic Investigation Atlas 270. I'll give you sheet 3 if you'd like.

THE SPECIAL MASTER: Is the document you have in your hand, Mr. White, one of those footnoted on table one?

MR. WHITE: It is, Your Honor. It's sheet 3.

THE WITNESS: Without reading it in detail, I did refer to this, did incorporate some of this. Now, if we want to look at each specific one, it will take awhile.

Q (By Mr. White) I'd just like to know generally what you pulled out of this?

A I looked at the way this was prepared, this was prepared, this was prepared, the very beginning

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of the investigation to put all these formations in perspective. We looked at this source, the source of these two books which all had similar type tables. We took each formation and pulled their information from each source side by side, looked at it. If one contributed something new we incorporated it. If it was a lot of duplication we then -- as I recall, if there was a lot of duplication we stuck with this one.

Q What happened in the case of conflict between the information of the various sources?

A I can't recall if there was conflict. I would have, I believe I would have included it. If you have a specific example.

Q I've got to save that for cross.

THE SPECIAL MASTER: Mr. White, I'm going to ask you to kind of hold it down because you really have exhausted the inquiry on these exhibits. He can't keep up, he can't survive the afternoon.

MR. WHITE: I might suggest, Your Honor, that we might want to break early with this witness because there will be a long

cross-examination concerning the groundwater study.

THE SPECIAL MASTER: I'm trying to save his voice for that.

MR. WHITE: I know, Your Honor. It's going to be a long period, we're talking about tomorrow as well as today.

MR. MEMBRINO: We have no -- We make no exception to the long cross-examination, but if we could keep the trial going in a discreet fashion and commit voir dire to voir dire we'll be better off.

THE SPECIAL MASTER: We're trying to.

Q (By Mr. White) Mr. Page --

THE SPECIAL MASTER: We might even have a night session tomorrow night because we're not going to be in session tomorrow afternoon.

Q (By Mr. White) Mr. Page, are you sure that you used Water Supply Paper 1375 as one of your sources?

A What was the title?

Q It's the last source of information listed on the bottom of table one.

A I used it in the preparation. It contributed

very little. I'm not -- I will not be positive in the final addition that much of that is included in here. Then again it was one of the four sources.

Q Are there any changes, additions or deletions that you'd like to make in any of your answers concerning table one?

A I don't believe so.

Q Mr. Page, I was handed two different table three's and I couldn't tell which one you were testifying about. I wonder if you could tell me which one of these two that I have in my hand we are talking about.

A This one, right here.

Q That's the one that has --

A Under surface water, surface water should be deleted. Without looking at it specifically, it should be, surface water should be deleted from that.

* * * * *

Q (By Mr. White) So the table three that is your exhibit is the one that has the source David M. Dornbusch on the bottom?

A That's correct.

Q In the title of table three, what is the difference between the term "Groundwater" on one hand and "Subsurface underflow" on the other hand?

A Groundwater in table two refers to the water, the groundwater -- well, in this case, essentially the Wind River Formation, those that are not hydraulic, continuity -- one of the major streams.

Q So what we are talking about, then, are those water sources --

THE SPECIAL MASTER: You didn't get a chance to finish, did you?

MR. WHITE: I'm sorry.

THE WITNESS: Yes, I did, but it died there, but as major rivers or streams.

MR. WHITE: I'm sorry, I thought you were pointing towards Exhibit 32, and I was trying to help you out by saying, does groundwater mean those formations in blue on Exhibit 32 which are below the surface deposits, is that what you are talking about?

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A For the most part.

Q What are the exceptions then?

A The exceptions would be any groundwater and terrace deposits or glacial deposits. It's a distinction between the subsurface -- the subsurface underflow with the flow in the alluvial channel, the sands and gravels in that confined channel that are either discharged or are recharged to the particular river above it.

MR. MEMBRINO: If it will assist you -- may it please the Court, it might assist the witness in making his explanation if he could use the chalk board.

THE SPECIAL MASTER: That is up to you. You can also use whispering only if you want to.

MR. WHITE: Why don't you --

THE SPECIAL MASTER: It might help with the throat problem.

THE WITNESS: Let me check one little thing.

(At this time the witness is drawing on the chalk board.)

If we had -- we have a river channel here (indicating); so this is the Wind River Formation, here's ground surface, we have the river

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flowing in here. This is sands and gravels of your alluvium along the particular channel. This might be consolidated rock, Wind River Formation. Definitely it is permeable. Well, then you can have your groundwater, but we are talking about underflow if the groundwater flowing in this channel in these alluvial deposits with -- you are looking at some connection with the river, either a discharge or recharge situation.

THE SPECIAL MASTER: Those would be sub-surface underflow?

THE WITNESS: Or if it wasn't connected, if it was an intermittent stream, it would still be underflow, underflow still includes the water flowing at generally the same direction as the stream, and semi-gradient.

THE SPECIAL MASTER: Mr. White, you will never have a better definition, given his strain.

MR. WHITE: I appreciate it, Your Honor. I have grown very fond of the witness during several depositions, and I look forward to the cross-examination.

Q (By Mr. White) So the subsurface underflow, then, page-voir dire-white

would be QA, the areas that are QA on Exhibit 33?

A Yes, the QA, and where they didn't differentiate it might include some QSA. You would have to look at each specifically.

Q Do you know how the values were developed for the water requirements shown on table 3, or was that information simply provided to you by Mr. Dornbusch?

A It was.

THE SPECIAL MASTER: You mean table 3?

MR. WHITE: I meant to say table 3, I'm sorry.

THE WITNESS: It was provided to me by the Dornbusch people.

Q (By Mr. White) What information on table 3 represents a professional opinion on your part?

A None of it in that case. It's just something used -- the purpose of the table was to show quantities of water that are taken from either of these two groundwater sources.

Q But of no knowledge with respect to the preparation of the table other than the informations given to you by Dornbusch?

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A That's correct.

Q And there is none of your work in this table?

A That's correct.

Q How did you rely on this table in developing any opinion which you testified to?

A I relied on this table mainly to indicate the magnitude of community water use on the Reservation. We had that slip-over chart --

MR. WHITE: I will get it over here. Just a second. Jim, could you help me?

(Brief pause.)

THE WITNESS: It's the one underneath, isn't it?

Q (By Mr. White) So you relied on that information in table 3 to develop the relative size --

A No.

Q -- of these circles?

A No.

Q No?

A The size of those circles are based on population, which didn't -- which would be proportional, but does not tell you the water being produced. This gives you, in the case of 1980, will give you an indication of the magnitude of groundwater

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use from -- for those communities. Those are population.

Q Well, how did you rely on that magnitude in forming any of the professional opinions that you have given?

THE SPECIAL MASTER: I wonder if that isn't argumentative? He said he did.

MR. WHITE: I thought he said he didn't, Your Honor. I'm sorry.

THE SPECIAL MASTER: The question was how did you rely, was it not --

MR. WHITE: Yes, sir.

THE SPECIAL MASTER: -- on the magnitude of those problems to form your opinion, and I feel the question leaves a little to be desired.

THE WITNESS: To my knowledge, a professional opinion, it was just presented as the magnitude of groundwater produced for these various communities.

Q (By Mr. White) So it's Dornbusch's figures for the magnitude and not yours, is that right?

A Right.

THE SPECIAL MASTER: I thought he answered it about five minutes ago by saying "Yes."

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Q (By Mr. White) Any additional deletions, changes to your answers with respect to table 3 --

A No.

Q -- that you would like to make?

Would you turn, please, to table 4. Is it correct that your work on table 4 is limited to the last two columns on the right?

A That's correct.

Q Is it true that the continuous pumping rates in the next to the last column simply arithmetically derive from the peak annual water use?

A That's correct.

Q Are those pumping rates the amounts -- strike the question.

Could you describe the methodology which you used to determine the information in the last column, water sources?

A It was the culmination of my general groundwater investigation of the Reservation. I relied on the geologic map there, and that overlay, we showed the location of the water uses.

Q Are you familiar with the Statement of Claims

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in this action?

A Not in detail, but yes, I'm familiar with the Statement of Claims.

Q Would you be able to show me where the values listed on table 4 appear in the Statement of Claims?

A I believe some of them have been revised.

Q Okay. Could we --

THE SPECIAL MASTER: Is that the United States' Statement of Claims --

MR. WHITE: Yes.

THE SPECIAL MASTER: -- or the Tribes'?

MR. WHITE: It's the United States', Your Honor.

MS. SLEATER: Your Honor, I'm afraid I would like to at this time --

THE SPECIAL MASTER: I'm going to sustain the objection. It has little to do with voir dire and might be more appropriate on cross.

MR. WHITE: Your Honor, I was just trying to determine the relevancy of the exhibit to this action which is based on whether it has something to do with the Statement of Claims.

THE SPECIAL MASTER: It has nothing to do

with voir dire of the exhibit.

MR. WHITE: I was voir diring table 4, Your Honor.

THE SPECIAL MASTER: Table 4, he stated his water source for the purposes to which they were listing an activity and water use, and if there is a distinction between this and the pleadings, that's for you to bring out, but I don't think that affects this witness' exhibit, Mr. White. I don't mean to go too far on this thing, but --

* * * * *

Q. (By Mr. White) Mr. Page, let's turn to Exhibit C-32.

A. Okay.

Q. You listed five sources of information at the bottom of that columnar section. Is it true that that columnar section is based primarily on WSP 1576-I?

A. That would be correct, yeah.

Q. Does it accurately represent the information contained in WSP 1576-I?

A. I believe so, yes.

Q. Have you checked it?

A. Yes, I did.

Q. Based on --

MR. WHITE: I'm sorry, Your Honor. That would be cross.

Q. (By Mr. White) I'm curious about a couple of items in Exhibit C-32. What is the Gross Venture Formation? Is that the Gros Ventre?

A. I'm not familiar with the name Gros Ventre.

Q. Let me give you 1576-I and direct your attention to page I-20.

A. A misspelling.

Q. Do you want to change the exhibit, or do you want to leave it like it is?

A. I would want to verify the spelling. I'm not sure this is (indicating) --

Q. Is the exhibit correct as it stands, or is that a misspelling, or is it a different formation from the Gros Ventre?

A. It's the same formation as the Gros Ventre, but what I'm wondering --

MR. MEMBRINO: Your Honor, I think what the witness is talking about --

THE SPECIAL MASTER: The Court knows what he's talking about, and the Court is losing its patience that that would be considered -- it has been misspelled a thousand times, and no one knows whether it's Big Wind or Big Belly, and it's hardly a thing to be raising.

MR. WHITE: These exhibits are being offered for the proof of their contents.

THE SPECIAL MASTER: I surely know what they are being offered for, Mr. White.

Q. (By Mr. White) Was this surface deposit of zero to 150 taken from 1576-I?

A. That specifically was not derived directly from this. We combined them, which shows alluvium can be as much as a hundred plus or minus feet.

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In this you have alluvium. It is just an illustrated figure up there.

Q. So the figures on Exhibit 32 are illustrative rather than being precisely accurate?

A. They are in the case of the surface deposits, and otherwise I believe they would be from this --

Q. Isn't it true that the Dinwoody Formation, for example, isn't part of the Chugwater Group?

A. That appears to be the case.

Q. And the symbols in the right-hand side are representative of sort of classical geological symbols. They are not supposed to represent the makeup of those formations?

A. No, not in the sequence they are shown.

Q. So these are illustrative?

A. They are just based on the basic description of rock, type of rock in there.

Q. Is there any place on the Reservation that you know of where this precise or these precise sets of stratgraphic units occur in the order shown here, or is this a hypothetical column?

A. They would occur in the order, but some may be missing, and I cannot say a specific location where all are present.

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Q. So this is a hypothetical column; is that correct?

A. That is correct.

THE SPECIAL MASTER: Is it not a column based on geologic age?

THE WITNESS: It is in their sequence and their relative undisturbed relationship is correct as shown on there.

Q. (By Mr. White) Turning your attention to Exhibit C-33, is this a map which is comprised of Plate 2 from our supply paper 1576-I?

A. That's correct.

Q. And are its contents or the representations made on that map correct and accurate?

A. To the best of my knowledge, they are. There are a few mislabelings on, I believe, where the color code doesn't match the letter T.

Q. Isn't it true that the geologic contacts on that map are approximate rather than being very accurate?

A. In some cases they would be. Other cases they would be accurate on the larger scale. I mean, they would be precise.

Q. You have got 1576-I up there. Would you please take a look at Page I 3?

A. All right.

Q. Doesn't it there say that all geologic contacts must be considered approximate?

A. Considered approximate, correct.

Q. Doesn't it also indicate that this map was developed from existing maps?

A. That's correct.

Q. And isn't it true that the existing maps upon which Exhibit 33 were based -- or was based or is based -- do not cover the entire area of Exhibit 33?

A. It's indicated down there on the right.

Q. Sure, there's a big area right up in the northern part of the Reservation for which there is no source material for this map; isn't that correct?

A. Yes, that indicates, yes.

Q. Do you wish to change, add or delete anything from your answers with Exhibit 33?

A. (Witness shook head)

Q. No?

A. No.

Q. Mr. Page, is it true that you used Exhibit 33A and 33B, the overlays, as a basis for reaching the professional opinions that are included in the last two columns of Table 4?

A. Not the overlays, per se; the original maps they were traced from.

* * * * *

MR. WHITE: Okay. Your Honor, at this time we would object to the admission of United States Exhibit WRIR C-31A on the following grounds. I should put a footnote there and say these objections are based on the offer being the truth of the exhibit's content. The witness was not able, with respect to table 2, to indicate the location of the yields which he estimated for terrace deposits and glacial deposits.

The witness was not able to indicate whether or not the degree of accuracy of potential yields listed in the second column were greater or lesser than fifty percent.

THE SPECIAL MASTER: I don't recall him answering that question like that. I remember him saying they were accurate.

THE WITNESS: I considered them accurate, but I was not going to put a percentage --

MR. WHITE: And I believe I asked him, Your Honor, could he say whether it was greater or lesser than fifty percent and he said he couldn't.

THE SPECIAL MASTER: So in your opinion that makes this exhibit untrue?

MR. WHITE: No, it's impossible to say that it's accurate --

THE SPECIAL MASTER: He just said it's accurate.

MR. WHITE: How could it be accurate --

THE SPECIAL MASTER: In his opinion.

MR. WHITE: I understand that was his opinion, but it's your opinion that counts, and I suggest or I would ask that you say it's not accurate for the truth of its contents if the witness cannot indicate that it is significantly greater than fifty percent likely to be true.

THE SPECIAL MASTER: Mr. White, let me ask you a question. Do you know anything in the science of hydrology or geology that can give you a more accurate figure on testing the thickness and values of the Wind River alluvium sands and of the reservation where we've gotten figures like this?

MR. WHITE: Yes.

THE SPECIAL MASTER: Without going to specific wells and specific places and pinpointing it down right to the acre?

MR. WHITE: The answer to your question is, yes, there is a better way. You've indicated

that way and the reason that it's important for the State to be very exacting in its objections here is that the stakes are very, very large. The witness's testified that there are approximately 365 acre-feet of water in storage. The claim purports to extend to the reserve right for groundwater, and I know as well as I'm standing here that when proposed findings of fact are submitted to you, it's going to be said, well, look at all the groundwater that can be gotten out of these formations.

The burden of proof is on the United States, and the stakes are incredibly large, and it seems to me that this Court is entitled to have information to sustain that burden that's better than a witness that can say he doesn't know whether it's greater than or less than fifty percent.

MR. MEMBRINO: Your Honor, I think Mr. White is arguing about the credibility of the exhibit, not its admissibility. Mr. Page has prepared this exhibit and is talking about estimated potential well yields. We're not talking about anything else at this stage. There is nothing in this voir dire that indicates that the exhibit

doesn't represent precisely what Mr. Page said it does, and with -- to a very reliable degree. It's qualified in terms of the range of potential yield, and I think it's a perfectly satisfactory exhibit and ought to be admitted.

MR. WHITE: Your Honor, if it were admitted to illustrate Mr. Page's opinion, I wouldn't have that particular objection, but it's not.

THE SPECIAL MASTER: Go ahead with your other objection; I know you got more.

MR. WHITE: In addition, Your Honor, the witness was unable to disclose the facts and many of the facts and data upon which he developed the saturated thickness and the permeability upon the values in column two of table 2 were based.

With respect to table 1 in Exhibit C-31A we would object to its admission for the truth of its contents as opposed to being illustrative of Mr. Page's opinion since Mr. Page is unable -- excuse me, since Mr. Page has indicated that qualifications such as the information being based on local data or data from areas other than that covered was not included, those limitations

were not included in table 1. He's unable to indicate with any precision where the information came from in table 1 except that it was based primarily on 1576-I, and with some input from the other areas. And I didn't press into the specifics of that input simple because of Mr. Page's voice problem. But I think the fact that it failed to include the footnote 3 out of 1576-I, which is a great limitation on the information contained in table 1, shows that it is not true and it's not, does not accurately represent the source as shown there. It may show -- represent Mr. Page's opinion, and if it were offered to illustrate his opinion, we would have no objection to it.

With respect to table 3, if it's offered for the truth of its contents, I think that it's a misoffer because all Mr. Page said was that he relied on the information in table 1 upon which to base his opinion, and if it were offered to illustrate the information upon which he bases his opinion we'd have no objection, but it's being offered for the truth of its contents and Mr. Page is simply unable to verify the truth of its contents since he didn't

prepare it.

With respect to table 4, we would object to table 4 in that it goes far beyond the issues which are relevant to the trial in this case. The claims in this case are substantially less than the values shown on table 4. For example, on the oil development on table 4 where 6,580 acre-feet were claimed or shown; the claim was for 2,000.

For natural gas, the values are 695 and 4,250 added up to 4,351 acre-feet, and about one-sixth of that was claimed, 766 acre-feet.

With respect to coal, it adds up to 5,300 feet, and the claim was for 3,000 acre-feet less. We have no problem with uranium. We do, I would object to the phosphate rock claim, which the exhibit shows to be 830 acre-feet. The Statement of Claim was for about half that, 318 acre-feet. And we got no problems with the amount shown for gypsum. So the basis of my objection to table 4 is its relevancy and materiality because it goes beyond issues raised by the pleadings in this case.

With respect to the generalized columnar section, which is the U. S. Exhibit WRIR C-32,

we would object to the admission of the truth of its content, not to illustrate an opinion, but to the truth of its contents, in that it does not accurately portray the information contained in the references. It contains generalized classical symbols on the right-hand side which Mr. Page indicated are just generally illustrative of what may be in those stratagraphic units. Mr. Page indicates that it's a hypothetical, and not an actual columnar, and while I respect Mr. Page's opinion very much, he has quite candidly said that there's no place on the reservation he could point to and say that that occurs.

That is a consolidation or a compilation of stratagraphic units and a description of those units from a variety of places. They all exist on the reservation, but not in any one place, and as he says, it's hypothetical, and therefore if it's offered for the truth of its contents, we object. If it's offered for illustrative purposes, generally what's happening, we've got no objection.

With respect to the geological map, it also is offered for the truth of its contents.

The publication from which it is derived says that the geological contacts or contact areas which are the areas between these various colors are only approximate, yet it's being offered for the truth of its contents. It's got a large area right up in here which has geologic contacts or geologic formations shown on it, and yet, as Mr. Page very candidly says, the map, this map is based on several other maps. And yet there is no other map for this white area. I don't know if the Court can see it from there, but it's this white area along this part, which includes generally this area in here (indicating).

And since this is an area of high mineral development, it becomes pretty important to know whether or not this map is true and we would object to it being accepted.

THE SPECIAL MASTER: Didn't the matter you're pointing to show the very omission you're pointing to?

MR. WHITE: That's true.

THE SPECIAL MASTER: It shows the omission.

MR. WHITE: That's correct, but the

contents in this northern central area can't be true because it shows a great white gap here, and so long as those contacts are shown as anything but a blank on this map, it's not an accurate representation of the sources. In addition, as I mentioned before, the publication from which this is derived says that these locations, the contact points between these various areas are only approximate. And the reason I'm concerned about the truth of the contents of the map is that we'll find Mr. Page made some analyses of the water and storage in the Wind River alluvium, and the accuracy of the location of these contact zones becomes all important because he calculated the area of water storage based on this map.

MS. SLEATER: Your Honor, I object to a preview of the testimony --

MR. WHITE: He's already testified, Your Honor.

MS. SLEATER: This is supposed to be limited to a discussion of the exhibits which should contain only the information on the exhibit as proper grounds for the objection.

MR. WHITE: Your Honor, he already

testified about calculating the water and storage before the exhibits were offered, and in addition, as you'll notice, there are mineral resources areas that are located in that blank area. And so we would object to Exhibit 33 as being offered for the truth of its contents because the main map on Exhibit 33 simply does not accurately represent the contact points between these geologic types, and it does not accurately represent what the source material in the lower right-hand corner would show.

Now, I think, Your Honor, I would have a technical objection on the ten day rule, but I'd be hard pressed to convince the Court that I didn't have plenty of time to look at these, so I'm going to waive the objection.

THE SPECIAL MASTER: The Court's ready to rule on the voir dire.

MR. PARISH: Your Honor, I do have several questions I would like to ask on voir dire.

THE SPECIAL MASTER: All right, proceed.

Would the reporter's want a break or are you all right?

MS. RACINE: We would appreciate a break, yes.

THE SPECIAL MASTER: All right, we'll proceed in ten minutes.

(Thereupon a 10 minute recess (was taken.

* * * * *

THE SPECIAL MASTER: Are we ready, ladies and gentlemen? Okay, would you proceed, please.

MR. WHITE: Your Honor, I just want to add one more grounds to my objection, and that's the standard one about reserved rights not applying to groundwater, and I will sit down.

THE SPECIAL MASTER: All right.

MR. PARISH: Your Honor, although I sort of have a feeling how you are going to rule on Mr. White's motion, I have to ask a few questions on behalf of the City of Lander, but none of my questions have to do with that. I will just put it there for the record.

VOIR DIRE EXAMINATION

BY MR. PARISH:

Q Mr. Page, I'll turn your attention to table 4 of Exhibit C-31-A. Now, I simply have a question. I don't know exactly what that is stating as far as the right-hand column labeled "Water Sources." Is that -- does that column purport to say that the amount of water that is claimed to be necessary for the particular activity in the left-hand column can be gotten from those formations or that the water from

those formations is a useable source for the activities specified?

A The answer to your question would be both. It is a useable source and it can be obtained.

Q So in other words, to take the first one there, the Wind River underflow and --

A That's existing already.

Q Okay. So are there any water sources listed there for any particular type of acitivity that are not in current use? You will have to forgive me not being here for the other days of the trial.

A Well, you can look on the second column from the left, the top three are marked "Existing" in parenthesis.

Q I see, okay.

A And then the rest are --

Q Okay. The rest are prospective only?

A That's correct.

Q Have you performed any tests or do you know of any tests for the ones other than the existing uses to tell whether that -- those water sources listed there, the water contained in those sources, would be useable for that

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particular prospective activity?

A Our conclusions on that column were based on the culmination of the groundwater study where we had specific information. It was a professional conclusion based upon my overall study of the Reservation.

Q So it was your professional opinion the water in those listed sources can be used for those activities, is that correct?

A That's correct.

Q Was that based upon any actual tests of the quality in composition of those waters?

A In one case. For instance, the pump tests there near the -- on the Wind River, we indicate for the electric generating plant in the same general area. There would be a test in that area.

Q There was --

A That was an example where we had a test. Then we looked at existing data that was available in the other areas, and then based professional conclusions.

Q But in some areas there was no actual test of the quality of the waters coming from those

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particular aquifers?

A You mean quality, water quality, chemical quality?

Q Well, yeah. What I'm getting at is I would assume, perhaps, you can only use water with certain types of chemical compositions for uranium development or something.

A That was not a specific consideration, the water quality for industrial purposes in the selection. This is for a physical availability of water.

Q So then the right-hand column, except for the existing uses, perhaps, does not purport to say that water from those aquifers could actually be used in those activities?

A From a water quality standpoint?

Q From a water quality standpoint.

A That's correct.

Q Okay. What are some of the factors that go into determining what the yield of a particular well will be from an underground source? I don't even know the terminology.

MR. MEMBRINO: Your Honor, I think that line of questioning was examined by Mr. White in describing how Mr. Page arrived at the figures

in his, I believe, table 2.

THE SPECIAL MASTER: I thought he went into this in detail with the wells on the Wind River, the wells on the alluvium and down through the seven or eight classifications.

Q (By Mr. Parish) Okay. Let me -- I think what they are is something having to do with transmissivity and permeability and saturatedness and all that sort of stuff. Can those qualities change over time in one given formation?

A Specifically it could stay in an unconfined aquifer you could have as water levels drop your saturated thickness would drop, your transmissivity would drop.

Q In an unconfined aquifer. In a confined aquifer would it change?

A If you do not dewater or drop your potentiometric surface below the top of the aquifer itself, it remains saturated.

Q But there are at least some potential circumstances under which those qualities could change in almost any given aquifer?

A I wouldn't say almost any given. It's a little too broad.

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Q Okay. But at least the possibility of change is not what you would call a remote thing, it can happen?

A Change occurs in some situations, yes.

Q And those factors can also be affected by development of the surrounding land, can it not?

A Could you be more specific?

Q Well, I don't know. I would assume if you built a city on it -- on a piece of ground and, therefore, kept, let's say, the precipitation from seeping into the ground, that that would have some affect upon things?

A In this particular area it wouldn't because your direct recharge from precipitation is very small.

Q Very negligible, but if you have heavy industrial development, would that have an affect upon these factors?

A You mean just of the existence of the industrial -- no, I can't say unless you have a specific example in mind.

Q I think what you are probably trying to say is it would probably take quite a bit if it was

going to affect it?

A No, I don't -- you know, I'm not -- I cannot say quite a bit at all. Right now I can't picture the situation you are describing on how it would affect the groundwater, just the existence of this industry, without being specific.

THE SPECIAL MASTER: Do you want the record to reflect that if you were to drill 40 wells to serve a coal slurry pipeline, that in 50 years it might affect the recharge capacity of the aquifer?

MR. PARISH: It has political overtones, but that's what I'm talking about.

THE SPECIAL MASTER: I mean, it's a geological fact, that's what you're trying to say?

THE WITNESS: That's how I understand it.

MR. PARISH: Like I say, I don't know how to state it. Let me get on to my point here.

Q (By Mr. Parish) Okay. Most of your data, at least for table 1 and for about half of table 2 on Exhibit C-31-A came from some U.S. Geological Survey information, correct?

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A That's correct.

Q Okay. And just look through at the sources listed at the bottom of table 1. Most of those sources there seem to have been generated either in the '60's or the late '50's, the papers have dates on them to that effect.

A That's correct.

Q Okay. Do you know, and I frankly don't, I haven't read them, were those studies and all of the information that they came up with based upon, let's say, a 20-year study of the region or was it a study for just 1969, say, for 1576-I?

A Well, the information, it's abstract in here from which they generated what was pulled on this. It is not essentially a time-orientated situation. The geology has been there, it will be there. The distribution of the materials, the well fields will not change. In the situation of the Wind River Indian Reservation, the groundwater supplys then and now are still in a state of virgin conditions, if you want to use that term. They have not been drawn upon heavily, so if you are referring that these

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water levels have yields higher than they are now, the answer would be without specifically looking at a well, particularly on the alluvium where you would have this affect, the answer would be no. You might have a drop in potential metric services, but from one information, up-dated information, that doesn't -- in at least the last several years, does not seem to be a problem.

Q I understand what you are saying, that it's very -- any change would be slight or negligible, but you just mentioned -- I thought you did -- there could be a drop in potential metric services, or whatever, and I thought we had established that could have an affect.

THE SPECIAL MASTER: Let's avoid the repetition if we can for the sake of the throat, and I think the answer is yes; I think you have said that already, is that right?

THE WITNESS: I'm just saying that there could be some type of changes, a few changes since that date to the present, but I don't think it reflects what is shown -- would affect what is shown on table 1 because the alluvium

where you could have the affect of the well yields, you know, you're dewatering something on a permanent basis. That has not occurred. If it gets dewatered in a pumping scene, and then it is recharged during the runoff season, the only difference is nowadays there would be more available data, well data, than they had then.

Q Okay. I won't press my point any further, but there could be some slight variation between today and the figures they generated back then, however slight.

A There could be.

MR. PARISH: Thank you, Your Honor. I won't present any additional grounds for objection, I just join in Mr. White's.

THE SPECIAL MASTER: You join in the motion previously made?

MR. PARISH: Yes.

THE SPECIAL MASTER: I'm ready to rule on them.

On U.S. WRIR C-31-A, table 1, 2, 3, 4; and C-32 and C-33 with its overlays -- they are not numbered separately, are they?

MR. MEMBRINO: Yes, they are, Your Honor.

MR. WHITE: Yes.

MR. MEMBRINO: They are designated C-33-A and 33-B.

THE SPECIAL MASTER: All right. And 33-A and B. I want to respond as best my notes and memory will let me to each of the objections, because I did give them serious consideration.

As to these exhibits being totally truthful, I believe they touch such a subject matter on which there is no such things as total truthfulness known to man. I think the geology is not that an exact science, it is a relatively new science. It's thrust on us in the last 150 years, and since Cheswick (phoenetic) himself and the first authors of geology and Darwin himself, there has been a vast field of what is known and unknown and what is the probably and what is tentative, and from that comes truth man can recognize and live with. Therefore, I think that 32 in particular meets the test of representation for purposes of this lawsuit, and I recognize that the State may very well find some unique distinctions other than misspellings that are in 32.

31-A and B, the same token based upon USGS materials and upon the evidence of the witness, and while its figures may vary on the potential yield, I don't know how we are going to get to something much closer unless we want to take the next 40, 30 years to go into well fields with measurements on them, week to week, month to month, year to year, measure the recharge capacities and go into such detail.

We could challenge them for that reason.

The objection that the claims were lower on soil is a very serious objection, and one that I should like to rule upon except for the fact there are two sets of claims in the case. The United States' claim was lower, but the Indian claim was not, and this conflict between the Indian claim and United States' claim is quite a matter before me because I wonder why there could be such a disparity between the trustee and guardian, and this is one of those cases, but I don't think it is sufficient to say I have to throw out 31-A, but I recognize it.

* * * * *

MR. WHITE: I was under the impression, Your Honor, this was the United States' and not the tribes' case in chief.

THE SPECIAL MASTER: Well, that's true, but the pleadings -- your objection is based upon the difference between the pleadings and --

MR. WHITE: That's correct.

THE SPECIAL MASTER: And the pleadings include the tribes --

MR. WHITE: Not for this case, Your Honor.

THE SPECIAL MASTER: They certainly do. Am I supposed to ignore the mountains of pleadings I have in my office that all of you have filed?

MR. WHITE: I won't argue with you.

THE SPECIAL MASTER: I know you would like for me to ignore it, but I can't. It's a claim of tribes in this case, so that being the case, I think that these exhibits will be -- these exhibits are ordered admitted. How much ultimate reliance I place upon them compared to other exhibits depends on my own weighing of these exhibits and my determination of the facts and evidence before me, so they are in evidence.

THE SPECIAL MASTER: Mr. Membrino?

MR. WHITE: Could I just get a clarification

They are in evidence for the truth of their contents or for illustrative purposes?

THE SPECIAL MASTER: Some are for illustrative purposes, but most are for the truth of their contents, and I recognize that some have no capacity for factual truth, you know.

I would like to comment on the geologic differences between the boundaries of those areas. There's no way of accepting something much more careful than this as far as the geologic description of that area in my opinion.

MR. MEMBRINO: I just have a couple more questions on direct.

Q. (By Mr. Membrino) Mr. Page, I refer you to Table 4. Earlier there was some discussion about the use of water for reinjection purposes, and I would like you to tell the Court how that water is retrieved and how it's used. I'm speaking specifically on Table 4 of the enhanced recovery, the existing enhanced recovery.

A. Well, the source of --

THE SPECIAL MASTER: Maybe I can save the throat a little bit more.

I believe your testimony was that most --

some of this water in large amounts is recycled and used over?

THE WITNESS: It is all recycled.

THE SPECIAL MASTER: And in the process of bringing the oil up, some water is brought up and it's recycled, and the net loss -- the testimony left me in the air on this question as to how can there be annual use of 6,000 feet without there being a discharge somewhere, and that has not been -- or regeneration into some structure where oil has been taken from, and that has not been answered to my satisfaction.

MR. MEMBRINO: That's precisely the question he wants to answer.

THE WITNESS: It is my understanding now in the case of particularly Steamboat Butte all the water that is pumped is utilized. There is no discharge. It would be --

THE SPECIAL MASTER: Reinjected?

THE WITNESS: Reinjected. In the case of Winkleman Dome, some of their produced water is released -- is discharged to the ground, and it's my further understanding that some of that water is used for irrigation of 112 acres.

THE SPECIAL MASTER: It's obviously picked up

by downstream users?

THE WITNESS: Yes, apparently it's discharged.

Q. (By Mr. Membrino) I would like to get clear your professional opinion on three issues. The first one is would you give us your opinion about groundwater, potential groundwater maintenance on the Reservation?

A. I mentioned before the groundwater on the Reservation has hardly been developed. It is essentially in its virgin condition and, as a result, it's my professional opinion that we cannot determine an accurate pereniel yield or safe yield to any specific.

Now, with regards to its future depletions, its future things, the only way we can do this is to monitor the groundwater supplies, and a monitoring program can be set up such that when development occurs an indication can be determined that you are starting to get some of these adverse effects and then you can make a groundwater management decision at that time regarding the status of the groundwater sources.

Q. To a layman, if you were describing groundwater conditions as being in virgin condition, would you describe that as a good condition or a bad condition?

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A. A what?

Q. A good condition --

A. Did you preface that as a layman?

Q. -- as a virgin supply or a virgin condition?

In explaining that to a layman, would you tell him that that is a good supply, that is a plentiful supply of water?

A. Well, it's plentiful where you are at, yes. I mean, you could have virgin conditions in the Mohave Desert and it's pretty hard to convince somebody --

THE SPECIAL MASTER: That's true.

MR. MEMBRINO: You have me there.

THE WITNESS: I didn't mean to get you.

MR. MEMBRINO: I'm touched. Let me proceed.

A. (By the Witness) No, in the case of the Reservation, you would have virgin conditions, yes, that would be -- it would be nice. I mean, it would be -- you'd have abundant water particularly in your --

THE SPECIAL MASTER: May I ask a question? Would you indeed with such virgin conditions of great aquifer and groundwater be so good that you would have no need to ever tap surface water for

construction of power plants? Isn't that a fact?

THE WITNESS: Well, it depends -- there are other aspects.

THE SPECIAL MASTER: We've got one there, haven't we?

MR. MEMBRINO: There is an important issue here, Your Honor.

THE WITNESS: There are economic aspects that would probably be the bottom line.

THE SPECIAL MASTER: Of course. Considerations for all other human beings all enter into this.

Q. (By Mr. Membrino) Once again, my second point is I want to get clear for the record your professional opinion about the water in storage in the alluvium on the Wind River Reservation.

A. Yes.

Q. Would you tell the Court what your professional opinion is as to that amount of water in storage?

A. The quantities in storage?

Q. Yes.

A. The total -- the number is about 360,000 acre-feet are in storage under full or essentially present conditions.

Q. Thank you.

A. Do you want a more specific breakdown?

Q. No, that is fine. Finally, turning your attention to the Exhibit WRIR C-33 and its overlay, 33B --

A. What overlay is that?

Q. That is the mineral and resource development.

A. Okay.

Q. Is it your professional opinion that there is sufficient water available, groundwater available, for the development of the resources described and the requirements for development of those resources described in that Exhibit?

A. Yes.

MR. MEMBRINO: Thank you.

THE SPECIAL MASTER: Let me ask two or three questions, and I hope you can answer them in just a few words.

Please define for me the distinction between permeability and transmissivity. Is one horizontal and one vertical?

THE WITNESS: No, permeability is -- I'll try to -- is for a unit, a square foot, let's say, and transmissivity is the sum of those.

Say you have an aquifer that is 20 feet thick.

Permeability is the characteristic of the aquifer property, not all aquifer, of the sands and gravel, the open spaces, and so it is the number of a foot of it, a square foot. It's a quantity of water that can be transmitted through a cross-section.

THE SPECIAL MASTER: And does that depend upon the porosity of the material in that square foot?

THE WITNESS: There is a relationship, but it is not fully dependent on porosity.

THE SPECIAL MASTER: Okay. Now, then, transmissivity.

THE WITNESS: Okay. Transmissivity is just the sum. You have defined sort of the flow characteristic of the aquifer. Now you have -- if you have 20 feet of aquifer, you have 20 of those little squares. You have 30 feet, so that product is your transmissivity.

THE SPECIAL MASTER: All right.

Q. (By Mr. Membrino) With your indulgence, Mr. Page, I want to make one thing clear. You gave your opinion that there were 360,000 acre-feet of storage of water stored in the Wind River alluvium.

A. No, that's the total alluvium, of the ones we

evaluated.

Q. Now, would you tell the Court what the principal source of that water in the alluvium is?

A. Well, the principal source are the surface streams that traverse that alluvium.

Q. What will happen if substantial amounts of that water in storage in the alluvium is withdrawn? What effect does that have on the surface?

A. That's a function of the time of pumping and the amount of pumping, but with a significant withdrawal, you will be getting -- inducing more surface water or diminishing the surface water supply in that particular area of pumping.

MR. MEMBRINO: Thank you. Your Honor, I think that's all the questions I have at this time.

THE SPECIAL MASTER: Very well.

MR. ROGERS: Your Honor, I have a couple of sets of questions.

CROSS-EXAMINATION

BY MR. ROGERS:

Q. The colloquy you just engaged in about the use or the interrelationship between the surface water and the alluvium, do you understand the

claim of the United States for use of surface water to include pumping from the alluvium?

MR. WHITE: Objection Your Honor. It calls for a legal conclusion.

MR. ROGERS: I just asked him if he understood the claim of the United States to include the use of surface water --

THE SPECIAL MASTER: He can answer yes or no, but that's about all right now.

THE WITNESS: Are you asking me then is the claim for both under surface flow and --

THE SPECIAL MASTER: Repeat the question again, would you, please?

(Thereupon the last
(question was read as
(follows: "Q. The colloquy
(you just engaged in about
(the use or the inter-
(relationship between the
(surface water and the alluvium,
(do you understand the claim
(of the United States for use
(of surface water to include
(pumping from the alluvium?)

* * * * *

THE SPECIAL MASTER: Do you understand it?

I'm going to let you answer. I think it's not a legal conclusion, and his expertise. Go ahead.

THE WITNESS: They are definitely connected and by pumping from the alluvium, it would be taking surface water. From a legal standpoint, I'm not going to comment on the legal basis.

Q (By Mr. Rogers) My question was not seeking any sort of legal conclusion, I was trying to obtain your understanding of the facts of the claim of the United States as to whether or not you knew whether any of the uses they claim from surface sources whether they intended those to be in any way pumped from the alluvium.

A No, they did not.

Q Thank you.

MR. WHITE: I'd move the question be stricken or the answer be stricken, and I object to the question because when I tried to get the witness on voir dire to examine the Statement of Claims I was not allowed to do so,

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and as part of the cross examination the witness is asked to interpret the Statement of Claim, and if Mr. Rogers' question and answer hold up, then I'd ask that I be given the same indulgence in my cross examination.

MR. ROGERS: Your Honor.

THE SPECIAL MASTER: Just a minute. If the question just asked -- and I was too busy writing to hear it -- dealt with the Statement of Claims and something in it, it is hereby stricken. The answer that I heard and will permit on the record was as follows: "By pumping from the alluvium you would be taking surface water." That will stay in the record.

MR. WHITE: I got no objection to that, and withdraw my motion to that.

MR. ROGERS: Your Honor, maybe I should clarify the reason why I'm standing up here. I understood I was up here in cross examination not here voir diring the exhibits. I understood that I was in cross examination and therefore I should be able to inquire into Statement of Claim.

MR. WHITE: Well, Your Honor --

MR. ROGERS: Mr. White earlier was in voir dire and he will have his opportunity for cross examination.

MR. WHITE: Your Honor --

THE SPECIAL MASTER: I thought you were bringing some information from your witness on direct not on cross, Mr. Rogers, but you have not yet examined him or interrogated him. Now, if you wish to say you're cross examining your own witness, I --

MR. ROGERS: Well, Your Honor, this is not my witness. I am standing here representing the Tribes.

THE SPECIAL MASTER: The line gets pretty fine between who is and who isn't with the United States and with the Tribes.

MR. WHITE: That's right, Your Honor.

THE SPECIAL MASTER: But I ruled on this, let's move ahead.

MR. ROGERS: I would like to clarify what I am permitted to do then because I understood from the previous rulings of the Court when the Tribes have -- what I have done is cross examine the two previous witnesses

and that Your Honor was considering it a form of cross examination.

THE SPECIAL MASTER: Continue with your examination, cross or otherwise.

MR. ROGERS: Well, I'm happy with what I've gotten. I got what I wanted out of the question, and do I understand that you did not strike it?

THE SPECIAL MASTER: I struck one question I didn't even hear, and if you want to repeat it -- I'm just as human as the rest of them.

MR. WHITE: Maybe I could help clear something up. If counsel for the United States will stipulate that I can inquire into the Statement of Claim, I'll withdraw my motion to strike, and his answer will stand as was given rather than repeated by the Master.

MR. MEMBRINO: I don't believe Mr. Page should be questioned about the legal aspects of the United States' claim. He was hired to do technical research and that's what the examinaton ought to be confined to.

THE SPECIAL MASTER: I don't think he

should be questioned on the legal contents of it either, but I think the material, the mathematical figures on it, what we have gained, would be -- can come in.

MR. ROGERS: I think there are two of us talking in two different directions. I think Mr. White and I are beginning to be on the same wave length. And it's my understanding that he will be entitled on his cross examination to inquire of Mr. Page about the Statement of Claim.

THE SPECIAL MASTER: Yes, and you have no objection to do that and nor do I.

MR. ROGERS: I have no objection to that.

MR. WHITE: I just want to make sure that's the case and the United States joins in with that agreement and I will withdraw my motion to strike.

THE SPECIAL MASTER: Very good. Then it stays in the record. Proceed.

CROSS-EXAMINATION CONTINUED

BY MR. ROGERS:

Q Let me restate the question, Mr. Page. Are you

aware of the United States' Statement of Claim with respect to diversions of surface water for various purposes?

A Yes.

Q Is it your factual understanding of those surface water claims that they would be purely surface diversions or will some of those involve pumping from the alluvium?

A To my knowledge they're purely surface water diversions.

Q Thank you. Earlier in the direct examination I believe the Master made inquiry about the effects beyond the reservation boundaries of withdrawals from groundwater within the reservation. How many of the aquifers that are displaced on Exhibit C-33 extend beyond the reservation boundaries?

A Speaking of the aquifers in blue, there are --

THE SPECIAL MASTER: I have to ask that the question be clarified because C-33 is not an exhibit of aquifers, it's an exhibit of formations. Now, Mr. Rogers, if you substitute the word formations for aquifers --

MR. ROGERS: Formations is the word I

meant to use.

THE SPECIAL MASTER: All right.

MR. WHITE: Your Honor, the witness was looking at Exhibit 32, I think when he's answering. You mean 32 or 33?

THE SPECIAL MASTER: I meant 32 and so did Mr. --

MR. ROGERS: I meant 32 as well, Your Honor.

THE WITNESS: I'm looking at 32.

THE SPECIAL MASTER: I'll make the numbers bigger, I've been wanting this done for two days.

(Off-the-record discussion.

THE WITNESS: Essentially all of the deeper formations, all the formations with the exception of some of the local surface deposits extend off the reservation.

Now, I believe that would apply to the Wiggins Formation, Tepee Trail and Unnamed Tuff, and Aycross Formation. They have small outcroppings. Some of the are up in that northeast corner.

I would believe they would go off the

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reservation, but the major, from there down are off the reservation including the Wind River Formation and the exception would be the surface deposits and I think the Popo Agie, some of those surface deposits would be off the reservation.

Q (By Mr. Rogers) As I understand your answer, then the deeper formations would extend even further away than just a short distance off the reservation?

A Oh, very definitely.

Q Do -- Can you tell us whether those formations that go great distances beyond the reservation boundaries, do they extendin a westerly direction beyond the Continental Divide, or is there a single easy answer for all of the formations?

A I am familiar with them extending eastward and northward; westward, I can't answer that question. A lot of them you can see where starting on the west part of the reservation. There you get in the granitic rocks, they're just being trimmed off, but I can't say for sure their extent, but I do know they go to the north of the Big Horn Basin to the west and -- I guess I mean to the east and northeast, Powder River Basin and beyond

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in some cases.

Q Based upon what you know as a professional or what you have studied for this case, do you have any sort of opinion as to the general effect of the withdrawal from those extensive deeper formations to points very distant from the reservation in the north and easterly direction?

A Well, it's my opinion you won't have an affect at very great distances from the withdrawals in this area.

Q In other words, if there were a level of development that might occur, as contemplated in the United States' Statement of Claims for the Tribes, are you stating that in, at some hundreds of miles distance from the reservation, as the Master inquired, that that would not have a significant affect on the formations that far away?

A I've not studied the regional geology in that way, but it would be hard for me to believe it would have an affect hundreds of miles away. The level of development, that is really relatively small from these aquifers because of their depth, deep occurrence throughout most of the reservation, that development probably remains restricted.

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Q Is it -- Do you know whether or not there is a great degree of recharge of those same formations contributed from the general area of the reservation that would perhaps restore or recharge?

A Undoubtedly they're getting some recharge where they outcrop on the flank of the Wind River Mountains and in the Owl Creek Mountains, streams pass over the outcrop areas. That's just one of the recharge areas that you look at, and, of course, where they extend a hundred miles away they have many rechargers at other places.

* * * * *

Q (By Mr. Rogers) Would significant withdrawals of groundwater for large scale purposes, say, in the Powder River Basin of the state, are even more eastward or northward, have an effect on the levels of groundwater in those formations on the Reservation?

MR. WHITE: Objection, Your Honor. No foundation.

THE SPECIAL MASTER: Objection overruled.

THE WITNESS: I don't believe that's the case. That would be a situation that would occur.

Q (By Mr. Rogers) So that there would not be -- the effect of withdrawal eastward and northward would not have an effect, a great significance, if any, on the Reservation, is that it?

A Yes, that's my belief.

MR. ROGERS: Thank you. I don't have any further questions.

THE SPECIAL MASTER: Off-the-record.

(Off-the-record discussion.)

MR. WHITE: Your Honor, what is the pleasure of the group? I have probably five or six hours of cross-examination.

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THE SEPCIAL MASTER: Why don't we go another hour tonight, if you can stand it, and that cuts off an hour from tomorrow and we will get done tomorrow morning, unless you can think you can get it done tomorrow from nine o'clock to twelve, that's three hours. But we are going to break up at twelve o'clock tomorrow. I have to go to a funeral.

MR. WHITE: I understand.

THE SPECIAL MASTER: I guess we can come back later in the afternoon, but I already told somebody we would not meet Friday afternoon.

MR. WHITE: My point was, I probably will not finish cross-examination before we break on Friday, and if we want to break now and save the witness' voice, we should, if we are going to get three quality hours in tomorrow. I don't care.

THE SPECIAL MASTER: I am willing to go an hour more if everybody else is.

MR. MEMBRINO: Mr. Page, is that all right with you?

THE WITNESS: That's okay.

THE SPECIAL MASTER: As long as you are not in pain.

THE WITNESS: No.

MR. ROGERS: Your Honor, may I also suggest

that in order for the continuity of the trial, would it be -- would all be amenable to possibly going another hour now and beginning at eight o'clock in the morning so as to have four hours in the morning under our belts?

THE SPECIAL MASTER: That's agreeable with me. Does everybody want to be here at eight o'clock in the morning?

MR. WHITE: That's fine with me.

THE SPECIAL MASTER: All right, fine. We will go now until five o'clock or 5:30 and we will convene at eight o'clock in the morning.

Mr. White?

MR. WHITE: Can I have just a minute? I have some notes misplaced.

THE SPECIAL MASTER: Do you want to take a minute or two?

MR. WHITE: Could we, please, Your Honor?

THE SPECIAL MASTER: All right. We are off-the-record for a couple minutes.

(Whereupon, a short recess was taken.)

MR. WHITE: Your Honor, I'm reminded I stepped in out of order. Private counsel has first crack on cross after the Tribes, and I apologize to

the Court and private counsel.

THE SPECIAL MASTER: Either way is fine. Private counsel may begin on cross.

MR. PARISH: Thank you.

THE SPECIAL MASTER: You bet. We are in session.

CROSS-EXAMINATION

BY MR. PARISH:

Q Mr. Page, first of all, as to your opinion that there are approximately 360,000 acre-feet of storage in the alluviums that you studied at least on the Reservation, I guess I didn't quite understand how that was computed. How did you total all that up?

A Just a moment, please.

(Brief pause.)

What we did, we took all the available cross sections, some of which are published -- all published at various sources, USGS had them for their studies, various studies for dam sites had them, we took those cross sections, we -- and although the existing well information we had, and from that --

THE SPECIAL MASTER: Please stop. Please

read to me what he said so far.

(Whereupon, the Reporter read back, "A Just a moment, please. What we did, we took all the available cross sections, some of which are published -- all published at various sources, USGS had them for their studies, various studies for dam sites had them, we took those cross sections, we -- and although the existing well information we had, and from that --.")

THE SPECIAL MASTER: Will you proceed, please, and from that --

THE WITNESS: From that we determined the saturated thickness of the various alluvial bodies under essential full conditions -- okay, so we have the saturated thickness. From the cross sections we also used the cross sections to -- I will backtrack. You look at your outcropping area where the alluvial outcrops. That's a surface expression. Besides that channel are not vertical, so they're sloping to various degrees. In the wider parts of the channel by Riverton it's pretty vertical. You get further upstream and it becomes more v-shaped, so we had to account for that because it's not like taking a whole slice, we had to reduce page-cross-parish

our area. You can apply the reduction factor to the area or volume, reduce what we call sort of the average saturated area. We did that from the cross-sections where we had them. That resulted, as I recall, in reductions anywhere from maybe 75 to 95 percent. Then we analyzed the drillers logs that describe what was penetrated below the water level by the wells, and utilizing another U.S. Geological Survey publication, and I cannot right offhand give you the number, but they have specific yield, and that is the quantity of water that can be yielded from the formation to the well. It's less than the porosity. You can have some porosity, but the water cannot escape or drain from gravity from that, so the specific yield is a lower number, anywhere from three percent for clay, I believe, and it can get up above 30 percent or above, in the 20's, for some clean gravels or sands.

So from that we looked at those logs and determined average or composite specific yield for any of the creeks we had there. The USGS in Water Supply Paper 1576-I discussed -- I'm page-cross-parish

not sure what they might have used, but they are talking about ten percent and applying it overall in their water supply paper, and Owl Creek they were saying if it was 20 percent you would have this much. Our values ranged from 13, I believe, to 18 percent.

Because the distribution of the well information we had was not uniform, I made the decision to use 15 percent. In other words, I used the log information to kind of confirm and overall -- I applied an overall value as did the USGS --

Q And you picked sort of the middle of what changes they --

A We found what they said, what I have used in other work and from that you take the saturated -- well, from the saturated thickness in your area you get a volume, and from that volume you apply that percentage, the 15 percent. I mean, that is the total quantity in storage.

Q It would just seem logical to me, I'm probably wrong, that somewhere along the way I would have to know the total volumes of the alluvium, would you not?

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A The saturated alluviums. That's what we did. We essentially had the area and we had the average saturated thickness adjusting the thickness. That product is your volume -- right, area times the volume, that's it.

Q Okay. Now, in getting that saturated thickness, you mentioned at some points the size of some streams are more vertical than others, and that makes a difference on the volume.

A Correct.

Q Because you don't get a full slice. Did you actually go out and measure the angles on a lot of these streams?

A No, we used the existing cross-sections that were available to us. I believe all of them were published in various sources.

Q Like USGS --

A Well, I know -- it's an approximation in 1576-I, yes, several on the rivers. We picked some up -- dam sites, when they drill for dam sites they define the channel. We had that information.

Q Okay. Now, again, it would seem to me only logical that the size are certainly something the angles of them are certainly something that

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could change with time; you have a flood go down there and it is going to carve out a bigger channel at a different angle, right, so the angles in the '69 USGS thing are not accurate, it would seem.

A What we did, the saturated portion is essentially below the scouring line. I mean, we are looking at subsurface, it doesn't mean the river couldn't scour into that. All right, we had that contact there. What we did, I had my people get the USGS topographic maps, seven and a half quadrangles, I believe, and I said we want to look at the configuration based on the topography. Usually you see the bank and it drops down, and we used that to guide us in the validity of those banks, and sure, I don't know the dates on those topographic maps, they probably varied, but --

Q I was just going to ask you that.

A But that's one factor. That's why we say we estimated the groundwater in storage.

Q That's fine. I understand this, as the Master has said, it's not an exact science, but I'm just trying to find out from where you got your

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information. Fine. Thank you.

I would like to move now to the terrace deposits, if I could. If my notes are correct, I got the idea that the way you estimated those was that there is sort of a standard storage in terrace deposits for a set volume of saturated feet, is that correct?

A No, no. We applied the same -- we did sort of the same situation, but we had fewer wells than those. So I can't tell you whether we had three water level measurements, ten water level measurements, I cannot tell you that, but I did not feel we could say full saturated thickness under full terraces. We looked at some terraces with the general information, I forget the specific values, but maybe the USGS 1576-I terraces range in thicknesses -- well, it might be on this (indicating) no, apparently they didn't.

But I picked -- okay, where drained, so maybe with the drained you might still have five saturated feet. Full, you might have 20. Essentially the terraces were not important after I got to know them, so to speak. Anything

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that's just dependent on man's recharge of it, irrigation, it had to depend on development above it, it did not -- I didn't consider a major -- or a significant source of groundwater, and I just essentially said, fine, we have looked at them, that's it.

* * * * *

Q (By Mr. Parish) You have mentioned that those terrace deposits get recharged, I think, from return flow and precipitation?

A Precipitation would be pretty small, the quantity of it.

Q Return flow from other activities then?

A That's right. That's why you would have irrigation above it.

Q Did you ever do any actual -- I don't know -- tests to determine what that return flow was in those areas?

A No, I didn't.

Q So how did you sort of estimate what it might be?

A I didn't. I just assumed that it would -- that with the return you would get twenty feet of saturated thickness.

Q What is that assumption based on?

A The assumption is based on some information I had on the thickness of the terrace deposits, looking at topo maps. I do not recall, but I believe we would have had a least a few logs for showing the thickness of the terrace deposits.

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In other words, you could say maybe twenty feet would be the maximum capacity, and then draining -- it could drain down to one foot, you see. Your edges of the terrace deposit, depending on the direction of drainage, would probably be drained down to almost nothing.

You would anticipate your drainage occurring where these terraces are staying in contact with something like the Wind River Formation, some barrier type situation, a less pervious material, but essentially doing that, we had that capacity, and that's where we left it.

I mean, it was just general assumptions and definitely I can't say this terrace is that (indicating).

Q I'm not sure I understand, but maybe Mr. White will have questions about it.

A Pardon me. That 360,000 acre-feet did not include the terraced deposits.

Q That was just the alluvium?

A That was just the alluvium.

Q Right. I believe my next question has to do with Table 4 of C-31A, which has now been admitted, if you would turn to that, please.

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And I just -- perhaps this is more appropriate in voir dire, but the peak annual use figures, that column, where did you obtain those figures?

A From Dornbusch and Associates.

Q They told you that that is what this type of activity would use at its peak?

A They told me that was the water requirement, yes, to do that type.

Q And you didn't do any independent calculations of your own to confirm that?

A No.

Q You just accepted whatever they told you?

A That's correct.

Q If they had told you, for instance, in the first thing for oil, they told you 10,000, you would have used that?

A Yes, I consider them professionally competent so I accepted their figures.

Q Someplace in your testimony you mentioned something about an infiltration gallery. Can you tell me where that was located, please?

A The communities of Fort Washakie, Ethete, Boulder Flats -- I believe that covered them -- uses

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infiltration galleries to develop their community supplies.

Q And can you just briefly explain what an infiltration gallery is, please?

A Pardon me?

Q Can you briefly explain what an infiltration gallery is and how it works?

A It's a horizontal piece of perforated pipe or casing that is placed in the alluvium below the water-- groundwater -- the water table, and, ideally, if you can place it a couple feet above the base of the alluvium, that's ideal, allows you to capture the maximum quantity of water that you could get.

* * * * *

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Then it is connected to a vertical sump or another vertical piece of pipe, a culvert, something like this in which a pump is mounted.

It's like a horizontal well, is what you are doing, so as you draw down, you pump, you are causing, instead of a cone of depression around a central well sort of, kind of a trough depression.

I think that's a professional term, but that's essentially what you are doing (indicating).

This water flows from the perforated pipe to the sump and is withdrawn by a pump.

Q. And undoubtedly the drawing of water into that infiltration gallery, of course, depletes the surface flow of the stream, correct?

A. I wouldn't say that as a general statement. It depends on the quantity of pumping and duration of pumping, yes, but you could assume that.

Q. Over a sustained period of time?

A. Right. Quite often these galleries are used to divert surface water because you get natural filtration, and it eliminates a lot of the solids that might be in the surface water, so if you have sufficient natural sands and gravels, you can filtrate your water that way.

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Q. Now, concerning the projects listed on Table 4 of Exhibit C-31A, did you do any calculations concerning the expected rate of return flow for any -- we talked about them some, but the expected rate of return flow from any of those projects? I think we talked about the oil, was it?

A. No, I didn't, because I'm not familiar with these particular projects, and so I have no return flows were looked into on my part.

Q. The column concerning peak uses presumably -- in other words, that amount of water would not have to be new water each year? Some of it would be recovered?

A. I can't comment on that. I don't know.

Q. The present pumping of wells and whatever sources would take place from the Reservation, is that having any effect at all upon the groundwater table there? You have mentioned it is still pretty much in a virgin state, but --

A. Probably the only area where there has been some effect would be the Riverton area, but the hydrographs we have had available which were monitored by the USGS did not indicate any significant declines

at least for the last several years. I'm not commenting from their start up date back in the fifties, or whenever that was, but for maybe the last -- I don't have it in front of me to look at the hydrographs, but our hydrographs were not necessarily the middle of the center of pumping, so I'm -- from what we saw, things are pretty stable now at least.

* * * * *

Q. (By Mr. Parish) (Continued) Okay. From what you saw, there was not much effect, but certainly your test did not cover a very large area looking for that?

A. On the Riverton -- We have hydrographs as well where -- and I -- my professional opinion would be elsewhere on the reservation, they're not in that state where you have effect. The only other center of pumping would be the well field there of Gulf by Pilot Butte for Steamboat Butte there. They're pumping in the order of 1,000 to maybe 1600 acre-feet a year.

Now, during the summer they may have effects, they would have some local effects that would be recoverd in the period of high runoff. And specifically, their manager there indicated that when the river's flowing high, wells performed better. Of course, they're flowing up the bank. These wells are located on the bank. So they've raised the static water level just in that. I was pump testing, I can't say it was low flow, but it was fairly low flow, and it was like 9 feet to water, and we were about on a 9-foot bank, something like this, and they apparently had some trouble with

them then.

Q. I just realized that I must be good for you, your voice sounds better.

A. It is better when I talk. It's these breaks when the attorneys are arguing with each other that do it.

Q. I think I just have one more question. When I asked you did you do any calculations on the return flows before, I take it from your response from that that you did not do any return flows on irrigation or pivot sprinkler or anything like that?

A. That's correct.

MR. PARISH: Fine. I have no further questions.

THE SPECIAL MASTER: Mr. White or Mr. Merrill, either one?

MR. MERRILL: While Mr. White's preparing for cross-examination, I wonder if I might be excused from the courtroom. Some of our experts are leaving town and I need to meet with them before they go.

THE SPECIAL MASTER: All right, we'll proceed in the morning at 8:00.

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MR. MERRILL: Thank you, Your Honor.

THE WITNESS: Your Honor, can I get a cup of coffee?

(Off-the-record discussion.

CROSS-EXAMINATION

BY MR. WHITE:

Q Mr. Page, with respect to your well yield predictions or estimates, Table 2 of Exhibit 31-A, did you -- Well, let me ask you this: What assumptions did you use in calculating those estimated yields?

A. The main assumption would be on those creeks in -- that I gave you permeability of 1,000.

Q. Okay.

A. Okay. That was based just on professional opinion. I lowered it from the test data we had on the other creeks because, just given to be on the conservative side. I felt it was a reasonable -- a reasonable value, but we did not have any specific values. The assumption of the K value in that --

Q Fifteen hundred?

A. Fifteen hundred. Again, that, as I indicated, the test I performed, we were looking more to around a little over 2,000. And that's a figure that's been thrown around, used a lot by people in my profession

when they have no test data and they have to make some estimates or some calculations.

Some place we had to assume a saturated thickness or interpolate. And even on the permeability values we did determine from the Wind River, there's interpolation between them.

As far as I recall, it's probably the main assumption. There may be others.

Q. You must have made some assumptions as to the most efficient percentage of draw data?

A. All right, yes.

Q. What was that?

A. I made the assumption that the aquifer was essentially homogeneous or at least there was not a restricting clay layer in there, and what we did is we assumed that the well was drilled to basement -- not to basement, to the consolidated rock, actually, into it 5 or 10 feet just as a junk collector, perforated the lower third of the saturated thickness and it did not allow drawdown with the interference allowance that I had spoke of, to drop below the top of the formation.

This screening of the bottom third is a standard assumption in my profession for this type

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of situation. It's not always attainable in the field. So drawdown, essentially total drawdown in the well was restricted to two thirds of saturated thickness.

Q. I must have misunderstood you. You perforate the upper two thirds?

A. No, lower one third.

Q. Lower one third.

A. It's ideal if you can avoid it to avoid cascading water.

Q. Well, I'm not sure I understand now how you applied your one-foot interference factor with perforation only in the lower third of your case. Could you explain how you did that?

A. Based on the permeability value, using that K factor, we determined a specific capacity, okay. Then what you take with that specific capacity, you say, okay, you want to know Q -- pardon me, specific capacity is the discharge that, the yield per foot of drawdown. So we said we have two thirds of the saturated thickness for the total allowable drawdown. I subtracted an amount for the interference, I believe it's one foot, something like that, it was an arbitrary selection,

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and that left me two thirds minus one foot. Then you can apply that to the specific capacity value, you get a discharge for the well.

Q. So if you had a 30-foot well, you're talking about a 19-foot drawdown, is that what you're saying?

A. That would be correct.

MR. WHITE: I have to fix this.

THE SPECIAL MASTER: May I ask a question while you fix it?

MR. WHITE: You bet.

THE SPECIAL MASTER: There's been so much attention given to the drawdown and so much attention to the comparable well, what guarantee is there of subsidence problems from the drawing of water from these structures?

THE WITNESS: You would not expect subsidence in the type of deposits you have along the alluvial channel.

THE SPECIAL MASTER: Why?

THE WITNESS: Because of their nature, the sands and gravels, plus you're not -- they're not under artesian wells, you get subsidence when you lower the pressure in the formation, and you have, like a clay compress, and then even though you may

recharge them, they cannot expand.

THE SPECIAL MASTER: I see; I think I see.

THE WITNESS: We're in water table conditions in the shallow alluvial aquifers.

Q (By Mr. White) Does that mean in the alluvial condition, the material is essentially in contact and you're just draining water out of the pores?

A. You're draining ideally by gravity, yes.

Q. Did you make any adjustment in your well yields for declining saturated thickness with increasing drawdown?

A. Yes.

Q. And what was that adjustment?

A. I do not have a specific factor, but I used the typical graph in the Johnson's book.

Q. Page 107?

A. I can't quote the page, but I'm sure you're familiar with it.

(Mr. White approached the witness.

A. That's it. I knew there was something missing from all this. I'm glad you brought it all up.

Q. Well, I asked you before to give you a little tip on it, but I didn't get a rise out of you.

A. What was that?
Q. About Johnson.
A. You did?
Q. Yeah.
A. I'm sorry, I missed that.
Q. I was really curious where you were going to come up that answer to that Page 107.
A. That's it, 73, that's correct.
Q. To use the figure 73, don't you have to assume, and have you assumed first that the water-bearing materials are of uniform permeability?
A. Yes, I assumed that.
Q. And that the alluvial aquifer is not stratified?
A. That's correct.
Q. And that the saturated thickness is constant before the pumping starts?
A. Within your area?
Q. Yes.
A. Yes. You mean uniform?
Q. Yes.
A. Okay.
Q. Don't you have to assume, to use that graph, the well's 100 percent efficient?
A. I made an adjustment for efficiencies, I used --

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assumed it was a new well, I believe I used 90 percent. This is one you're not getting a value of 1200 like the USGS.

* * * * *

Q. (By Mr. White) Are you saying that they didn't use 90 percent to get 1200?

A. My feeling is they didn't make these adjustments from dfficiency, they used the Johnson Curve, but I don't believe they made any adjustment for efficiency.

Q. Don't you have to assume the water table is horizontal to use that curve?

A. You do, but it's not necessarily that significant.

Q. Well, is the water table generally horizontal?

A. No, it isn't.

Q. Isn't this example that you have drawn here (referring to chalkboard drawing) an illustration of where the water table would not be horizontal?

A. That's correct. It's not horizontal laterally either.

Q. How about the nature of the flow through the aquifer, you have to assume it's a lateral flow?

A. I'm not sure with that particular equation you have to make that assumption. I know that that assumption is made on some groundwater equations.

Q. Don't you have to assume that the well penetrates to the bottom of the saturated thickness?

A. Oh, I did, yes.

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Q. How about -- Did you assume that the cone of depression is reached equilibrium?

A. Yes.

Q. That means the radius of the influence will not change during extended pumping?

A. That's correct.

Q. Have you assumed anything with respect to the continued flow of the surface streams for which you estimated yields in the alluvium? Have you assumed those surface flows, the discharge of those streams remains constant?

A. I assumed that the surface -- the stream remained a live stream, and that was not -- the river did not become intermittent.

Q. What would happen if 500,000 acre-feet of water were diverted out of the Wind River?

A. I'm not familiar with the surface water resources.

THE SPECIAL MASTER: At what, you would have to make your question, because he is answering he is not familiar, so I suppose that's the answer.

Q. (By Mr. White) Had you about 500,000 acre-feet taken out of the Wind River above the Kinnear Valley?

THE SPECIAL MASTER: At what rate of removal?

That much in one year?

MR. WHITE: Per annum with a constant rate of diversion.

Q. (By Mr. White) Would that have any effect on the yields of your wells?

THE SPECIAL MASTER: Well, south of that point of taking?

MR. WHITE: North of the point, Your Honor.

THE SPECIAL MASTER: North of the point of taking?

MR. WHITE: Yeah.

THE WITNESS: It doesn't matter where it's taken, but if you tell me what is taken and what the flows are there, I could give you a general answer back.

Q. (By Mr. White) Until you know the remaining flow after diversions are made from the area of any of your wells on Table 2, you wouldn't be able to say whether or not that yield would remain constant, wwould increase the surface diversions, would you?

A. Significant surface diversions where it would reduce the wetted area of the channel, it would affect your yields if you were pumping on a prolonged

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basis. In other words, you would be losing recharge, but essentially, if you have some water there that's available to be induced by these wells, you will be providing your recharge.

Q Let me ask you to assume that in the Kinnear Valley the Wind River was dry because of diversions for agricultural projects, What would happen to your estimated well yields of the alluvium of the Wind River?

A. They would eventually with time decline somewhat. You would have to design your pumping rates to account for that.

Q All right, your wells are essentially water out of storage, is that right?

A. To -- Well, they could also be intercepting groundwater, the recharge, say, from the Wind River Formation in small quantities, but essentially depending on the accompanying rate you may still reach an equilibrium by intercepting underflow, but a heavy well field is quite possible.

Q Have you made any determination with respect to the amount of water in storage, or estimated well yields, based on hydrologic conditions in 1868?

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A Oh, I'm not specifically familiar with the hydrologic conditions in 1868.

Q That answers the question. Have you been supplied with any information from any other consultants for the United States in this case with respect to hydrologic conditions in 1868?

A No.

Q Okay. I believe you told me that the yields on table 2 were designed to last essentially indefinitely under continued stream flow conditions, is that correct?

A That would be correct.

Q Let me skip around just a little bit. I got off on a tangent there. Let's talk about the alluvial storage determinations.

THE SPECIAL MASTER: Alluvial storage determinations?

MR. WHITE: Yes, sir.

Q (By Mr. White) Your 362,000 acre-feet.

A Okay.

Q Is that water in storage the quantity of groundwater filling the voids and alluvial deposits that could be available to wells?

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A No.

Q Okay, what is it?

A It's the total storage under full conditions, it is not a useable storage.

Q That's right. So the 360,000 acre-feet is not a useable resource, only a portion of it is, is that correct?

A That's correct.

Q What was the storage capacity that you determined for the alluvium of the Big Wind?

A I believe 147,000 acre-feet. About 168,000 acre-feet.

Q 147,600, perhaps?

A Correct. The same number I gave you during the deposition.

Q How about for the Little Wind, Spring Creek?

A Eighty --

THE SPECIAL MASTER: The same number he gave you at the depositions?

MR. WHITE: Just checking, Your Honor.

THE SPECIAL MASTER: How about Spring Creek, he said?

THE WITNESS: About 80,000.

Q (By Mr. White) Explain how you combined the page-cross-white

storage for the Little Wind and Spring Creek. I'm not quite sure why you combined those storages.

A I believe Spring is a tributary to the Little Wind.

Q Okay. And is that the only tributary of the Little Wind?

A No, but it appeared on the geologic map to be the one that had a significant alluvial deposit.

Q What I meant to ask: Is that the only Little Wind tributary that you lumped in with the Little Wind?

A That's correct.

Q You didn't pick up any others?

A May I look at the map?

Q You bet.

THE SPECIAL MASTER: Why don't we take a five, ten minute break since we have 45 minutes to go.

MR. WHITE: All right.

(Whereupon, a short recess was taken.)

* * * * *

THE SPECIAL MASTER: Shall we resume?

MR. WHITE: Off the record, Your Honor.

(Discussion off the record.

THE SPECIAL MASTER: Okay, Mr. White.

Q (By Mr. White) What storage capacity did you use for Little Wind and Spring Creek? 80,000, did you say?

A I believe so, yes.

Q How about Crow Creek?

A 2300.

Q Mill Creek?

A 30,700.

Q Popo Agie?

A 9600.

Q Sage Creek?

A 2100.

Q Owl Creek?

A 2400.

Q Five Mile Creek?

A 16,800.

Q Muddy Creek?

A 4400.

Q Kirby Draw?

A 17-six.

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Q Beaver Creek?

A 6900.

Q What area did you use for the alluvium of those respective streams when you calculated the amount of water in storage in the alluvium?

A I do not have the work sheets with me, but essentially we did not go up the little narrow tributaries. I could point out some examples. And again without -- for instance, let's just start with Wind River here (indicating). If we could just lop that off, a little creek like that. What's that -- that's called Sand Draw. We ignored that, ignored all of these along here (indicating), essentially -- of course, we did Crow Creek. Essentially on the Wind we didn't go into any tributary.

Q Now, did you planimeter the area that's covered by Qa on Exhibit 33 to determine your starting point for the area of your alluvium?

A Yes, we planimetered the perimeter after referring to our topo maps for -- yes, we planimetered from this with spotchecking from the topo maps.

Do you want me to look at other creeks, or did you want to continue your question?

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Q Yes.

A On the Little Wind -- this is just my recall -- we didn't go up and include this Qsa. We just stayed in this area arbitrarily. I would believe we didn't go any further than this on -- well, that's the Little Wind, and the same up here (indicating).

I cannot tell you if we included -- I would assume we excluded that just from observation. We excluded that, and then on Mill Creek we utilized -- in this area we checked some logs to see if -- you have some terrace deposits -- we looked at some of the logs, and we even indicated that we had alluvium underneath it, so we -- I believe we cut it off this way and came down like this (indicating) --

Q So you included some Qt or terrace areas?

A No, no, there's alluvium underlying it, it was our conclusion, and if the water level was not in the Qt -- if it was up above drain, it was not included then, and then we came down here to where it -- in this area right here where it's tributary to the Little Wind and then the Popo Agie and, of course, that's Beaver Creek. That

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was separate and Kirby Draw, that was separate.

Q So you took this map and planimetered the areas for the various alluvium units that are table 2?

A That's correct.

Q And you don't know the areas which you calculated from your planimetering?

A You mean the actual areas?

Q Yes.

A I believe I have those.

Q Okay.

A It's my general recollection I have those numbers here with me, but not here (indicating). I could give them to you tomorrow.

Q Why don't we come back to that area tomorrow then?

Let me ask you while we are there though if you know the locations of the cross sections, channel cross sections, which you used to determine your average saturated thickness for each of those?

A I refer you to Water Supply Paper 1576-I. They show the locations of the cross sections we used out of there.

Q Is it Plate 3?

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A I believe so, yes.

Q Would you take a look at it to make sure they are all the cross sections you used?

A They are not all of them.

Q Okay. Are there more --

A Yes.

Q -- than 1576-I?

A I don't believe in 1576-I. We had a dam site cross section up in here (indicating).

Q What was the source of that cross section?

A Oh, I believe it was a Bureau of Reclamation project regarding some study they did up there. I don't know the name.

And I believe we had another dam site cross section in this reach (indicating). I believe that was it.

Q Now, is that for everything or just the Big Wind?

A No, I don't believe we had any other dam site cross sections.

Q How about cross sections other than dam site cross sections on which you developed your saturated thickness for that alluvium?

A It's in that. You have the Kirby Draw and the white - cross - page

Beaver Creek.

Q So those are the only ones you used in 1576-I?

A That's correct, plus one or two from the Bureau of Reclamation dam sites.

Q Let's come back to your groundwater storage then tomorrow and talk again about your well yield analysis.

You indicated that on Sage Creek you had assumed saturated thickness of 20 to 30 feet, permeability of 1,000; is that correct?

A That's correct.

Q What did you do with those two numbers to come up with the yield values on table 2 for Sage Creek?

A We went through the methods I described previously, using the K factor, using -- assuming an interference, using the Johnson curve, the same procedure. To my knowledge, I recall --

Q Straight through?

A As I recall, it was the same procedure.

Q Isn't it true that for all the units, the alluvial units, for which you calculated potential well yields on table 2 that those well yields are calculated -- calculated well yields are far

in excess of any well that has yet been drilled or been produced for water in any of those units?

A To my knowledge, that's correct.

Q Why is it that in the Wind River alluvium, for example, the largest measured discharge shown for any well in Water Supply Paper 1576-I is only 65 gallons per minute and yet your estimated yield is 900 gallons per minute? What's the explanation for that?

A That's incorrect, for one thing -- that might be what that says, but the Gulf well was discharging at a hundred gallons a minute. My calculation resulted in the area of the Gulf well where I had the pump test for a properly designed, properly efficient, and not a 30-year old well -- we should be looking at a hundred and fifty gallons a minute. Nine hundred gallons a minute is in the Crowheart area where you have your thickest saturated thickness and your highest permeability.

Q But it's true that there's no well in the Wind River alluvium today that even approaches the 900 gallons per minute?

A That's correct.

Q If 900 gallons per minute was available from a

well or a series of wells that you've described, do you know why such a well has not yet been constructed?

A In the case where the Crowheart area -- let's talk about that area -- that's where the 900 gallons, not anywhere else along there -- we look at that well, and they estimated the cost of a single well at that point, and it was in the order of 20 to 25 dollars an acre-foot to pump that water to the wellhead.

In that area, surface water -- I have been advised surface water is cheaper to use, and I think that's the reason.

Q Isn't it true that in the Little Wind River you've calculated a potential yield of about 200 gallons per minute, the largest measured discharge from any well shown in Water Supply Paper 1776-I is roughly one-fifth of that?

A If you are reading it from that, yes, that wouldn't surprise me.

Q Are you aware of any other well that is greater than 40 gallons per minute measured discharge?

A Not specifically, no.

Q Mill Creek, shown by 1576, is again 40 gallons

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a minute. Are you aware of any well that is greater than that or approximates the 250 gallons per minute that you have estimated?

A Not to our knowledge, none that's been drilled for that purpose.

Q (By Mr. White) (Continued) Are you aware of any well on Sage Creek where you estimated a yield of 190 gallons per minute that has actual measure..discharge of over 30 gallons per minute?

A I don't -- I'm not aware of the specific discharges from these creeks, I'm aware they're very low.

Q Any idea why on Sage Creek instead of having 30 gallons per minute and 10 gallons per minute wells there are 190 gallons per minute wells?

A What are their diameters and what are their pumps?

Q I don't know.

A See, you can drill a six inch domestic well and need 10 gallons a minute. Does it mean that those wells were designed and pumped at their potential?

Q You're saying the bigger wells could have been build but just haven't for some reason?

A That's what I'm saying, yes.

Q Mr. Page, when did you begin your work on your groundwater investigation for the Wind River Indian Reservation?

A The summer of '78.

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Q And were you given any assignment or instruction which you did not describe on direct examination with respect to what you were supposed to do?

A No.

Q No? Have you submitted a report entitled Groundwater Resources of the Wind River Indian Reservation?

A I have not completed that.

Q I see. Is that the report that you indicated previously would be coming out in September of last year?

A That's correct.

Q Have you reached any conclusions in that report which are different from the conclusions which you expressed in Court today?

MR. MEMBRINO: Your Honor, I believe he said the report is not completed.

THE SPECIAL MASTER: Yeah, but he can still answer the question.

THE WITNESS: The numbers I have given you way back in the first deposition, they have not been changed and to my knowledge I haven't reached any new different conclusions.

Q (By Mr. White) Well, let me ask you specifically, page-cross-white

without trying to trap you, the values for the various parts of M and I use weren't included in that report, were they?

A Do you mean those in this table?

Q Table 4?

A I didn't discuss that in the report. I wasn't really even planning to. I think I discussed, at best, maybe the magnitude of pumpage on the reservation because at that time that's all I had.

Q Is it true that you spent less than two weeks actually on the reservation studying the groundwater resources?

A I made four trips to the reservation including two of prolonged stay. I would say a total of around two weeks, in that order.

Q You mentioned that you got some material from the USGS office in Lander.

A No, not Lander.

Q I thought you said that.

A Thermopolis.

Q Thermopolis?

A Oil and gas conservation.

Q How many pump tests did you actually conduct on page-cross-white

the reservation?

A Conducted three, two of which we got results.

Q The other one was a fluke?

A The other one was a fluke.

Q Did you conduct any seepage runs for any of these rivers?

A No.

Q Isn't it standard professional -- standard professional approach when investigating groundwater sources, especially alluvial groundwater sources, to consider secretions and depletions from that alluvium in the form of a seepage run?

A In the situation where we had these virgin conditions, we had this -- it's not necessarily standard, it's a thing you can do. We did not do that.

Q Were there constraints placed on your work in terms of the budget that you had to stay within?

A I had a budget.

Q Would that budget allow you to do seepage runs for these major alluvial areas?

A Maybe at the expense of doing something else. Our fieldwork was restricted or at least it was specified

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to pump testing.

Q In your contract?

A Yeah, we had a contract for test pumping.

Q So it wasn't within your contract to do your seepage runs?

A Right.

Q Okay. Couldn't have done them if you wanted to; is that right?

(No response.

MR. WHITE: The record should reflect that the witness nodded.

Q (By Mr. White) You indicated that your work was essentially a reconnaissance, during direct examination. What does that mean in the groundwater context? Does it mean the same thing as it would, say, to somebody that works with the Bureau of Reclamation, that same sort of reconnaissance study?

A. I don't know the Bureau of Reclamation's term. What it means within the area as large as the Wind River Reservation, covering such a diverse type of aquifers and in areas where there is no groundwater data, in some cases you quantify the groundwater resources with the information. The

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next step would be, you want to go into a specific development, and then you would look at, you would take your time and effort and money to analyze every little bit of information in that area.

THE SPECIAL MASTER: That was a reconnaissance you just described?

THE WITNESS: The general study on the reservation and the other one is a little more specific.

THE SPECIAL MASTER: I see.

Q. (By Mr. White) Is the second step that you described normally referred to in your area of expertise as a feasibility study?

A. Pardon me?

Q. Is the second step a feasibility study?

A. It's a little above the reconnaissance, more site specific, but as far as the feasibility, I picture the feasibility of getting into costs, that would be the next step short of test drilling, unless you had, fortunately had the resources to test drill before.

Q. So you're describing sort of a fourth step process before you actually go to construction; is that correct?

A. In general. Sometimes your test drilling can be

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in one step or the other. You can elimate a step.

Q. Have you progressed the first step with respect to the ground water supply for any of the facilities shown on U.S. Exhibit WRIR C-33-B?

A. On the overall.

Q. Beyond Step 1 that you described?

A. Step 1, I did -- Well, in the case of the withdrawals from the Wind River, stream generating electricity plant, that was close enough to our pump test area in our study and that I felt in that situation it was a step beyond.

Q. Okay. So you got to Step 2 here for the coal-fired electric generating station?

A. Yes.

Q. And this is the --

A. In other words, yes.

Q. -- the area that's got a green circle around it and an arrow that points down to the Wind River?

A. That's correct.

Q. What effect did you assume, if any, on your ability to obtain the subsurface underflow from the Wind River for this coal-fired general -- coal-fired electricity generating station that would be caused by diversions and consumptions of water

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claimed in other portions of the statement of claim by the United States?

A. Again, I assume that we had a live stream, more than trickle, and that, you would get equilibrium conditions. You would have essentially a similar type of performance they have at Pilot Butte where the wells are spaced 150 to 200 feet apart, talking of a few inches of interference.

Q. Okay. Have you or have you not developed the potential of groundwater supplies for specific uses on the reservation?

A. Could you be more specific?

Q. Well, I worded it carefully because it was the same question I asked you in the deposition, and you said, "No, you had not." Do you want to look at the deposition?

A. No, that's okay.

Q. Okay.

A. You asked me -- Would you repeat it again?

Q. Well, let me pull it out and make sure I've got it right.

(Brief pause.

Q. Have you developed the potential of groundwater supplies for various uses in the reservation?

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A. Since then I have, since that deposition I have looked at more site specific..

Q. Okay. Have you done any analysis of a site specific nature beyond that which you described in your direct examination?

A. I'm trying to recall my direct examination.

Q. No, I mean today, during direct.

A. Yeah, I know, I'm trying to recall.

Q. It's been a long day.

A. Not beyond the extent of determining that there were aquifers present capable of yielding the quantities of water required. Is that what I said earlier?

Q. I think that's a fair representation. So then it's true that you've made no investigation with respect to the suitability of that water from a water quality standpoint?

A. That's correct.

* * * * *

Q (By Mr. White) So the water may be physically available, yet unfit to use for the particular purpose, is that correct?

A I don't know that.

Q You don't know one way or the other?

A I don't know what water quality requirements are for the specific uses.

Q Didn't Dornbusch give that to you?

A I mean, the water quality, pardon.

Q I'm sorry, I thought you said "Quality." Didn't Dornbusch ask you to find sources of a certain water quality?

A No, no quality factor at all.

Q Wouldn't you normally make that investigation?

A On -- well, not necessarily -- that may not necessarily be the case. As an example, in Peabody we were looking on Black Mesa for the poorest quality we could find. The Navahos wanted us to use the junk. Now, on some particular boilers I know specifically there are water quality requirements. So it -- I can't give you -- yes or no, it would vary, that you could be expected if it was a water quality sensitive use.

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Q Did you provide anyone -- excuse me -- did you determine for any of the mineral and resource developments shown on Exhibit C-33-B the cost of developing the amount of water needed from the source identified by yourself on table 4?

A No.

Q No, okay. So your conclusion is that if you spent enough money, you might get some water from those sources and you don't know how much money it would be?

A Well, I developed the cost of single typical wells to the wellhead I mentioned to you, but I did it different for a shallow well, a 1,000 foot well --

Q But you didn't do it for these specifics?

A No.

Q So if Mr. Merchant had included the cost of water development for these particular facilities, the values he used would not have come from you, is that correct?

A That's correct.

Q Now, let's get to the Statement of Claims.

A Okay.

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Q Turn to page 15.

A Okay.

Q You see the language "Sufficient groundwater to maintain the surface condition and the well levels of the Wind River Indian Reservation in their naturally occurring state"?

A Yes.

Q Do you know what a naturally occurring well level is?

A My interpretation of that statement would be keeping the well levels, the conditions, not in an overdraft state, in an --

Q Overdraft state means you are taking out more than what is coming back in?

A That's correct. Over perennial yield you are going to have some well drop for utilizing your perennial yield.

Q So, okay, are you saying that language on the top of page 15 essentially means that from a groundwater geologist's standpoint, that you do not have mining of groundwater?

A That would be my interpretation.

THE SPECIAL MASTER: Could I inject a question at that point, Mr. White --

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MR. WHITE: Yes, sir.

THE SPECIAL MASTER: -- exactly on the charges? If I were to add after the words "Occurring state, comma, and this must be qualified to allow for the inevitable drop in tables if use exceeded recharge capacity," would that appear a fair and proper statement to your education and technology?

THE WITNESS: Could you read that again?

THE SPECIAL MASTER: I will, indeed. After the "Occurring state," comma, "Must be qualified to allow for the inevitable drop in tables if use exceeds recharge capacity."

THE WITNESS: That would be contradicting. wouldn't it?

THE SPECIAL MASTER: That would be what?

THE WITNESS: It would be contradicting, wouldn't it?

THE SPECIAL MASTER: Do you believe that would be contradicting --

THE WITNESS: Are you implying that -- I think you are mentioning, you are talking about you would be overdrafting; in other words, you would be taking out more than your recharge

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or your captured discharge.

THE SPECIAL MASTER: Yes, but the request is the water is to maintain the level of all lakes within the Reservation in their natural state except Bull Lake, Ocean Lake, Boysen Reservoir, Ray Lake, Washakie Reservoir and Pilot Butte Reservoir, then comes the point, "Sufficient groundwater to maintain the surface condition and well levels of the Wind River Indian Reservation in their naturally occurring state."

How can you assure groundwater if there are to be drawdowns in excess of recharge capacity?

A THE WITNESS: How you can preserve -- what I'm saying is you could -- if you were pumping the perennial yield, you would have drawdowns and you would get recharge and recovery. If you are mining, you would have pretty much continuous drawdowns below that level that pumping at the perennial yield would result in. That's my interpretation of it.

THE SPECIAL MASTER: I think that's been helpful to me. Thank you.

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Thank you, Sandy.

Q (By Mr. White) Oliver, that discussion was applicable primarily to alluvial water, wasn't it?

A Well, you can be talking about the piezometric surface, also you would be mining the potential metric surface or depressing it, which would affect that would be -- over well fields or someone else coming in.

Q So you are saying that this would preserve the artesian head in the confined formations, is that your interpretation of this, or is that too rough a statement?

A Your -- my interpretation would be that might be the intent, that's not separating unconfined and confined, but in the case of the artesian condition, you will have a piezometric, a drop in the piezometric surface, and I think this is just saying that let's control, let's monitor these effects. We cannot say at this time say water levels or the potential metric surface can drop 50 feet, and that's it, like that, I think it's just saying we want to not use the groundwater in excess to where you are

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having some adverse effects, tremendous drops of piezometric surface. I can't put a number to those, but let's monitor and avoid that. In other words, monitoring the use of groundwater is what it's stating.

Q But isn't it true that just about any development in a confined formation will reduce the artesian head or the piezometric levels?

A That's true. It's to the extent -- I mean, if you pump a well 500 gallons a minute, it's going to reduce it a lot more than at 100. That's your total extractions. Now, I don't know where you would draw your lines to say we will only tolerate this amount.

Q In the Wind River Formation, say, in the central and eastern portion of the Reservation, at what distance -- or over what distance would the artesian head or piezometric surface be affected by withdrawals from the 500-gallon-per-minute well?

A I haven't made the calculations, so I could not give you that number.

* * * * *

Q (By Mr. White) It would extend not very far off the reservation?

A I am speaking of a single well.

Q Right.

A The artesian cone expands out a fair distance. I'm not -- I can't tell you without making the calculation what the aquifer assumption -- it can be done where that cone is going to be, extend to.

Q Have you reached any conclusions since January 9 with respect to acquifer recharge or discharge areas?

A No. We have talked --

Q I'm sorry.

A Other than what we did talk about in general terms, the recharge areas.

Q You are just picking those up from USGS, aren't you?

A Well, in some cases. From my professional experience on the deeper acquifers where they are outcropping along the outflanks of the mountains and the streams, that is my professional conclusion. I don't believe I have specifically picked that up. They may mention it, but as far

as the Wind River Formation, that is correct.

Q Where are the areas of discharge out of the Wind River Formation into the Wind River itself based on your professional opinion?

A Without that accretion study you were talking about -- I might get back to that. HKM Associates were doing surface hydrology, and the initial thought was we will wait for their results and, you know, I haven't seen a final result. I was hoping from that we could get some general idea of looking at the values they generated, but I have not done that.

Q But isn't it true that without a seepage run it's almost impossible to say with any certainty exactly where areas of discharge --

A That's true because you have manmade additions and subtractions from the system.

Q Isn't it true that USGS has not performed any seepage runs?

A Not to my knowledge.

Q So any conclusions that the GS may have reached with respect to discharge and recharge areas are similarly without the benefit of a seepage run?

A I don't know.

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MR. WHITE: I'm at a convenient stopping point, Your Honor, before I start on the next.

THE SPECIAL MASTER: I think it's a good convenient stopping point.

MR. WHITE: Do you want to start at eight o'clock in the morning?

THE SPECIAL MASTER: I'm wrestling with the idea, maybe anticipating the legal burden, but a particular one of a claim for reserved water right for suffucient groundwater to maintain well levels when there cannot be, at the same time, imposed certain restrictions upon the draw of those well levels. Otherwise, you give somebody the right to dry up every drop of water not only on the ground, but on the surface too, but this is a real concern.

We are now at the heart of the this lawsuit, and on that little thought I will adjourn until tomorrow morning at eight o'clock.

MR. WHITE: We'll get back to it, Your Honor.

(Court in recess at 5:30 p.m.

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REPORTERS' CERTIFICATE

State of Wyoming)
: SS
County of Laramie)

We, Merissa Racine, Mary Nelson and Viola J. Lundberg, Registered Professional Reporters and Notary Publics, hereby certify that the facts as stated in the caption hereof are true; that we did at the time, date and place, as set forth, report the proceedings had before the Honorable Teno Roncalio, Special Master, in stenotype; that the foregoing pages, numbered 732- 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 for any of the parties hereto, nor are we interested in the outcome thereof.

Dated this 29th day of January, 1981.

MERISSA RACINE
Registered Professional
Reporter

MARY NELSON
Registered Professional
Reporter

VIOLA J. LUNDBERG
Registered Professional
Reporter

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My Commission Expires Mar. 10, 1984

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