UIdaho Law
Digital Commons @ UIdaho Law

Bighorn | Hedden-Nicely

6-16-1981

Trial Transcript, Vol. 80, Morning Session

Frontier Reporting Service

Follow this and additional works at: https://digitalcommons.law.uidaho.edu/bighorn

Recommended Citation
Frontier Reporting Service, "Trial Transcript, Vol. 80, Morning Session" (1981). *Bighorn*. 109.
https://digitalcommons.law.uidaho.edu/bighorn/109

This Transcript is brought to you for free and open access by the Hedden-Nicely at Digital Commons @ UIdaho Law. It has been accepted for inclusion in Bighorn by an authorized administrator of Digital Commons @ UIdaho Law. For more information, please contact annablaine@uidaho.edu.

File 187
4438
Box 12

case # 4793

File # 187

4438

IN THE DISTRICT COURT FOR THE FIFTH JUDICIAL DISTRICT

WASHAKIE COUNTY, STATE OF WYOMING

IN RE:

THE GENERAL ADJUDICATION OF ALL RIGHTS TO USE WATER IN THE BIG HORN RIVER SYSTEM AND ALL OTHER SOURCES, STATE OF WYOMING.

Civil No. 4993

FILED 6/23 1981

Margaret V. Hampton CLERK

DEPUTY

VOLUME 80

Morning Session

Tuesday, June 16, 1981

ORIGINAL

APPEARANCES

FOR THE STATE OF WYOMING:	HALL & EVANS 2900 Energy Center Building 717 17th Street Denver, CO 80202 BY: MR. MICHAEL D. WHITE, Special Assistant Attorney General and MR. SCOTT KROB
FOR THE UNITED STATES OF AMERICA:	MR. JAMES CLEAR Attorney at Law Land and Natural Resources Division Department of Justice P.O. Box 7415 Benjamin Franklin Station Washington, DC 20044
FOR THE SHOSHONE and ARAPAHOE TRIBES:	DRAY, MADISON & THOMSON 204 East 22nd Cheyenne, WY 82001 BY: MR. WILLIAM THOMSON
CLERK TO THE SPECIAL MASTER:	MR. LEO SALAZAR Attorney at Law 701 Rocky Mountain Plaza Cheyenne, WY 82001

THE SPECIAL MASTER: Let us come to order, please, ladies and gentlemen. Mr. White.

MR. WHITE: Your Honor, before we start the next witness, yesterday my experts pointed out to me that I misspoke myself with respect to the waiver of the remainder of the cross-examination of Mr. Toedter. Apparently what I said was that we had enough information to evaluate his work and therefore didn't need to cross him further, which was almost true. My experts point out to me that to make a complete evaluation they would need the program listings which we requested and were not allowed to have, but absent the program listings, assuming we are not going to get those, then in that situation we have all that we could reasonably expect. And I wanted to make that clear so it didn't appear that I was saying we didn't need the program listing.

THE SPECIAL MASTER: Okay. I have a matter that should be brought up now by way of notice to all parties, and I suppose I better wait until the tribal man gets here or repeat it then. We are interviewing young people, law school graduates or practicing lawyers to help with the report; rereading of the record, gathering of information, preparation of witnesses and other material ready to crank in to help me on the report. One young lady who applied, her name is Billie Ruth Edwards. Billie Ruth

Edwards at one time, according to her resume, did some secretarial legal work for Yegge, Hall and Evans. She said that work involved some work for some senior members who were in the insurance business and she can't ever remember seeing this case, let alone touching any of its subject matter. If you'd be kind enough to indicate no objection to hiring her, in the event we choose to hire her.

MR. WHITE: What were the dates, Your Honor?

THE SPECIAL MASTER: Very short; '77, '78 I think.

MR. WHITE: If it was prior to January 1, '78, she would have absolutely no exposure because that was the date of the merger of our firms.

THE SPECIAL MASTER: Summer of '78.

Mr. Clear, why don't you take it and look at it and see what you think of it and if you would have any objection to my hiring her.

She's now the Deputy County Attorney for Platte County, Wyoming; works for a young man by the name of Brian Sharratt, and her husband is also a lawyer. The last piece of legal writing that was published was in the law journal of about a year ago dealing with alcoholism and arrests and the use of the breathalizer by prosecutors.

MR. WHITE: Your Honor, do you know whether Edwards was the name that she used when she worked with our firm?

THE SPECIAL MASTER: That is right. Her name now is Mrs. Johnson. Her husband is an attorney with the Air Force, has about four more years in the Warren Air Force Base in the Staff Judge Advocate's office. And if we hire her she already lives here, she would be -- I interviewed her Saturday and virtually assured her a job providing this is not objected to by you folks.

MR. WHITE: Unless there's some history of her relationship with our firm that might make her angry with us or something like that, we'd have no objection. I think the objection that needs to be waived would be more properly by the parties adverse to the State, Your Honor, but I will check on our position and let you know.

THE SPECIAL MASTER: Very good.

MR. WHITE: In fact, I would state that if she's indicated to you that her departure from the employment with our firm was under happy circumstances, I would have no objection.

THE SPECIAL MASTER: It was a series of firms she did work for, it was summer employment only and then she went the next year and -- Off the record on this, please -- She worked for other counsel the following year -- Off the record, please.

(Off-the-record discussion.

THE SPECIAL MASTER: Back on the record. Will either

parties let me know if you have objection to the Special Master's office employing Mrs. Johnson, that is Billie Ruth Edwards, to assist us in our work in this case.

Now, do you think we should begin and wait for Mr. -- and if Mr. Thomson doesn't come in in 15 minutes we'll be glad to defer.

MR. WHITE: I would urge Your Honor, that we hold off until 9:15 or whenever he gets here, which happens first.

THE SPECIAL MASTER: Very well.

(Thereupon a 15 minute recess
(was taken.

* * * * *

MICHAEL DAVID KEENE

was called as a witness by the United States and having been first duly sworn, testified as follows, to wit:

THE SPECIAL MASTER: Will you give the Reporter your full name?

THE WITNESS: Michael David Keene, last name spelled K-E-E-N-E.

THE SPECIAL MASTER: All right. Mr. Keene, we are going to stand in recess for a few minutes until Mr. Thomson joins us, who is Counsel for the Tribes.

(Recess 9:10 a.m. to 9:16 a.m.

THE SPECIAL MASTER: Okay.

MR. THOMSON: Mr. Master, I'm sorry. I thought you started at 9:15.

THE SPECIAL MASTER: Don't you worry about that. Every now and then we get moved and the truth of the matter is, I was at the office very early this morning.

Let the record show please, that Mr. Bill Thomson is appearing for --

MR. THOMSON: On behalf of the Shoshone and Arapahoe Tribes.

THE SPECIAL MASTER: Off the record.

(Off-the-record discussion.

THE SPECIAL MASTER: Okay, back on the record.

Mr. Keene is the first witness this morning.

Mr. Clear, your direct, please.

MR. CLEAR: Your Honor, the record does reflect that Mr. Keene has been called and sworn?

THE SPECIAL MASTER: May I hear that again?

MR. CLEAR: Does the record show that Mr. Keene has been called and sworn?

THE SPECIAL MASTER: The record shows that he has been called and sworn, but not identified..

DIRECT EXAMINATION

BY MR. CLEAR:

Q All right, Mr. Keene, can you give us your address and occupation?

A My address is 3216 Reimers Park Drive, Billings, Montana 59102. My occupation is a civil engineer, employed by HKM Associates in Billings.

Q Can you give us a summary of your educational background in engineering?

A I have a Bachelor of Science Degree in Civil Engineering from the University of Denver, in 1972. I have a Masters of Science Degree in Civil Engineering with concentration in water resources engineering. I obtained that in 1974.

Q Are you a licensed engineer?

A Yes, I am licensed in the State of Montana.

Q Okay. Can you give us the rundown of your employment

experience since 1974?

A I have been employed by HKM Associates since that time, a total of approximately seven years. I am currently Director of Water Resources study at HKM. I have held that position for approximately two years. Previous to that I was a staff engineer in the water resources division.

Q What does the water resources division at HKM do?

A Basically, we develop flood studies, water availability studies, water budget studies. We are currently responsible for the inspection and evaluation of dams for the National Dam Safety Program -- projects of that nature. Generally, we serve as a support group to the other divisions at HKM even though we do some design ourselves. Commonly, we use the design branch of water resources for those particular purposes.

Q How many engineers do you have under your direction and control as Director of Water Resources Division at HKM?

A I have four engineers directly responsible to me and one agricultural economist and computer programmer; a total of five people directly responsible. There are other support people such as technicians and administrative assistants that float throughout the different divisions of the water resources and we share a common participation,

but they are not directly responsible to me.

Q All right. I don't know whether you covered what you did with HKM before you became Director of Water Resources.

A I was a staff engineer of the water resources division.

Q Can you give us some examples of projects that you have worked on as Director of the Water Resources Division at HKM?

A I have examined water availability and water delivery systems for numerous industrial clients in Southeastern Montana. I am currently involved in water budget studies for an industrial concern in Northern Wyoming. I was involved in the flood studies in Western and Northwestern Montana, and commonly we perform flood studies and low flow studies for small clients and large clients in river basins, to again support the design function, it is important to know low flows and low flow stages for design purposes. I have examined water availability for several Indian Reservations similar to this.

Q What professional organizations do you belong to?

A I'm a member of the American Society of Civil Engineers, I'm a member of the National Society of Professional Engineers, I'm a member of the Montana Society of Engineers, and the Midland Empire Chapter of the Montana Society of Engineers.

Q Can you define for us the scope of your work with respect to the Wind River Indian Reservation water rights claim?

A The general work purpose for my involvement was to quantify naturally occurring flows at selected sites.

Now, those sites were identified by Mr. Billstein, the project manager. Some sites were added to the study for the purposes of the fishery claim, and also to obtain a general hydrologic perspective of the study area.

I think it is well at this point, that I define natural flows as used in my study. The natural flows are those affected only by natural influences and I would like to draw a parallel to another term for the sake of clarity, and that is historic flows. Historic flows are those measured at a gauging site.

THE SPECIAL MASTER: May I hear that again, please?

THE WITNESS: Historic flows are those that have been measured at a gauging site. The historic flows reflect man's activities in the Basin, whereas the natural flows are unaffected by man's activities.

* * * * *

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

Q. (By Mr. Clear) What was the geographic scope of your study?

A. The geographic scope spanned from the westerlymost portion of the Wind River Basin through the Wind River Basin and included a small portion of the Big Horn Basin downstream of the Wind River Canyon and upstream of the confluence of Owl Creek. In terms of a town in Wyoming, Lucerne, Wyoming, or maybe Kirby, Wyoming, would be the downstream limits of my study area.

Q. Can you identify for us with particularity, specificity, the particular sites you studied?

A. Yes, I can. In fact, I have prepared a general outline that will help explain the different classifications for the purposes of my report and for the purposes of identification.

MR. WHITE: Jim, could I inquire as to whether or not this is being used solely for illustrative purposes and therefore can engage in a consent to waiver the objection of the five-day rule?

MR. CLEAR: Yes. This is merely for illustrative purposes in assisting the parties in following Mr. Keene's testimony.

MR. WHITE: Your Honor, while we're here, I wonder if I might ask if this is, if this would be the law of

the case. I think it's turned into the law of the case, where exhibits are beinq used solely for illustrative purposes the five-day rule doesn't apply.

THE SPECIAL MASTER: Yes, I think so. Do you wish to qualify this witness as an expert at this time before offering the exhibits or using them?

MR. CLEAR: All right. Your Honor, Mr. Keene will testify, as he stated, to the natural flows into the Wind River Reservation, particularly with specific sites which we'll get into now. And as he's testified, he is a licensed enqineer with both an educational and experiential (phonetic) background in hydrology and hydraulics and water resources, and we offer him as an expert to render opinions as to natural flows at specific sites within the Wind River Reservation.

MR. WHITE: I just have a couple questions on voir dire.

THE SPECIAL MASTER: All right. You may ask them.

VOIR DIRE EXAMINATION

BY MR. WHITE:

Q Mr. Keene, as opposed to water availability studies, the types of studies which you described, how many natural flow

studies have you previously conducted yourself, been previously responsible for?

A. There's at least two other studies that I was personally involved in, both as a supervisor and actively involved.

There are others that don't come immediately to mind that I was involved in, one way or another, whether it be natural flows or historic flows and in identifying water availability.

Q. I'm not talking about historic flows, I'm talking about natural flows. There are two other natural flow studies you participated in?

A. Yes.

Q. Okay. What are those studies?

A. There's a study for the Northern Cheyenne Indian Reservation and the Jiciralla Indian Reservation.

Q. Are those studies completed?

A. The Jiciralla is not completed, the Northern Cheyenne is in a draft form at HKM and pending litigation in the State of Wyoming. I do not know the status of that.

Q. Is it fair to say that neither of the natural flow studies which you have prepared have been subjected to either peer review or judicial scrutiny?

A. They have not experienced full judicial scrutiny, but they have been reviewed by peers and supervisors above

my level.

Q. That's solely within HKM, is that correct?

A. That's correct.

Q. So there's been no outside peer review?

A. I can't answer that completely because Mr. Billstein is the project manager on those, and I'm not sure of the circulation of those particular reports.

MR. WHITE: Your Honor, while we would have no objection to Mr. Keene's qualifications as a civil engineer or in water resources area generally, we believe that the testimony by the witness indicates that he is not what could be described as a thoroughly experienced person in the area of natural flow analysis, and, therefore, if the offer is to give opinions on natural flows as opposed to the other portions of water resources engineering, we would render our objection.

THE SPECIAL MASTER: The objection would be overruled if rendered, and I think his education plus his seven years of experience renders him competent to testify as an expert on both these subject matters, natural and historic flows.

All right, Mr. Clear.

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

DIRECT EXAMINATION (RESUMED)

BY MR. CLEAR:

Q. Mr. Keene, referring to Exhibit 296, it's obvious there that you have groups and subgroups of study sites. Did all the groups and subgroups receive the same level of study?

A. They did not. In fact, the subgroup A-1 received the most intensive study, and only after we go through a few examples would it become more obvious of the different level of study.

I would like to just give a broad brush of review of this general outline and then submit some other exhibits and proceed in these subgroupings.

As shown on the general outline that for the purposes of identification, clarity and reporting, I have two major groups, Group A Study Sites and Group B Study Sites. The Subgroup A-1's are the detailed study sites. Those were identified by Mr. Billstein to satisfy the needs of his systems operation study and to essentially define the hydrologic potential and characteristics of the study area within the A-1's.

The A-2's are described here, are described as being bookkeeping sites throughout the Wind River Reservation. I've coined the word "bookkeeping" because

it simply allowed me a step-wise accounting from the very detailed studies, the A-1 studies downstream to the other limits of my geographic scope.

The sites were studied for the purposes, again, of obtaining a general hydrologic perspective of the area and also to provide some information for the fishery study.

The A-3 sites were studied for a similar purpose as described for the A-1's, and if we could use another exhibit, Jim, I could show the basic layout of the Group A studies.

While he's putting up that exhibit, I'd like to mention one thing. I'm not sure if I indicated the other school for the Master's Degree. I know that I ran consecutive from the University of Denver for my B. S. Degree. The Master's of Science Degree was at Montana State University in Bozeman, but if that had not been previously entered, I'd like to.

(Brief pause.

Q. Mr. Keene, I've placed on the easel, an exhibit which I have marked as United States Exhibit WRIR C-297, and could you explain what that exhibit is?

A. Yes. The exhibit is titled, "Stream Gage Map".

THE SPECIAL MASTER: Does the word "gage" get

spelled that way in the engineering world?

THE WITNESS: According to our drafting department, it is stream gage. Whether it should be one word or two words --

THE SPECIAL MASTER: No, I'm referring to the spelling of the word.

MR. WHITE: We'll stipulate that the U often is dropped in engineering.

THE SPECIAL MASTER: I did not know that. Is it a matter of truth?

MR. WHITE: It often is. It should not reflect on the witness that it was.

THE SPECIAL MASTER: All right. I suppose it's a concession to phonetics, and it probably ought to be spelled that way, g-a-g-e.

All right. Go ahead, I'm sorry.

THE WITNESS: In fact, you'll find it both ways in the literature, but we'll be using g-a-g-e.

MR. CLEAR: It's a matter of economy, we're trying to save money.

THE WITNESS: Anyway, the map, first of all, provides an index of the USGS gages that were considered in my natural flow study. And immediately adjacent to that is an index of the BIA or Bureau of Indian Affairs gages

that were used.

The station numbers are also plotted on the map to give you a geographic location of these particular sites, and again, remembering my Group A sites, the reasons they were studied and the geographic location, all the Group A sites are contained within the Wind River Basin with the downstream term being Wind River Canyon.

* * * * *

Q All right. Do you have a map to identify as to where the Group B sites lie?

A Yes, I do.

THE SPECIAL MASTER: What was the last of that? Do you have a map what?

MR. CLEAR: That shows where the Group B sites are located.

THE SPECIAL MASTER: Group B sites, all right.

MR. CLEAR: As indicated on --

THE SPECIAL MASTER: Yes.

MR. CLEAR: -- as set forth on Exhibit C-296.

THE WITNESS: While he's handing those out I can give a brief history of the Group B's as I did for the A sites.

THE SPECIAL MASTER: If Mr. Clear desires.

MR. CLEAR: Pardon me, I didn't hear that.

THE WITNESS: I was just going to give the definition of B sites, because we haven't previously done that.

MR. CLEAR: All right.

THE WITNESS: Before I refer to the exhibit.

MR. CLEAR: All right.

THE SPECIAL MASTER: All right.

THE WITNESS: The B sites are also called additional study sites. The B sites were again selected by Mr. Billstein to satisfy the purposes of his work. To my

Frontier Reporting Service

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

201 Midwest Building
Casper, WY 82601
(307) 237-1493

knowledge he did not intend to perform a systems operation study on these particular sites. He was going to study them on an isolated reach basis, rather than a basin-wide basis.

The geographic scope for these sites is a little greater than that.

Q (By Mr. Clear) I don't know if I have done this, I have placed on the easel U.S. Exhibit WRIR C-298. Can you identify that exhibit --

A Yes.

Q -- Mr. Keene?

A This exhibit is titled, Additional Study Sites and it, too, has a study site index. Within this index is the study site number and the site name, and mapped are the study site locations. Now, as I was saying, the Group B study sites cover a broader geographic area than the study sites in Group A.

THE SPECIAL MASTER: Mr. Keene, what is an ungauged study site? What do you do?

THE WITNESS: There is no stream gauge located at that site or it has very insufficient stream gauge information. So, sometimes it is a very hard and fast definition of ungauged and sometimes it's simply that I did not have enough gauge information to call it a gauge

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

site.

THE SPECIAL MASTER: Well now, what exists, for example, on the North Fork of Sage Creek in 11-166 that constitutes an ungaged study site?

THE WITNESS: Okay. I had some scattered BIA records on these tributaries, but I did not use it in my study, so I did not have any stream gage measurements at that particular site, and as I will explain when I go through some examples, I used other study techniques rather than those employed for the detailed study sites, the A-1s. So the ungaged basically means that I did not have stream gage information or if it was there I did not consider it in my study.

THE SPECIAL MASTER: Well, what information other than gaging flows is of value in determining either historic or natural flows?

THE WITNESS: There are other parameters to consider.

THE SPECIAL MASTER: Like what?

THE WITNESS: Such as watershed characteristics, climatological characteristics, the precipitation, your drainage area size, mean basin elevation, mean slope of the basin, certain watershed characteristics that can be associated with hydrologic conditions.

THE SPECIAL MASTER: And upon these you can rely to

keene-direct-clear

come to an actual quantification of flow in feet per second or in acre-feet per year or season?

THE WITNESS: Not an actual quantification of it, no, because you do not have the measured records, but you can estimate flows.

Q (By Mr. Clear) Group B also has a B-2, Owl Creek Basin?

A That's correct, and it's the sites at the northerly end of this map up at the top, and it's basically North Fork and South Fork Owl Creek and then Owl Creek immediately downstream to the confluence of the North and South Forks. And again, I used a slightly different study technique because, here's an example of some gage records being available and incorporating those in my study, and again we will get into some examples in a moment.

Q Mr. Keene, although your study areas are broken down into groups and subgroups and you have testified that the different groups receive different levels of intensity, was there any common methodology of study applied with respect to all of the groups and subgroups?

A Yes. The starting point was a data assessment exercise where I accumulated and examined as much hydrological information, such as the stream gage records and climatological information and other information that would be related to my natural flow study. So it's

Frontier Reporting Service
409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280
201 Midwest Building
Casper, WY 82601
(307) 237-1493

basically an accumulation and assimilation of information appurtenant to the study.

THE SPECIAL MASTER: Is this exhibit to be identified, C-298, as an additional study site of the Wind River Basin or just additional study sites? I see your second line is stricken.

THE WITNESS: Yes, I would like to strike that because as the scope changed, we moved outside the Wind River Basin.

THE SPECIAL MASTER: Very well. Thank you.

THE WITNESS: Anyway, back to the data assessment exercise. I examined the gage network, the stream gage network relative to the selected study sites, and in referring back to Exhibit C-297, you have an opportunity to examine this gage network as I did through the Basin. So, I'm looking at the density of the information that's available specifically relevant to some of the study sites identified by Mr. Billstein. So, I'm looking at the geographic location, the density of information, the quantity of information that's available at those particular sites and also the quality of the information. And, now, with respect to quality, general considerations in this area are things like the channel stability at a gaging station, the frequency of measurement and the

completeness of record, the agency performing the measurements, the purpose of the measurement, things of that nature to give kind of a qualitative sense to the measured records. Now, certainly we didn't have to look at all of these quality considerations at every gage, because the U.S. Geological Survey or the Bureau of Indian Affairs provides some of this information and they are the measuring agency. So by using their documents, we are able to review some of their own qualitative assessments of their data. So those are basically two elements that are common to both the Group A's and the Group B's.

Q (By Mr. Clear) Did you do any field investigations?

A Well, that's true. That was another study element that is common. We performed a field investigation to review the physical features that relate to hydrologic conditions. We performed both a ground level reconnaissance and an aerial reconnaissance and this gave us the opportunity to look at site specific features as well as get a basin-wide perspective of the area.

Q What did you do with it after you completed your data assessment and field investigations; what did you do with that investigation?

A Well, I marriaged the data assessment information with

some of the field information that we obtained and blended that with the scope as identified by Mr. Billstein.

Q Now, Mr. Keene, let's move on to the -- move back on the A-1 sites and discuss them with some particularity. You stated the A-1 sites received the most intensive study. Can you describe -- describe your intensive study and the study methods with respect to the A-1 sites. First, the first question I have for you: Are these A-1 sites the same sites as testified to by Mr. Toedter with respect to his depletion analysis?

A That's correct.

Q And those basically are the sites which are shown on U.S. Exhibit WRIR C-288, which was introduced by Mr. -- through Mr. Toedter?

A Yes.

* * * * *

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

Q. (By Mr. Clear) Can you describe for us then the methodology you used with respect to the A.1 sites which received the most intensive study?

A. Again, because they were identified by Mr. Billstein for certain needs of his work, that fell into this detailed study classification, it was necessary to quantify the depletions upstream of the sites. Now, Mr. Toedter has already testified to the agricultural depletions. The only other depletions that were considered upstream of the A.1 sites were the incremental evaporation depletions for Bull Lake Enlargement. All other depletions such as the municipals depletions, industrial depletions were considered relatively insignificant above my study sites, and therefore, were not considered.

Again, reviewing the available historic flow records in terms of the periods of record, it can be observed that the A.1 sites do not all have a common historic period of record. There's a mix throughout my study area, and I would take the depletion estimates and add those to my historic flows to obtain natural flows.

Q. Let me give you a hypothetical question. Suppose you had a gage with a record of only 1930 to 1979, and you had Mr. Toedter's information, depletions which were

from 1918 to 1979. How did you take Mr. Toedter's information and apply it to the hypothetical gaging site?

MR. WHITE: Objection, Your Honor. Now we're back to the hypothetical question, where the old law still holds, assumes facts not in evidence. If there's a particular gage with a particular depletion study which fits these facts, it ought to be disclosed to the Court, otherwise the question assumes facts not in evidence.

THE SPECIAL MASTER: Well, it's a hypothetical anyway, so it doesn't have any probative value, so he may answer it.

THE WITNESS: For the hypothetical example, you have stated that the historic flows are available from 1930 to 1979. I would take Mr. Toedter's depletion estimates exactly coincident with that period of 1930 to 1979 and add to those, to my historic flows to obtain natural flows. I would not have any need for the estimates that Mr. Toedter made of depletions from 1918 to 1931, so I'm only considering his depletions exactly coincident with my historic period of record.

So, you can see that if I have a mix of different gaged periods for my study sites, even after adding the

natural flows, I continued to have that same mix. I do not have a common study period at this point.

Q. (By Mr. Clear) Mr. Keene, in the -- Mr. Toedter's Exhibit 293 which was a computer printout of his depletions on the A.1 sites, in some instances he had negative numbers for depletions. How did you use those?

A. Well, as Mr. Toedter alluded to in his testimony, that his tabulations contain an arithmetic sign associated with a certain depletion for a given month. The negative depletions indicate that those are flows that should be arithmetically subtracted from my historic flows. They carried the arithmetic sign into my study.

The positive sign in Mr. Toedter's table, the positive depletions indicate water that was depleted above my gage, and therefore, should be added back to my historic flows, and as you'll see in any given year or if you're analyzing on a row basis, that there are certain negative sign values and certain positive sign values, and those are because of the time delay of the return flows. So the return flows are carrying a negative sign.

Q. What do you mean by the "time delay of the return flows"?

A. The water is diverted at a certain point in the stream at a certain time, and it takes time for that same amount

Frontier Reporting Service
409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280
201 Midwest Building
Casper, WY 82601
(307) 237-1493

of water to return back to the stream system.

THE SPECIAL MASTER: When there is an absence of a sign, does your testimony, does that mean there's a plus or positive?

THE WITNESS: That is correct. The default in the computer program listing is if it's positive, the sign is not shown.

Q. (By Mr. Clear) Okay. Mr. Keene, I believe before I asked you that series of questions, you were discussing the fact that you don't have a common data base period for all of the A.1 sites, and you're now going to explain how you overcame that problem.

A. Yes. I examined the key gaging stations throughout my study area for the A.1 sites. Key here is meant to be qualified by the quantity of information and the quality of information. That's why I called them key stations. And the key station that I'm going to use for the A.1 sites is Bull Lake Creek near Lenore, and if we can refer again to the U. S. Exhibit C-297, if you start in the gage index, Bull Lake Creek near Lenore has a Station No. 2250.

THE SPECIAL MASTER: 2250?

THE WITNESS: Yes, 2250. And it might be well at this point --

keene-direct-clear

THE SPECIAL MASTER: I find 40, 45, 50 and 60, but not on Bull Lake.

THE WITNESS: Look at the index.

THE SPECIAL MASTER: I'm trying to locate it on the map.

THE WITNESS: I'll get to the location on the map in a minute.

THE SPECIAL MASTER: It's near Lenore, but I don't find -- Will you point to it?

THE WITNESS: I sure will.

THE SPECIAL MASTER: Oh, I see it, I got it. Thank you.

THE WITNESS: Let me, for a moment, I might indicate --

Q. (By Mr. Clear) Mike, wait till they find it on the map.

A. Let me digress for a moment and give a description and the station number in that column. The 2250 is an abbreviated identifier for this particular site, and the 2250 is obtained from the USGS classification or identification.

THE SPECIAL MASTER: Why would you identify this as an optimum gaging station on such a stream of relatively low flow compared to the Main Stem of the Wind or to Dinwoody or to North Fork, much larger streams?

THE WITNESS: Those -- I also have some key

stations on the Main Stem Wind River, but for the purposes of establishing an outside study limit for my time period, I am saying that the Bull Lake Creek near Lenore station is the key station because it has the longest stream gage measurement period of record, again within my A.1 classifications.

THE SPECIAL MASTER: Okay.

THE WITNESS: Concentrated in this area, so it has quality, not water quality, but in terms of definition of the records, and it has the longest period of record.

THE SPECIAL MASTER: Okay.

THE WITNESS: That was identified as the key gaging station. That particular station has a measured period of record from June, 1918 to the present time, and for the purposes of my study, the ending month and year was September, 1979. So the measured period of record, Bull Lake Creek near Lenore is June, 1918 to September, 1979.

Now, I abbreviated this outside limit, so to speak, study period to a 34-year period, 1946 to 1979, and I'm referring to water year rather than calendar year.

Q. (By Mr. Clear) What's a water year?

A. Water year for purposes of this study and commonly used

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

by USGS begins in October and ends in September.

Q. Why did you choose the 1946 to 1979 base period for the base sites, A.1 sites?

A. This particular 34-year period contains relatively current measurements. Many of the gages have a continuous record for most or all of the period 1946 to 1979. This period contains representative monthly and annual averages and variations. It includes dry cycles and wet cycles, and is relatively long for a hydrologic study of this nature.

In both of these study periods, the outside limit study of 1918 to 1979 and the 1946 to 1979 were established by me and communicated to Mr. Toedter and Mr. Billstein.

* * * * *

Q You briefly described how you established the common data base for all of the sites, even those which had no -- or might have been missing records for sometime, either 1946 to the 9-79 period?

A As you will recall, there are several gages and study sites within the A-1 classification that did not have this complete period of record. So, it was necessary as part of my study to get all of my study sites on a common data basis, and I have selected the 1946 to 1979 to accomplish this. I used a statistical study to extend or fill in some of the missing information, some of the natural flows at short period stations to come up with a common site.

THE SPECIAL MASTER: Mr. Keene, if it naturally arises in my mind that the '30s should have been included in the data base, that excludes one of the most serious drought, water short periods in American history, in my lifetime, how would you respond to that?

THE WITNESS: I would say that it is true that this was a dry period, the 1930s but also the 1920s were extremely wet, very surplus. And I felt that by going to 1946 to '79 I obtained a representative condition on a long-term average basis. So the same argument can be made for going back to the 1920s or going all the way

back to the information available of Bull Lake Creek and [illegible] including 1918 to 1979. So, through different analysis and techniques that I employed, I was satisfied that the '46 to '79 was more representative of long-term conditions than going back even further than you suggest. So I do not deny that the '30s were a dry period, you are correct.

THE SPECIAL MASTER: Very good. Go ahead, Mr. Clear.

Q (By Mr. Clear) While we're still on the A-1 sites, Mr. Keene, can you give us a few examples which will show us with particularity how you went about your studies, starting with a very simple A-1 site and then going to, maybe, a more complex one?

A Okay, let's start with Wind River near Dubois.

Q What's the number of that?

A That number would be 2185. It will be on the left-hand side of the map.

Now, for this particular site, I had a historic measured record of October, 1945 through the present time, but again, the outside limits for my study were September, 1979. I took Mr. Toedter's depletion --

Q You said your outside limits of the study were '79 -- '46 to '79 was what you meant?

A I meant on the most current side of the time would be

9-1979.

I took Mr. Toedter's agricultural depletions and added those to my historic period of record, and came up with a natural flow estimate on a monthly basis for water years 1946 through 1979, and at that point I had satisfied the objective for that particular site and have gotten to the 34-year study period base.

Q All right. Well, let's --

THE SPECIAL MASTER: We have been at it about an hour. Why don't we take a short break?

MR. CLEAR: All right.

(Recess, 10:02 a.m.

* * * * *

Frontier Reporting Service

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

201 Midwest Building
Casper, WY 82601
(307) 237-1493

THE SPECIAL MASTER: All right, we'll convene, please. Mr. Clear.

Q (By Mr. Clear) Mr. Keene, just before the break you made an analysis of a very simple A.1 site. Can you give us an example of a complex A.1 site and run through that for us?

A Okay. Let's select one in the Little Wind River Basin, North Fork Little Wind River at Fort Washakie.

Q What's the number on that?

A 2290.

Q All right.

A Can you find 2290?

Q Yes. Describe for us why this is a complex site.

A Well, this is a situation where we do not have measured flows at this site for the total period of record.

Q For the --

A And also --

Q You have measurements for the full period of record or the full period of the -- the full study period?

A The full period for the defined study period from 1946 to 1979.

Also there are two transbasin diversions involved in this particular site, so that adds some complexity to it.

THE SPECIAL MASTER: What do you mean two transbasin diversions at that site of 2290 reflected at North Fork? Flows into the Little Wind, something of that kind?

THE WITNESS: No. There is water above the gage that is diverted from one of its tributaries, St. Lawrence Creek into Pivot Creek, and that flow does not return to the Little Wind River system above my gage.

THE SPECIAL MASTER: Where does that flow return to?

THE WITNESS: It comes in below, it comes through the Sage Creek system and comes in below my gage.

MR. CLEAR: Can you speak a little louder?

THE SPECIAL MASTER: That's not a river diversion -- Well, I beg your pardon, I'm thinking in terms of Wind River and its -- all of its tributaries. If the water gets back into there I feel it's not a diversion. It's a diversion from your particular gage.

THE WITNESS: That's correct.

THE SPECIAL MASTER: I see, I'm sorry.

THE WITNESS: The other transbasin diversion is a canal project that was constructed in the middle '30s in the North Fork of the Little Wind for the South Fork Little Wind River and this diversion to the canal will affect my study strategy as I'm going to describe.

Now, the foundation information again is my historic

stream flow measurements, and for this particular site, the USGS has monitored or did monitor the gage from May, 1921 to September, 1940. The Bureau of Indian Affairs had a gage at this same site from October, 1940 to October, 1963. That established my foundation information, my historic stream flow period.

THE SPECIAL MASTER: Both of those did or just the latter?

THE WITNESS: Both combined, a composite of both of those.

However, because of this canal project from the North Fork Little Wind River to the South Fork Little Wind River and the fact that I could not obtain satisfactory information from the Bureau of Indian Affairs to quantify the diversion amounts, I truncated my historic measured period of record to exclude the effects of this particular diversion.

Q (By Mr. Clear) How did you truncate to exclude the effects of the diversion?

A The information that we obtained from the Bureau of Indian Affairs indicated that this canal went into operation approximately the fall of 1936 or the winter of 1937. Therefore, I did not consider any of the USGS or the BIA historic stream flow measurements after

water year 1936. Therefore, I truncated my historic period of record. What I have now available for me is the period from May, 1921 to September, 1936.

Going back to the transbasin diversion, so I can justify my historic flows to get them back on a natural flow basis, I obtained from BIA, information on the diversion from St. Lawrence Creek to Pivot Creek in the upper reaches of the watershed. I also talked to BIA representatives and also residents in the field to help quantify the amount of flow that was being diverted into Pivot Creek, and therefore, bypassing my gage.

I quantified that information and included it in my analysis, so I have allowed for that transbasin diversion.

I did not have to consider the transbasin diversion from the North Fork to the South Fork of the Little Wind River because, remember I truncated my historic period of record, there's no longer an impact.

I then took Mr. Toedter's agricultural depletions for the period May, 1921 to September, 1936, added those to my historic flows and obtained natural flows for that period.

Q For which period is this?

A May, 1921 to September, 1936.

Now, remember, my study objective is to get all

gages on a common study base period throughout my A.1 study area. To do this I used that statistical analysis that I indicated earlier to reconstitute or to fill in missing information, and it is a practice that's common to hydrology, and we have a standard statistical package that we use at HKM that includes different forms of prediction equations to fill in this missing information. And I can show you those prediction equations in mathematical form.

THE SPECIAL MASTER: Is the work you're referring to part of A.2, study group work or is it still A.1?

THE WITNESS: It's still an A.1 site.

MR. CLEAR: This is a complex A.1 site as opposed to a very simple A.1 site.

THE SPECIAL MASTER: Okay. You don't have to show it to me unless Mr. White wants to see them.

MR. WHITE: I don't care to see formulas again.

MR. CLEAR: You don't want them?

THE SPECIAL MASTER: No.

* * * * *

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

A. (Continued) So using just this statistical package, I examined these three forms of a prediction equation and I select the prediction equation that I think provides me the most representative results. And I determine that from reviewing the statistical parameters that come out of the analysis as well as reviewing the hydrologic results. In other words, I feel that there are certain hydrologic conditions that are characteristic of the North Fork Little Wind River that I want to preserve in a statistical analysis, such as the monthly flow distribution or what I anticipate to be the average annual natural flow, things of that nature. I do not want to upset with a correlation exercise. So, keying on statistical parameters and hydrologic characteristics, I selected the prediction equation or equations that I think are most representative to synthesize or reconstitute some of this information to get it on the common study base period of 1946 to 1979.

Q. (By Mr. Clear) Mr. Keene, using the type of analysis you described with respect to the simply A.1 Site and an example of a complex A.1 Site, what results do you reach with respect to the A.1 Sites?

A. I obtained monthly streamflow values on a natural flow basis for the period 1946 to 1979, and those were turned

Frontier Reporting Service

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

201 Midwest Building
Casper, WY 82601
(307) 237-1493

over to Mr. Billstein.

Q. Let's move on and, by using an example of an A.2 Site, describe the study technique that you used for A.2 sites.

A. Remember that --

Q. Maybe we should go back and refresh our memory as to what the A.2 Sites are.

A. Yes, I think that is important. The A.2 Sites are those used in my bookkeeping process to step downstream from my very detailed study sites, the A.1s, to the Wind River Canyon, which was the outside limit of my Group A Sites. So it is a stepwise accounting of flows. And let's take the first increment downstream of the Crowheart gage, Wind River near Crowheart.

Q. What's the Crowheart gage, can you give us the number on that?

A. That's 2255. That was classified as an A.1 Site and a detailed analysis was performed.

THE SPECIAL MASTER: And you identify that as the Crowheart Butte gage or the Diversion Dam gage?

THE WITNESS: It is called Wind River near Crowheart by the USGS. And it is immediately upstream of diversion into Wyoming Canal.

Do you find it there, 2255?

THE SPECIAL MASTER: Yes, I find it a mile from the

Frontier Reporting Service
409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280
201 Midwest Building
Casper, WY 82601
(307) 237-1493

canal, but I find it about 7 miles south from what it is named for, but that's all right, go ahead.

A. Right. What I'm going to do is make an increment stepping downstream on the Wind River going through this bookkeeping process, and I'm going to perform a simple water budget analysis. I consider incoming flows and water that may leave the system between that -- within that particular increment and establish mean monthly flows for the period 1946 to 1979. At the point downstream of my increment I'm going to identify as Kinnear, Wind River near Kinnear, and that's located at No. 2276.

THE SPECIAL MASTER: We have that.

A. Now, even though I have a few historic measured records at Kinnear, I did not use those. We did not perform a detailed depletion analysis upstream of this point as scoped by Mr. Billstein. So, again, it fell into an A.2 classification, and this is the example I'm giving.

The simple water budget was performed by quantifying incoming flows and one of the relatively major tributaries in this particular reach, certainly not major compared to the Wind River, but in terms of its neighbors was Dry (sic) Pasup Creek, and I examined the average annual incoming flow from that particular tributary and then I examined the other local tributary flows that may be coming into this particular reach

this particular reach. Those would be pluses to this little mathematical water budget. The minuses are things such as natural depletions along the Main Stem Wind River. So, combining my pluses and minuses, I was able to come up with a transfer ratio or a multiplier that I could multiply the Crowheart information by to obtain mean monthly flows '46 to '79 for the gage near Kinnear.

Q. (By Mr. Clear) How did you determine the amount of water flowing into the system from Dry Pasup Creek?

A. On this particular case I used an isogram map developed by the USGS and published in 1949. An isogram is a contour of equal runoff, and this particular map has the contours plotted throughout the basin and a person can examine the average weighted runoff, natural runoff for this particular study for that particular stream.

THE SPECIAL MASTER: Even though there is no gage on it?

THE WITNESS: That is correct. Because this map was developed based on gaged information in terms of hydrology. They have some climatological stations and then they developed some precipitation elevations, contours through the basin.

Now, there are other techniques that I employed in tributaries like this that will come up in another example,

Frontier Reporting Service
409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280
201 Midwest Building
Casper, WY 82601
(307) 237-1493

but for this particular site that was the technique employed. So that quanitified the major inflow to the system, and the natural depletions were estimated by examining the amount of phreatophyte acreage, the acreage between my Crowheart gage and the Kinnear gage and the typical phreatophyte species and its density in that particular region and assigning a consumptive use rate to that and coming up with a natural depletion.

So having my inflow --

THE SPECIAL MASTER: What is your professional basis for doing that?

THE WITNESS: It's actually adequate for the intended purpose of this stepwise accounting downstream. I have essentially defined the hydrologic potential and the hydrologic characteristics of the Wind River by the time I get --

THE SPECIAL MASTER: What is your professional basis? You stated the phreatophytes or hydrophytes and then making a correction or addition to your figures based upon the consumptive use of these plants. Is there literature that says this is where this should be done? Is there some degree that you can do this with some scientific accuracy? How do you apply those results? Do you apply it to the entire totals you come up with on your natural

flows for the whole Reservation?

THE WITNESS: Only for the increment from Crowheart to Kinnear, and, yes, there is literature on consumptive use for these particular species. And, in fact, one of those would be the Soil Conservation Service Type IV Study that was published in 1974. They discuss acreage and depletion a little for natural phreatophytic types. There's also other reports that are available that talk about this sort of thing. So it's not a guess and by golly sort of thing. But, do remember, that the purpose of this is a general bookkeeping from a detailed study site which in itself has primarily defined the hydrologic potential and the characteristics of the Wind River. So I am not really upsetting those characteristics by this bookkeeping method.

THE SPECIAL MASTER: Okay, go ahead, Mr. Clear.

Q (By Mr. Clear) So what results do you come up with in this particular example of your A.2 Study Site?

A. I have mean monthly flows for the study period 1949 to 1979.

THE SPECIAL MASTER: Do you need a drink of water?

THE WITNESS: I have some right here. Thank you.

THE SPECIAL MASTER: I see. All right.

* * * * *

Q (By Mr. Clear) Let's move on and give us an example of an A.3 site and how you approached those sites.

A An A.3 --

Q And again, refresh our memory as to what a 3 site is.

A An A.3 site is one that I was able to say the natural flows are essentially equivilent to the historic flows; that the watershed upstream of that particular gage site is essentially unimpaired, that is, that the depletions are not significant, the man-induced depletions are not significant, and therefore, I have established that equivilency.

Let's take Bull Lake Creek above Bull Lake.

Q What's the number on that?

A The number for that one is 2240. For this particular gage the historic measured period of record is June, 1941 to December, 1953 and from October, 1966 to the present time. So here is another example of not having a complete record for my selected study base period of 1946 to 1979.

I used the statistical analysis that I described earlier to fill in the missing records for this particular station to get it on a common study base period. But the unique feature here is I did not have to add any depletions back into those records because the upstream watershed is essentially unimpaired.

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

Q Using this method what results do you come up with with respect to A.3 sites?

A Again I come up with mean monthly natural flows for the period 1946 to 1979.

Q Now, we've completed your discussion of your Group A study sites. What overall information did you derive from the Type A studies, the Group A studies?

A Again, it is the mean monthly flows on a natural flow basis from 1946 to 1979, and that is the information that was turned over to Mr. Billstein and also some of the information was turned over to Mr. Vogel for the fishery study.

Q Have you prepared an exhibit with respect to your conclusions on the A.3 sites?

A Yes.

Q Were the A sites?

A The A sites.

Q A sites.

(Brief pause.

THE SPECIAL MASTER: Surface water flow chart?

MR. CLEAR: Yes, Your Honor.

Q (By Mr. Clear) Mr. Keene, I've placed on the easel an exhibit which has been marked as United States' Exhibit WRIR C-300. Are you familiar with that exhibit?

Frontier Reporting Service

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

201 Midwest Building
Casper, WY 82601
(307) 237-1493

A Yes, I am.

Q And did you prepare it?

A Yes, I did.

Q Can you explain what it is and what it shows?

A The title is "Surface Water Flow Chart, Natural Flows, Wind River Basin". It's a simple schematic of the natural flows through the Wind River Basin and I have plotted on the schematic at certain locations the estimated long term average natural flows. And you can start at the westerly most gage, even though it's not shown here, essentially the Wind River near Dubois gage. My estimate is 132,300 acre-feet per year, average annual natural flow. And you can proceed through the Wind River Basin, looking at the primarily sub-basins such as the Little Wind River and Popo Agie and examine the quantification of flows.

Now, as part of the schematic you can see that the river system gains in size as we proceed downstream, which is intuitive. It's not fully scaled,but it does give you the idea of the concept that we are increasing in full quantities as we proceed in the downstream direction.

And for that Group A study sites, the downstream limits which establishes my geographic scope is Wind River Canyon and I am estimating the long-term average annual natural flow estimate to be 1,490,000 acre-feet per year.

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

Q Mr. Keene, on Exhibit 340, the numbers that are located at each stream, you stated they indicated a long term annual average. Is the long term average annual figure the figure you turned over to Mr. Billstein?

A Yes, it is.

Q Did you turn over other information to Mr. Billstein?

A Yes, as indicated earlier I turned over the mean monthly flows as well as the average annual, so this is a result of a calculation for the study base period 1946 to 1979.

THE SPECIAL MASTER: This is just a little bit downstream, historically speaking, from where you are, but are you familiar with the rest of this as it goes past Yellowtail into the Missouri and down into the floodstage conditions south of Awallow Reservoir and down into the Missouri?

THE WITNESS: Most of my efforts have been concentrated in the Montana area of the Big Horn River.

THE SPECIAL MASTER: You don't know how much 1,090,000 acre-feet per year goes into flood conditions every spring south of Omaha, do you by any chance?

THE WITNESS: I do not know offhand.

THE SPECIAL MASTER: Okay.

THE WITNESS: But you must remember that is an estimate for natural flows and what you'd like is an answer on

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

what's happening down there right now.

THE SPECIAL MASTER: Well, I'd like to show somebody in Washington that the construction of a few dams would help alleviate some floods downstream, and therefore, they should make some contribution toward their building, that's what I think I have in mind.

Okay, Mr. Clear.

Q (By Mr. Clear) Mr. Keene, we've finished with the Group A. Could we move on to the Group B study sites and again, refresh our memory as to what that is.

THE SPECIAL MASTER: Before you go to the B's, are you going to have another map like C-300 showing historic flows for the same period?

MR. CLEAR: We do have a map, Your Honor.

THE SPECIAL MASTER: Coming up?

MR. CLEAR: Well, we'll do it now, Your Honor.

THE SPECIAL MASTER: Well, it probably ought to be done now, I think, better organized, I think.

Q (By Mr. Clear) Mr. Keene, I've placed on the easel what I've marked as United States' Exhibit WRIR C-299. Is that an exhibit which you prepared?

A. Yes, it is.

Q Can you identify what that shows?

* * * * *

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

A The exhibit is entitled Surface Water Flow Chart, Historic Flows Wind River Basin. It is similar to the surface water flow chart described in the natural flows, except I have measured for historic averages instead of natural flow averages at selected points along the schematic.

THE SPECIAL MASTER: At the same points used on 300?

THE WITNESS: Sometimes they are at the same point and sometimes different. That's really not that important because there is a main difference, and that is the historic flow map does not have a common study base.period. In other words, these values are essentially obtained out of USGS records, and do remember that those records do not have a common base. Not all my gages for my Group A's have the same historic measured period of record. So you cannot conveniently compare one value to the other value. I cannot go to the gage at Bull Lake Creek above Bull Lake and compare that to my natural flow map because we are not on the same data base.period.

THE SPECIAL MASTER: But, on the historic flow, maybe C-299 you have something like 384,000 acre-feet per year coming down the Wyoming Canal from the Diversion Dam. Where does it come back into the main stream of the Wind, just at Muddy Creek and Five Mile Creek, is that

Frontier Reporting Service
409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280
201 Midwest Building
Casper, WY 82601
(307) 237-1493

all?

THE WITNESS: There are other places that it returns to the system, and I have only indicated major stream systems. That's why you can't extrapolate too much information from this map. It gives you a physical sense to what's going on out there right now. In other words, you get to see the Wyoming Canal, you get to see the fact there is a Boysen Reservoir --

THE SPECIAL MASTER: Yes, but it doesn't give you the credit for the water that gets into Ocean Lake and drainage back into the river. Is it a true reflection of what are the historic flows?

THE WITNESS: There are historic flows at USGS gages. In other words, I did not do any synthesization of historic flows if they were not measured.

THE SPECIAL MASTER: Well, I'm about to conclude that the historic flow figures in this lawsuit are not accurate,because of this very reason.

Q (By Mr. Clear) Mr. Keene, do the historic flow figures include the return flows in the stream?

A Yes, they do.

Q Can you explain how that happens?

THE SPECIAL MASTER: Show me where the return flow is of the Wyoming Canal, initial diversion of 384,000 acre-feet

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

a year.

THE WITNESS: Some of that was -- will be coming back down Five Mile Creek. Five Mile Creek in its natural state does not flow 110,100 acre-feet. So, I do have some return flows from that project being transferred through the Five Mile Creek system.

Q (By Mr. Clear) Mr. Keene, since the return flows, as I understand it, return to the stream are the return flows reflected in -- necessarily reflected in a gage reading?

A Yes, they are. And that's the map --

THE SPECIAL MASTER: If they are upstream of the gage, I guess they are.

MR. CLEAR: Yes, sir.

THE WITNESS: That is correct.

Q (By Mr. Clear) So that map would indicate the return flows upstream from the gage, in other words, based on the --

A That's correct, as measured by the USGS.

Q All right. Mr. Keene, let's go on to the B sites and again, refresh our memory as to what they are.

A The Group B study sites are those identified as additional study sites. Mr. Billstein --

THE SPECIAL MASTER: Begin that again, please.

A The Group B study sites are those identified as the

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

additional study sites. They have received a different level of study.

THE SPECIAL MASTER: Yeah.

A They, too, were identified by Mr. Billstein for the needs of his work and I'm going to give an example for a B.1 site followed by an example of a B.2 site, so that you can look at the differences.

Q (By Mr. Clear) Are the B.2 sites, they are shown on Exhibit 298, the additional study site map, is that correct?

A Both the B.1 and the B.2s.

Q I'm sorry, the B.1 and the B.2 sites?

A I refer you to Exhibit C-298, and as an example of a B.1 site, let's take Number 5, Sheep Creek. Sheep Creek is a tributary to Muddy Creek and Muddy Creek is a tributary to the Big Horn River. This is a site that does not have any gaged records, so I have to use other techniques to determine the natural flows.

Typically, for the B.1 sites, I examined one or several techniques and selected the one or a combination of several that I think are representative to give me my desired result. As an example, I considered the isogram map that I have discussed earlier, that can be reviewed in the USGS 1949 Report. The SCS published an isogram

map in their Type IV study in 1974. Both of those provide you with a weighted average -- actually, you have to calculate the weighted average but you have the isogram plots that you can calculate a weighted average natural flow runoff on an annual basis. I also considered a reasonable runoff realization exercise. In that particular exercise I consider the average annual precipitation of the watershed above the gage and assign a representative percent runoff from that. Another technique would be field information that either our field people, or in contact with residents in the field on the amount of water that they typically see coming through the stream; and, finally, my own professional judgment in selecting what technique I think is most representative, or what combination of techniques I think is most representative.

THE SPECIAL MASTER: Mr. Keene, I can't help commenting on the fact that -- I would like to think it is from a mature lifetime in the law -- the fact that to me to prove a point, evidence is nothing that beats empirical, factual, physical, truthful, scientific evidence. The two plus two equals four, and it is done by adding. This is sort of a basic oversimplification of the situation. When you have a gage in a stream and you measure that gage year after year, decade after decade,

you give me evidence of the state of nature that in my opinion is acceptable, the best evidence. And in many ways, it is irrefutable. When you come in again on a separate study site and tell me these things you're just referring to, you may be perfecting a science, you may be doing marvelous professional and educational research, and paving great new ways to find materials, but they leave a long distance in my mind from what can be acceptable evidence of what's in that stream. Now maybe the law -- maybe the science of geology can do it for me in geologic time, I will buy that, certainly. But, you're not talking geologic time, you're talking a brief flick in the time of geology of measuring the last 40 or 50 or 60 years of these particular streams and you're doing it without a gage. Do you feel that your B group studies on ungaged sites, to what percentage they are -- do you feel they are as accurate as a gaging of that same site? Because, otherwise, I don't see much weight in what you're telling me. I don't see the need -- I don't see the justification we're putting much weight in what you're telling me.

THE WITNESS: I'm not implying that the Group B sites are as reliable or as accurate as those that I have identified as the A.1's. I have contended that a detailed

analysis was performed for the A.1 sites --

THE SPECIAL MASTER: I appreciate that.

THE WITNESS: These are different levels of study.

I appreciate your concerns and your opinions that the stream gage information is valuable. It can be extremely valuable provided that is of adequate quality and adequate quantity.

THE SPECIAL MASTER: Right.

THE WITNESS: But there are certain watersheds at which we do not have gaged information, and it is still important to predict runoff amounts.

THE SPECIAL MASTER: But that is not true, because you had adequate gaging on nearly every stream that is necessary to our adjudicating water rights in the area, is that not a fact?

THE WITNESS: Yes. Remember that --

THE SPECIAL MASTER: Well, then, why were the ungaged sites in the Group B studies engaged in?

THE WITNESS: I'm sorry. Could you repeat that?

THE SPECIAL MASTER: Well, if you had adequate sites with -- Group A sites for every stream necessary to do the work assigned to you by the United States of America, which is to namely give us a scientific basis for a claim for water, I mean -- and prove there is

Frontier Reporting Service

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

201 Midwest Building
Casper, WY 82601
(307) 237-1493

sufficient water to justify those claims, why then, did we have to engage in Group B study site activity when the best evidence was available and you did an excellent job of finding it for us?

THE WITNESS: The need for the Group B study sites will be described by Mr. Billstein. In other words, he had specifics.

* * * * *

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

Q. (By Mr. Clear) Mr. Keene, do you generally know what Mr. Billstein wanted?

THE SPECIAL MASTER: I don't think I want him to tell me what Mr. Billstein thought, I'll ask Mr. Billstein.

Q. (By Mr. Clear) Mr. Keene, in the field of hydrology and hydraulics and engineering, is it customary or is it often necessary to determine stream flows at an ungaged site?

A. Yes, it is.

Q. Is there a common method or common methods to determine that that's accepted in the engineering field?

A. Yes, there are common methods.

Q. Have you been applying here with respect to A.2 sites and B sites, B.1 sites, have you been applying the methodology generally accepted in the field of professional engineering and in the field of hydrology?

MR. WHITE: Objection.

THE SPECIAL MASTER: I'll sustain the objection because you have to identify that which he's applying.

MR. WHITE: That's the objection, which methodology.

THE SPECIAL MASTER: I saw it coming, and I concur in it. Can he identify the methodology or the basis for what he's doing? And I'll gladly let you discuss it

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

then.

Q. (By Mr. Clear) Can you identify the methodology you're using for the B.1 sites?

A. Yes, I can. I can cover all those that were considered, but not on every gage for each one were those considered. Again, that was my selection and judgment.

THE SPECIAL MASTER: .gaged only, not on ungaged?

THE WITNESS: Even on the ungaged, sir. There are several techniques that in general I considered but may not have used specifically at a given site, and I'll run through those particular techniques.

I used the isogram map from the USGS, I used the isogram map from the Soil Conservation Service, I used the prediction equations developed by USGS and by HKM. Now, those prediction equations take the form of a mathematical formula similar to work I was going to present, but you're familiar with the different forms of the equation. So I've indicated that there are prediction equations by the USGS and prediction equations by the HKM. There was an association of channel geometry.

THE SPECIAL MASTER: Association of what?

THE WITNESS: Channel geometry.

THE SPECIAL MASTER: Channel, c-h-a-n-n--

THE WITNESS: C-h-a-n-n-e-l geometry.

Q. (By Mr. Clear) What does that mean?

A. The shape of the channel at a particular reach I'm considering.

THE SPECIAL MASTER: I put two n's in it, I had my mind on perfume.

THE WITNESS: And relate to a representative or a typical runoff amount. I also considered the runoff realization again. That was taking a weighted average annual precipitation on the watershed of interest and examining what is reasonable, what can I reasonably expect to come off this watershed in terms of percent.

THE SPECIAL MASTER: How do you find that, do you have to go in and get some soil analysis to determine hydrology, hydraulic conductivity.

THE WITNESS: The best way is to calibrate your watershed. In other words, you can put rain gages on your watershed and observe the runoff process with stream flow gages. These watersheds I did not have an opportunity to do that.

THE SPECIAL MASTER: How do you make your correction when you have gages in two different watersheds, one made up of almost impermeable clays and then impermeable lime stops, and the other one made of an alluvium that permeates water, that absorbs water like

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8260

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

a sponge?

THE WITNESS: That's correct.

THE SPECIAL MASTER: As to what they're going to give to that drainage?

THE WITNESS: That's correct. And you consider the geologic elements as well as the physical elements, of the size of the watershed, the shape of the watershed, a lot of these perameters have been studied in great amount of detail by different agencies. And like the USGS, they have considered these physical characteristics and related those to hydrologic conditions. So there are a lot of elements, you are correct.

And only by actually calibrating the watershed do you know for sure. But you can take a watershed that may have the very impermeable soils and look at a representative runoff amount, at a certain amount of acre per square mile on the watershed that had those soil conditions and relate that to a similar watershed having those same characteristics.

Agreed, it's not the same as having it gaged, but a technique of transferring hydrologic information from a watershed of similar characteristics to another watershed --

THE SPECIAL MASTER: Okay. Thank you, Mr. Keene.

Go ahead, Mr. Clear.

Q (By Mr. Clear) These techniques you described are

generally accepted in the field of professional engineering and hydrology engineering?

A. Yes, that is correct. But the final utilization of those techniques are left to the hydrologist. In other words, the agencies make them available, but the utilization is a responsibility of the professional employing those.

Q. Using a technique described with respect to B.1 sites, what results do you come to?

A. A long-term average annual prediction or estimate of the natural flow. I do not have those flows on the same data base period as I had for my Group A study sites, that being 1946 to 1979.

I also have an estimate of the monthly distribution of that long-term average annual flow. This information was provided to Mr. Billstein, the average annual and monthly distribution for his needs.

Q. Let's go on to the B.2 site and describe the method you used there.

THE SPECIAL MASTER: That was just one, Owl Creek Basin alone, the B.2?

THE WITNESS: Yes.

THE SPECIAL MASTER: Okay.

A. So even though it fell into the Group B Classification, there are unique features to the B.2, and I'd like to

keene-direct-clear

cover those.

THE SPECIAL MASTER: Okay.

A. I refer you again to Exhibit C-298 and the example that I'll use, we'll start with the gage in the South Fork of Owl Creek, identified as No. 2600. And I'm going to describe the quantification of those here and the transfer of information downstream and finally quantifying flow in Owl Creek immediately downstream of the confluence.

I took my gaged information at Site 2600 for South Fork Owl Creek, and it has a period of record of April and May, 1942, August, 1939 to September --

THE SPECIAL MASTER: It jumped from '30 to '39?

THE WITNESS: That's correct. There was no measurement in that period.

August, 1939 to September, 1943, and April, 1959 to current time. I was also able to say that this is a site where the natural flows are centrally equivalent to the historic flows. I did not make any adjustment for upstream depletions.

I did not bring this period of record back to the common period that I established for the Wind River Basin, there was no need to compare the results of the keene-direct-clear

Owl Creek Basin with that, which I established for the Wind River Basin.

The study period of record on the Owl Creek Basin was essentially that which was the measured period. I did not include, however, the April and May, 1932, but I still have a broken record in consideration here. So what I have done at this point is established that my historic flows and natural flows are equivalent, and now I need to transfer that information downstream into an area of interest for Mr. Billstein. And I employed a hydrologic data transfer technique similar to what I had described on the Main Stem Wind River, and this case I concentrated on the perameter of drainage area. I'm saying that those flows transferred downstream are of some relationship to drainage area size. So I did a multiplier that I could take times my mean monthly natural flows for a period of record in the South Fork Owl Creek gage and transferred downstream to an ungaged position which happens to be immediately upstream of the North Fork Owl Creek confluence.

* * * * *

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

A I performed a similar analysis on the North Fork Owl Creek, transfer that information down to the confluence. I add the natural flow estimates on a monthly basis for North Fork and South Fork, for the period when they are exactly coincident. In other words, if I had a little more records on South Fork than I had on the North Fork, I was not able to include the South Fork flows, only for the period that they are exactly coincident. And then I, after the combination, identify an estimate of mean monthly natural flows for Owl Creek immediately downstream of the confluence. I did one additional thing at two sites for Mr. Billstein: At the point on the South Fork and immediately upstream of the confluence with the North Fork and at Owl Creek immediatly downstream of the confluence, I performed a percent yield analysis. Now, what that means is I examined my monthly flows on a percent chance or a probablility basis. He was interested in knowing what the 50 percent chance flows are, for example, in that month or the 60 percent or the 80 percent chance flows. So, it is just one additional little study that I did for him, and it was done as a substitute to a systems operation study. The systems operations study that he's performing in the Wind River Basin provides him an opportunity to associate water supply with water use

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

in that type of a model. As I indicated earlier, Mr. Billstein did not intend to run a systems operation study on this particular basin, so he wanted this one other piece of information for his purposes.

Q So did you use any mathematical formula in the study of the B.2 sites?

A Yes, I did. I used the mathematical formula for the hydrologic data transfer. And that, as described, was the drainage area proportionality. I used drainage area as my key parameter to associate hydraulic and hydrologic conditions, and I transferred downstream.

Q Is this mathematical formula commonly employed in professional engineering and hydrology analysis?

A Yes, it is.

Q Is that formula found in your report?

A It is in the report.

Q And also the other prediction analysis formulas -- or prediction equations, are they also in your report?

A Yes, they are.

Q All right. So with respect to the B.2 study, what result did you come up with?

A For the B.2 study sites I had mean monthly natural flows for a period of record which was coincident with the historic measured periods, and then I also had the percent

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

yield results. Both of those were provided to Mr. Billstein and they are provided in the report.

Q Mr. Billstein (sic), I have handed you an exhibit marked United States Exhibit WRIR C-301, can you identify that, please?

MR. WHITE: Objection, Your Honor, this exhibit is in violation of the five-day rule.

THE SPECIAL MASTER: I was going to say how many days --

MR. WHITE: We received this at our offices during my absence at five o'clock last Friday afternoon, and it's clearly without the five-day rule and -- or, in violation of the five-day rule. I don't know whether to say it is within or without the rule, but it is not within the five days and the five-day rule was expressly designed to avoid this sort of last minute report, and we object to any reference to Exhibit 301 since it is in violation of the rule.

THE SPECIAL MASTER: Well, that gives me a difficult ruling to have to make.

MR. CLEAR: Well, Your Honor, we'll save --

THE SPECIAL MASTER: Let me think about this for a little while outloud with all of you:

Wherein, I guess -- wherein, Mr. White are you damaged

or taken unfair advantage of when an exhibit like this, which does nothing more than summarize the evidence which you've heard this morning from this witness, is offered into evidence? That's the question.

MR. WHITE: I think it does more than summarize the evidence that we've already heard, Your Honor.

THE SPECIAL MASTER: Its come to some conclusions --

MR. WHITE: What I could ask you to do is reserve on our objection and allow the witness to identify the exhibit and describe --

THE SPECIAL MASTER: All right.

MR. WHITE: I think when he goes through that, you may notice --

THE SPECIAL MASTER: Let's do that. I'll reserve my ruling on the objection and let's proceed with the identification of this report.

MR. WHITE: But I think the record ought to be clear, there is no question that there is at least a technical violation to begin with of the five-day rule.

THE SPECIAL MASTER: You have made that clear.

Q (By Mr. Clear) Mr. Keene, --

THE SPECIAL MASTER: And you hope that it won't have to be broken again?

MR. WHITE: I just wanted another credit. I think

keene-direct-clear

I'm up to 63, Your Honor, and --

THE SPECIAL MASTER: All right.

He's saying this is a two-way street, Mr. Clear.

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

THE SPECIAL MASTER: You're going to be moving the other direction in about another month, and he wants you to know that.

MR. WHITE: I'll claim my credits when the objection is made for us, Your Honor. I'll claim my credits probably one by one.

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

Q (By Mr. Clear) Mr. Keene, I've handed you what has been marked as United States Exhibit WRIR C-301, can you identify that exhibit, please?

A That is a report that I put together. It is entitled Natural Flow Study, it's a summary of my findings and conclusions that presents the results of my study.

Q All right. Now, the results of your study are basically contained in what part of the report?

A It would be at the back of the report.

THE SPECIAL MASTER: Why don't we take it chronologically. Tell me about Table 1, Page 5, for example.

THE WITNESS: Table 1 is an index of USGS surface

water records. That is public information and it can be obtained in any USGS document.

Q (By Mr. Clear) The numbers listed there, are they similar to the numbers on your two exhibits or two maps?

A Are you referring to the station number?

Q Yes.

A The station number listed in Table 1 is the complete USGS number, whereas on my exhibit they are abbreviated to the middle four digits for the sake of report presentation and identification. They are the same gage.

Q All right. You have a column there,drainage area square miles, where did that information come from?

A That information came from the USGS documents.

Q The period of record, where did that come from?

A USGS documents.

Q Have you had your deposition taken in this case?

A Yes.

Q Did you indicate in that deposition that you were looking at USGS gage records?

A Yes.

Q Are they public records?

A Yes.

Q All right --

THE SPECIAL MASTER: Table 2, Page 11.

keene-direct-clear

Q (By Mr. Clear) Had you identified, prior to the time the gage sites you were going to study, I mean, did you identify those in your depositions?

A There may be some sites in the B classification that Mr. Billstein has added that had not been previously deposed on.

Q Well, Table 1 begins on Page 5 and continues on to Page 10, is that right?

A That is correct.

(Off-the-record discussion.

Q (By Mr. Clear) All right, Table -- can you describe to us what is contained in Table 2?

A Table 2 is an index of BIA surface water records. This information was obtained from the BIA office and also all BIA information that we used in our study, had been turned over in an interrogatory.

* * * * *

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

Q (By Mr. Clear) Let's go on to page 14 of the report. You have listed under, at A, B and C, three equations. Was the State made aware that you were utilizing those equations?

A To the best of my knowledge they were included in a previous deposition.

Q Go to page 15. You have a fairly lengthy mathematical equation there. Could you identify that equation?

A That is a traditional equation to transfer information from a point of unknown values to a point of known values.

THE SPECIAL MASTER: Or is it the other way around, or is it a point of unknown value to a known value?

THE WITNESS: If I have a known value, I'll transfer that known information to a point of unknown information.

So, for example, if you're looking at this formula and I'm going to make a transfer in the downstream direction and I know the information of the upstream, I say that the flow, which is a Q downstream, that's what I'm trying to find, is equal to the flow upstream which I already know, transferred downstream by a drainage area proportionately to some point. So it's some point of known information to a point of unknown information.

Q (By Mr. Clear) With equations on page 14 and 15 of your report, they've been alluded to in your testimony?

A Yes, they have been.

MR. CLEAR: Your Honor, these were the equations that he was going to --

THE SPECIAL MASTER: That we decided --

MR. CLEAR: And Mr. White said he was not interested in the equation.

THE SPECIAL MASTER: I concurred in that because I don't even understand the one on page 14.

MR. CLEAR: Pardon?

THE SPECIAL MASTER: I'd like to ask a question. How do you determine the exponent X, what do you mean when you say you establish it by regionalization or calibration?

MR. WHITE: Page 15, Your Honor.

THE SPECIAL MASTER: Page 15, I beg your your pardon.

Q (By Mr. Clear) Would it be helpful, Mr. Keene, to run through this with a blank sheet of paper or do you prefer to do it orally?

A To answer this question I think I can do it orally; that if someone else such as the USGS has studied this type of phenomenal and report an exponent, then if you feel comfortable that you are in a similar watershed or similar basin, you can use that exponent.

THE SPECIAL MASTER: I see.

A If it's not available, you'll take measured information in

Frontier Reporting Service

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

201 Midwest Building
Casper, WY 82601
(307) 237-1493

the basin and develop your own exponent, and if that information is available that is your own calibration.

THE SPECIAL MASTER: I see.

Q (By Mr. Clear) Let's move on to table 3 of the report on page 19.

A Table 3 is a streamflow summary, streams in the Wind River Basin.

Q Are these A sites, B sites or what type of sites are these?

A These will be A sites.

Q A.1's or A.2's or A.3's?

A They're a mix of all three.

Q All right. The first item is the stream station number. Where did you get that information?

A USGS documents.

Q Drainage area, where does that information come from?

A USGS.

Q The historic period of record?

A That will be USGS or as noted, the Bureau of Indian Affairs. In fact, the biggest two columns that was described, if there's a Bureau of Indian Gage there that is not coincident with the USGS, I would obtain that information from the BIA.

Q The average annual historic flow, where did you obtain that information?

A As noted, from the USGS, unless it is not available from

the USGS, in which case I developed it using USGS records.

Q The natural flow base period you have listed there 1946 to 1979. Is that the same base period you testified to today?

A Yes, it is.

Q And you derived it in the same method you testified to?

A Yes.

Q The average annual natural flow, I take it that this is the results of your studies of the A sites and this is one of the conclusions you reached?

A Yes, it is.

Q Has any of this information --

THE SPECIAL MASTER: That's in the sense of the same information, that it's on one of the exhibits where you put it in a graphic form, is it not?

THE WITNESS: That is correct.

Q (By Mr. Clear) Has the information contained in Table 3 been conveyed to you by the State at a prior time?

MR. WHITE: Maybe the other way around.

Q (By Mr. Clear) I'm sorry. Has the information contained in those tables been --

THE SPECIAL MASTER: Conveyed to the State.

Q (By Mr. Clear) Did you give those to the State at a prior time? Can you recall?

A In most all cases, very definitely it has. I was just

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

looking for exceptions in the table. The natural flow base period had previously been communicated and an average annual flow had been communicated in a deposition or in the interrogatory.

THE SPECIAL MASTER: Okay. I presume tables that follow contain the same material; is that correct, up to 7 on page 25?

MR. CLEAR: Yes.

THE WITNESS: Table 3 was the Wind River Basin up to Riverton, and I guess it proceeded on downstream to the Big Horn River near Riverton.

Table 4 is Group A sites again, but on the Little Wind River. And Table 5 --

Q (By Mr. Clear) Table 4, as far as you can recall, you have provided the State with all this information contained in the table?

THE SPECIAL MASTER: I don't think he has to go through those questions.

A To the best of my knowledge it is.

THE SPECIAL MASTER: Because it is the same. Doesn't the same apply to Table 5 on the Popo Agie?

THE WITNESS: Yes, sir.

THE SPECIAL MASTER: And Table 6 on the Big Horn River to the canyon?

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

THE WITNESS: Yes, sir.

THE SPECIAL MASTER: All right. Table 7.

Q (By Mr. Clear) All right. Can we go on to Table 7 on page 25. Can you describe that table?

A Table 7 is a streamflow summary for the additional study sites. It would be Group B sites.

Q Group B sites.

A And there are some additional study sites that were not included in my previous deposition, but in terms of some middle dates, I do not recall if anything has been transferred to the State subsequent to my last deposition.

Q Can you say offhand what those sites are?

A Site numbers 31 through 35. There are also some changes in the average annual natural flow estimates for some of the other study sites. I'd have to go through on a site by site basis.

THE SPECIAL MASTER: Changes from what they were during the time of your deposition?

THE WITNESS: Deposition, yes.

Q (By Mr. Clear) And you do not recall -- Do you recall what sites those were?

A I do not offhand.

THE SPECIAL MASTER: Were they negligible or were they substantial changes?

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

THE WITNESS: Negligible.

THE SPECIAL MASTER: Okay.

Q (By Mr. Clear) With respect to sites 31, 32, 33, 34, 35, can you, for each of those numbers, give me the study site name and average annual natural flow?

A Study site --

MR. WHITE: Objection; no foundation, Your Honor.

MR. CLEAR: I think we've been through the foundation --

THE SPECIAL MASTER: Objection is overruled.

THE WITNESS: Study site number 31, study site name is Sand Draw north of Burris. The average annual natural flow of acre feet is 460.

MR. WHITE: I object, Your Honor, to the line of questioning again, not only on foundation, but an additional sort of policy objection. If the practice before this Court is that if you don't get a report in on time then the portions of it or new information, the witness simply reads out of the report in order to get it in, then there are going to be some remarkable exploitations of this rule later on. I think we ought to have a rule that if they don't get it in on time they don't testify --

THE SPECIAL MASTER: Mr. White, if there was a substantive -- If there was a substantial breach I would concur in what you're saying, and I would not consider admitting

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

this into evidence because of it. But I think what I've seen so far is it's, the breach is minute.

MR. WHITE: With respect to so far, Your Honor, I'd like you to put a footnote on "so far". And second, with respect to study sites 31 through 35, this isn't a negligible change, this is new information.

THE SPECIAL MASTER: This is in addition, that's true. If I were to tear out this document, page 26, I think the rest of it is admissible without ---

MR. CLEAR: Well, Your Honor, again --

THE SPECIAL MASTER: I may rule on it, I may overrule the objection and admit it into evidence anyway. I presume the maps in the back are the same --

MR. CLEAR: Maps in the back are the same.

THE SPECIAL MASTER: -- as those that are in evidence. So, Mr. White, you got that material on 20, page 26, which takes you by surprise.

MR. WHITE: Let's keep going through the report, Your Honor; there's some more to come.

THE SPECIAL MASTER: I was going to say let's go on to Table 8 on page 27 and see what's new there that would technically violate the five-day rule.

Q (By Mr. Clear) All right. Mr. Keene, can you identify the, can you identify Table 8?

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

A Table 8 is streamflow summary of additional study sites, Owl Creek.

Q That's your B.2 sites, is that correct?

A That is correct.

* * * * *

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

Q (By Mr. Clear) The first column is the drainage -- was your deposition taken with respect to these sites?

A Yes.

Q Did you provide the State with the -- your figures on the average annual natural flow in acre-feet?

A To the best of my knowledge, I did.

Q Did you provide the State with the other information contained in Table 8?

A To the best of my knowledge, I did.

Q Is the information shown -- has the information that you gave the State in your deposition, have there been any changes made in that information which is reflected on Table 8?

A To the best of my knowledge it has not changed.

THE SPECIAL MASTER: Was the percent yield analysis on Page 28 brought up, perhaps?

MR. CLEAR: All right, that's Table 9, which is the percent yield analysis on the South Fork of Owl Creek above the confluence and Table 10, I guess, is the percent yield on the North Fork of Owl Creek above the confluence.

Q Did you discuss those two tables?

A That is information that was available at the time of my previous deposition, but Mr. Billstein had not determined

the extent of his utilization of this information, and there were no questions directed specifically to the percent yield analysis during the deposition. So the information was available at that particular time, but not previously communicated.

Q All right. So, as far as you know this is the first time the State has seen Table 9?

A Yes.

THE SPECIAL MASTER: What do these figures portend; what do they say?

THE WITNESS: It is the percent yield analysis that I described earlier. And the furthermost left column you see the percent, a range of 50 to 90 percent. And for each month I performed a percent yield analysis or probability analysis and provided information to Mr. Billstein such that he could say that in the month of October, as an example, the 50 percent chance of flow is 873 acre-feet.

THE SPECIAL MASTER: Per year?

THE WITNESS: Per month. That is 873 acre-feet for that month. So there is a 50 percent chance of that flow occurring, or a greater than that particular value.

THE SPECIAL MASTER: I beg your pardon. In the last column is, of course, your annual, as you've got it marked.

Frontier Reporting Service

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

201 Midwest Building
Casper, WY 82601
(307) 237-1493

THE WITNESS: That's correct. And that annual has its own probability distribution. It is not the sum, it is not the summation of the role. In other words, the 50 percent chance flow on an annual basis is 32,626 acre-feet. So, do not be confused by summing each one of the months you would obtain 32,626 acre-feet as its probability analysis.

THE SPECIAL MASTER: And Table 10 is a similar document except taken downstream of the confluence of the two forks of Owl Creek, is that right?

THE WITNESS: Yes, sir.

THE SPECIAL MASTER: All right. Well, I may in error, but I don't think I'm going to commit a reversable error. I would let the thing into evidence .

MR. CLEAR: Your Honor, we have --

THE SPECIAL MASTER: With the others when you get ready to admit them all into evidence.

Q (By Mr. Clear) Mr. Keene, on Page 18, the last sentence of Page 18, of your report, it says, "The monthly stream flow summaries"-- it says,"the monthly stream flow summaries for 1946 to 1979 have been provided as a supplement to this report."

I have handed you what has been marked as United States Exhibit WRIR C-302, can you identify that, please?

Frontier Reporting Service

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

201 Midwest Building
Casper, WY 82601
(307) 237-1493

MR. WHITE: Objection, Your Honor, five-day rule.

MR. CLEAR: Not on this one, Your Honor.

MR. WHITE: It came Friday, Your Honor, along with the report.

MR. CLEAR: No. Again, let's go through the --

Q (By Mr. Clear) Can you identify this?

THE SPECIAL MASTER: Wait a minute. Can I dispose of the objection. Can I rule on the objection?

Do you say it was in his hands in five days?

MR. CLEAR: Well, let me ask Mr. Keene.

As I understand it, this information has been provided to the State. Do you remember the stack of computer printouts, Your Honor, that we piled on your desk in discovery about four weeks ago?

THE SPECIAL MASTER: I have seen some stacks of computer printouts.

MR. CLEAR: This is part of the computer printouts.

THE SPECIAL MASTER: Go ahead and answer -- ask your question.

Q (By Mr. Clear) Mr. Keene, are you familiar with what I have marked as United States Exhibit WRIR C-302?

A Yes, I am.

Q All right. Is that what you refer to in your report as the supplement to the report?

A Yes, it is.

Q All right, what does it show, Exhibit 302?

A This shows the monthly natural stream flows for my Group A study sites for the study period 1946 to 1979.

Q This is for all the A sites, is that right?

A Yes.

THE SPECIAL MASTER: Now, in this document does the annual total, the last column on the right represent a mathematical sum of the 12 monthly totals?

THE WITNESS: Yes. Now, in addition to the Group A sites the B.2 sites are also included; the Owl Creek study sites at the very back. They are the last, probably the last four tables -- the last five tables.

THE SPECIAL MASTER: Why are there no figures for the years 1939 to '59, or did you testify to that?

THE WITNESS: Yes, I did. Could you refer to which tables specifically?

THE SPECIAL MASTER: The very very last one at the confluence of the two forks. They simply weren't taken --

THE WITNESS: It will take me just a minute to answer your question.

The pound signs indicated in that table is a default in our computer which indicates there was no information available, and as you have observed there was no

Frontier Reporting Service

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

201 Midwest Building
Casper, WY 82601
(307) 237-1493

information for that period and I did not have stream gage information at my upstream sites of which I could transfer downstream. So the pounds signs simply mean that there is no information available, and I'm not predicting for those months of those years.

Q (By Mr. Clear) For identification purposes, how do we correlate this printout to your gage sites? For example, the file name, what does that refer to on the first line in the printout? Do you see where I'm referring to?

A The file name is an HKM assignment, and it could get very confusing if I went through every gage site and told you what that means.

Q Well, what does the 2185 --

A Well, the 2185 is a USGS abbreviated station number and the NAT-1 following it is natural flow and the 1 was one of our first trials. I prefer not to establish a common identification using the file name because that is an internal identifier. I prefer going on to the next line which is site --

Q All right.

A -- and Wind River near Dubois is very explicit.

Q But the -- well -- where you have gaging sites, though, listed here, they are listed here and they can be correlated to the two maps that you have used today,

is that right?

A That is correct, but there could be exceptions and some of my staff can select any file name they wish. I prefer using the site line as the descriptor and identifier.

Q All right. Fine. The information contained in the computer printout USGS Exhibit WRIR 302, was this provided by you to the State of Wyoming prior to this time?

A Yes, to the best of my knowledge it was provided in response to requests made in my last deposition.

MR. WHITE: Well, Your Honor, I would like to see some evidence of that because we were advised that -- or I'm advised by our people who reviewed that material, that portions of these values were supplied in response to requests from information developed by Mr. Toedter. And Mr. Toedter's study, as you may recall, involved those areas way up at the headwaters and not throughout the entire length. The remainder is new and I would like the United States to show you that they actually provided that information. I don't think they can.

THE SPECIAL MASTER: You may attempt, Mr. Clear. I have a question, too, before we go much deeper into it:

After the file, the site and the unit there is a line called note, and in most of them -- in one of them we find that the pound sign means an absence of information,

as you have testified. But most of them say any month with August. What does that mean?

THE WITNESS: I will not go so far as to say that Aug. is the abbreviation for August. It may be, and I observed this same sort of thing on Mr. Toedter's printouts, Aug. and I'll answer for both of us in that it is essentially meaningless, because what we have is a full block of information 1946 to '79, the appropriate symbol is the pound sign and if you're looking at the table for Wind River near Dubois it is correct, you see Aug. but it has no meaning whatsoever. If there were missing values they would have put in the pound sign. So for some reason the computer programmer had Aug. It does not mean that there are values absent in August, as you can see in the table they are complete.

THE SPECIAL MASTER: What is the significance of those four words?

THE WITNESS: There is no significance of Aug. The program operates on the pound sign in the absence of data, and I cannot explain why Aug. is placed there, but I can tell you it has no significance to either Mr. Toedter's report or mine.

THE SPECIAL MASTER: It does not refer to August?

THE WITNESS: It does not refer to August, no, sir.

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8260

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

If you go to your tables at the very end of Owl Creek, remember where you found the pound signs and asked why the information was absent?

THE SPECIAL MASTER: Yes, I see it there.

THE WITNESS: That is the appropriate default symbol and that's how the computer operates.

* * * * *

Frontier Reporting Service

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

201 Midwest Building
Casper, WY 82601
(307) 237-1493

THE SPECIAL MASTER: I'm confused, but let's go ahead.

MR. WHITE: Your Honor, until the United States is able to demonstrate that this information was in its entirety provided --

MR. CLEAR: I think we asked the witness that, whether he provided --

MR. WHITE: The witness didn't provide us with a thing, it was counsel for the United States.

THE SPECIAL MASTER: Mr. White, I'm going to overrule your objection on this because it's nothing more than gaging summaries, and it's not the kind of information that puts you to a disadvantage or prejudices you or takes you by surprise. They are facts and conclusions, what he has for those dates and those years.

MR. WHITE: Let me explain why it does, Your Honor. I expect that these monthly values would be used by Mr. Billstein in his systems study, and we'll ask Mr. Billstein where he got them and he'll say he got them from Mr. Keene. Now, this is our chance, if we're ever going to have one, to cross-examine Mr. Keene about these monthly values.

MR. CLEAR: Well, Your Honor --

MR. WHITE: Now, the violation of the five-day

rule comes into extreme play because instead of being able to pick out those values that we specifically want to question, sort of do our own analysis first and see what we can accept or specifically want to question or see if we understand it.

THE SPECIAL MASTER: Substantively -- Substantially you are correct, but substantively, Mr. White, if I am to say to you now supplement 301, U. S. WRIR 302 not being within the five-day rule shall be set to one side and nun pro tunc on Friday afternoon next, the five days having passed, it will be admitted into evidence, wherein do I make your work any easier?

MR. WHITE: You make it easier --

THE SPECIAL MASTER: Or remove any element of surprise or unfair advantage?

MR. WHITE: You make it much easier if, as I assume you would, part of that ruling would be that at the end of five days the witness would be available for cross-examination on this particular --

MR. CLEAR: The five days will end tomorrow, I can finish direct examination today, and Mr. Keene can come back tomorrow and/or we could offer these tomorrow.

THE SPECIAL MASTER: Well, Mr. White's got a point, and I've been overriding that point an awful lot, eight times, seven or nine, he's keeping book on me, I know.

MR. CLEAR: Well, Your Honor, should we just bring Mr. Keene back tomorrow?

THE SPECIAL MASTER: You're paving your own future roads with some cobbles, some very large cobbles that you have to work --

MR. CLEAR: Why don't I just finish up his direct today, and I'll come back tomorrow, and we'll offer all of the exhibits at that time and then --

THE SPECIAL MASTER: Tomorrow afternoon. Five days is up tomorrow afternoon.

MR. CLEAR: All right, tomorrow afternoon. I think they --

MR. WHITE: It would have to be Thursday morning, Your Honor.

THE SPECIAL MASTER: Well, do you want to do that? I'm going to sustain Mr. White on one of these. I feel like I got a duty to pretty soon.

MR. CLEAR: All right. We'll have Mr. Keene back.

THE SPECIAL MASTER: So when I get to ruling into evidence, I'll consider that.--

MR. CLEAR: I'll finish up his direct and then Thursday morning I'll offer these into evidence at that time.

THE SPECIAL MASTER: All right. I've already sustained you on the, on 301, you know.

MR. CLEAR: Yes, Your Honor.

THE SPECIAL MASTER: I'm going to sustain Mr. White on the supplement.

MR. WHITE: I do get a chance to voir dire, aside from the five-day rule objection.

THE SPECIAL MASTER: Yes.

MR. CLEAR: I will offer these on Thursday morning so they can voir dire.

THE SPECIAL MASTER: All right. Very good, Thursday morning.

Have you got more to do this afternoon and we'll adjourn now for lunch? If not, we'll go until you're completed.

MR. CLEAR: I just got a very little bit more.

THE SPECIAL MASTER: All right, fine. We'll continue.

Q. (By Mr. Clear) Mr. Keene, in your -- When you began your testimony, you were speaking of types of sites and you alluded that some of the studies you undertook were relative to the fisheries claim. Can you tell us what you did with respect to that?

A. My scope of responsibility for the fishery claim was to provide the results of a low flow analysis using my mean monthly natural flows.

THE SPECIAL MASTER: To whom?

THE WITNESS: To Mr. Vogel for the fishery claim. And those sites fall within the Group A Classification. I examined the two-year, five-year and ten-year recurrence interval as requested by Mr. Vogel, and I communicated that information to him.

Q. (By Mr. Clear) Can you briefly describe how you undertook the low flow analysis.

A. The mean monthly flows that I developed for 1946 to 1979 for that Group A sites were analyzed for low flows. I examined those on a graphical basis, graphical interpretations as well as a theoretical interpretation of low flows, and the final result of the theoretical analysis was the quantification of flow for the two-year, five-year and ten-year recurrence interval.

Q. Did you communicate that information to Mr. Vogel?

A. Yes, I did.

Q. Are you familiar with Mr. Vogel's report?

A. Yes, I am familiar with the sections that pertain to the hydrology.

THE SPECIAL MASTER: Once again, I just have to ask you, if your study period would have included from 1932 instead of beginning in the 40's, would not your low flow figures have been even lower for fish and

409 West 24th Street
Cheyenne, WY 82001
(307) 635-8280

Frontier Reporting Service

201 Midwest Building
Casper, WY 82601
(307) 237-1493

Bull Lake Creek near Lenore from the period 1918 through 1979, and I was able to observe the 1920's the 1930's and years subsequent to that.

THE SPECIAL MASTER: I appreciate that, I appreciate that.

THE WITNESS: So they didn't go by without regard.

MR. WHITE: Your Honor, before the moment passes, I would move to strike the witness' answer on the question on the issue of relevancy. What we're dealing with here --

MR. CLEAR: Your Honor, it was a question you asked him.

MR. WHITE: Well, I move to strike the answer --

THE SPECIAL MASTER: He's got a right to move to strike the answer. Mr. White's even moved to strike some of my questions.

MR. WHITE: I haven't been that outrageous.

The relevancy issue here is the question of what relevance does the study period, '46 to '79, have to the determination that's before you of how much water should be given to what is claimed to be an 1868 priority date. What's happening here is we got evidence dealing with a recent period that attempts to be tacked onto an 1868 --

THE SPECIAL MASTER: I see where you're coming from,

wildlife, for fish purposes, fish habitat purposes?

THE WITNESS: That's a possibility, but do remember that I have the late 50's, early 60's which was very low. I also have a very low year in 1977, so as you recall, I selected the '46 to '79 to be a representative period.

THE SPECIAL MASTER: You feel, and you do testify that you feel that the figuresyou're using are representative and could almost be extrapolated to a hundred year life cycle of highs and lows, or do you feel it is a fair exclusion of those years from 1918, when records were first started, to date.

THE WITNESS: I feel it's a fair representation of flows within that geologic time-frame. I am not implying that they are the exact flows that occurred in 1100 as an example or the year 2001, but they are representative of long-term conditions, and that 34-year period satisfied my objective.

THE SPECIAL MASTER: In the 34-year period?

THE WITNESS: 34-year period, from 1946 to 1979.

THE SPECIAL MASTER: I see. I still have some lingering, uncomfortableness over the fact that the 30's weren't included in your work.

THE WITNESS: I understand that, and recall that I did have the opportunity to examine good information at

and I understand that, and I will overrule it, but I appreciate your raising it again. You're consistent on that one point, and I appreciate that.

Go ahead, Mr. Clear.

Q. (By Mr. Clear) Mr. Keene, the figures again, you are familiar with that are in Mr. Vogel's report that is, I believe, in evidence?

A. Yes, I am, the portion specific to the hydrology.

Q. Do those figures that he used, was two, five and ten-year low flows, are they the figures that you gave him?

MR. WHITE: Objection, Your Honor. There's no foundation of the values that he gave him for certain gages that fall even within --

THE SPECIAL MASTER: I'll sustain the objection; not the proper witness to know the answer to that.

Q. (By Mr. Clear) Mr. Keene, you developed the low flow information and you provided that to Mr. Vogel; is that correct?

A. Yes, I did.

Q. Okay.

MR. WHITE: Your Honor, I'll move to strike the answer on the issue or ground of foundation. There is no foundation to show that the low flow values which Mr. Keene supplied to Mr. Vogel --

THE SPECIAL MASTER: Were used by Mr. Vogel?

MR. WHITE: I'm sorry?

THE SPECIAL MASTER: His answer was he simply did provide them to him.

MR. WHITE: I think the answer's ambiguous, and there's no foundation for ambiguous answers because there's no testimony that connects the low flow given by Mr. Keene for certain gages with the reaches that Mr. Vogel testified to, and there's further no evidence to show that the low flow values for certain gages, even assuming they fell within those reaches, are representative of the values for the reach as a whole.

THE SPECIAL MASTER: Well, I've overruled the objection, and I'll let it in for what it's worth.

MR, CLEAR: Your Honor, that completes my direct examination. As I said, we'll come back Thursday morning, make the offer of the exhibits.

THE SPECIAL MASTER: You have some cross-examination?

MR. CLEAR: Your Honor, if I'm going to delay putting the documents on, I think we should delay cross-examination.

THE SPECIAL MASTER: That's right. You will have some documents on Thursday morning to offer into evidence.

MR. CLEAR: All the documents, all the documents referred to today.

MR. WHITE: Well, Your Honor, if Mr. Clear does not

intend to replow ground in direct examination that he's already plowed, we could go ahead and deal with cross-examination on some of those areas. It's really his option because he's technically correct, that I ought not to cross until he's done with direct. My offer in that option is if he would like me to do that, I can proceed for as long as the Court would like, to cross-examine with respect to the areas that's already been dealt with.

MR. CLEAR: Well, that's fine with me, Your Honor. We should break then.

THE SPECIAL MASTER: All right, let's break for lunch then and proceed with cross-examination. Maybe we can complete it in a short time.

MR. KROB: Your Honor, I have just a brief administrative matter before we break.

THE SPECIAL MASTER: You have a what?

MR. KROB: During the last week of hearings, it was brought up that we should have a brief on the instream flows for fisheries. At this time, I'd like to tender the State of Wyoming's brief on that subject to the Court and serve copies on opposing counsel.

THE SPECIAL MASTER: If you will --

MR. WHITE: I have to apologize to the Court. Those briefs were due yesterday, and I fouled it up and didn't

submit it yesterday.

THE SPECIAL MASTER: No problem.

MR. WHITE: I apologize to the Court and counsel.

THE SPECIAL MASTER: No problem. We will adjourn until 1:30.

(Thereupon, a lunch recess
(was taken at 11:50 a.m.

* * * * *

INDEX TO EXAMINATION

		PAGE
WITNESS: MICHAEL DAVID KEENE		
Direct Examination	By Mr. Clear	7048
Voir Dire Examination	By Mr. White	7053
Direct Examination (Continued)	By Mr. Clear	7056

INDEX TO EXHIBITS

	IDENTIFIED	RECEIVED
U.S. Exhibit WRIR C-298	7061	
U.S. Exhibit WRIR C-301	7112	
U.S. Exhibit WRIR C-302	7127	

REPORTERS' CERTIFICATE

State of Wyoming)
: SS
County of Laramie)

We, Lamont Miller and Merissa Racine, Registered Professional Reporters and Notaries Public in and for the First Judicial District, State of Wyoming, hereby certify that 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 Presiding, in stenotype; that the foregoing pages, numbered 7041-7143 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 16th day of June, 1981.

LAMONT MILLER
Registered Professional
Reporter

MERISSA RACINE
Registered Professional
Reporter

Lamont Miller - Notary Public
COUNTY OF LARAMIE STATE OF WYOMING
My Commission Expires March 27, 1983

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