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Trial Transcript, Vol. VII, Morning Session

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File 114
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case # 4993

File # 114

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IN THE DISTRICT COURT FOR THE FIFTH JUDICIAL DISTRICT
WASHAKIE COUNTY, STATE OF WYOMING

IN RE:)
)
THE GENERAL ADJUDICATION)
OF RIGHTS TO USE WATER)
IN THE BIG HORN RIVER)
SYSTEM AND ALL OTHER)
SOURCES, STATE OF WYO-)
MING,)

Civil No. 4993

FILED
2/6 1981
Margaret V. Hampton CLERK
DEPUTY

VOLUME VII

Thursday, January 29, 1981

Morning Session

ORIGINAL

APPEARANCES

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FOR THE STATE
OF WYOMING:

MR. JAMES MERRILL, MR. MICHAEL
D. WHITE and MR. SCOTT KROB
Special Assistants Attorney
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STATES OF AMERICA:

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MR. TOM ECHOHAWK
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Land and Natural Resources
Division
1961 Stout Street
Denver, CO 80294

MR. JOSEPH MEMBRINO
U.S. Department of Justice
Washington, DC 20006

FOR THE ARAPAHOE
TRIBE:

WILKINSON, CRAGUN & BARKER
1735 New York Ave., N.W.
Washington, DC 20006
BY: MR. R. ANTHONY ROGERS

FOR THE SHOEHONE
TRIBE:

SONOSKY, CHAMBERS & SACHSE
200 M. Street, N.W.
Washington, DC 20006
BY: MR. HARRY SACHSE

APPEARANCES (Continued)

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FOR THE PRIVATE
WATER HOLDERS:

WESTERN LAW ASSOCIATES, P.C.
43L Main St.
Lander, WY 82520
BY: MR. GREGG A. PARISH

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1 THE SPECIAL MASTER: Please come to order.
2 Regina.

3 MS. SLEATER: Your Honor, we had, I believe
4 when we left last night an order of business
5 about this setting for the future settings for the
6 trial which we couldn't resolve because Mr. White
7 wasn't here.

8 Have you gotten to see this, Sandy?

9 MR. WHITE: Why don't you let me take a look
10 at it, Regina.

11 MR. MERRILL: While Mr. White is examining
12 the order, I would like to introduce Mr. Gregg
13 Parish to the Court, a gentlemen Mr. Radosevich
14 spoke to you about when he left yesterday.

15 THE SPECIAL MASTER: Very good.

16 MR. PARISH: Glad to be here. I would like
17 to emphasize, as Mr. Radosevich has probably
18 already said, that I am not a member of the
19 Wyoming Bar; I am a member in good standing of
20 the Colorado Bar.

21 THE SPECIAL MASTER: You have been admitted
22 for the purposes of this lawsuit.

23 MR. PARTSH: Thank you.

24 THE SPECIAL MASTER: You're welcome.
25

1 MR. WHITE: Your Honor, as I understand it,
2 the second setting on the order of January 16th
3 extends beyond the week of February 9th into the
4 following week.

5 THE SPECIAL MASTER: Yes. There were two
6 matters I think Mr. Rogers raised. The first
7 was if that goes beyond the week of February 9th,
8 there might be an objection to us going into the
9 next week.

10 MR. WHITE: That's the week in which --
11 the first week of a three-week trial set down in
12 Alamosa, Colorado.

13 THE SPECIAL MASTER: Why don't we -- we can
14 make this change without having to notify everybody.

15 MR. WHITE: If we could just strike the
16 language through "not later than February 19th."

17 THE SPECIAL MASTER: It would be through not
18 later than the 14th of that week.

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

20 THE SPECIAL MASTER: So I don't think that
21 requires another mailing.

22 Now, the second one was whether to start in
23 March on the 19th or the 16th, and I put 16th.

24 MR. WHITE: I'm available to start on the 9th,
25

1-3

1 Your Honor, if --

2 THE SPECIAL MASTER: Is everybody else?

3 MS. SLEATER: Yes, sir, we are.

4 MR. ROGERS: Yes, Your Honor.

5 THE SPECIAL MASTER: And would you prefer

6 to?

7 MS. SLEATER: Yes.

8 MR. ROGERS: Yes.

9 THE SPECIAL MASTER: That poses a problem,
10 whether we should have to set -- is there another
11 mailing in the offing anyway in the next two, three
12 weeks?

13 MR. SALAZAR: Yes, sir, there is, the mailing
14 on the lists of witnesses for the United States and
15 the tribes.

16 THE SPECIAL MASTER: Is that going on right
17 now?

18 MR. SALAZAR: It's being prepared right now.

19 THE SPECIAL MASTER: Why don't we just slip
20 into there an addendum to the order on hearings, that
21 the March hearings will begin on March the 9th
22 and may proceed through the week of March 16th and
23 March 23rd.

24 MR. WHITE: I should say for the record, Your

25

1 Honor, that I still have a conflict for the week
2 of the 23rd, a pre-trial conference.

3 THE SPECIAL MASTER: All right. Then in
4 the inclusion merely put the hearings in the
5 month of March will begin the week of March 9th
6 period.

7 MR. WHITE: I can advise the Court then
8 during that set of hearings that it begins on
9 March 9th whether my pre-trial conference during
10 the week of March 23rd is still on.

11 THE SPECIAL MASTER: Yes. The order is if
12 you -- if you, prior to March 18th, let us know
13 whether you got a problem with March 23 we may
14 have no hearings the week of the 23rd.

15 MR. WHITE: I still have a problem, I hope
16 the case will settle; most of these, except
17 these kind of cases settle, so I'm hopeful that
18 they will.

19 THE SPECIAL MASTER: All right.

20 MR. MERRILL: Your Honor, before we resume
21 with the redirect testimony of Mr. Merchant, if
22 there is any, I would like to make several motions
23 while all his direct testimony and his cross-
24 examination is still fresh in
25 your mind from yesterday

1-5

1 afternoon. I'm aware from your previous rulings
2 that the Court is not particularly disposed to
3 strike either testimony or exhibits from the
4 record, and I understand and appreciate your
5 preference to have a full record before you. However,
6 I think that based on the Wyoming's Rules of
7 Evidence that there are several motions to strike
8 portions of Mr. Merchant's testimony which should
9 be made. Each of these motions is based on Rule 705
10 of the Wyoming Rules of Evidence.

11 The substance of that rule is that when
12 testifying on the direct examination an expert
13 witness need not disclose all of the facts and
14 data upon which he relies. However, the rule goes
15 on to state that on cross-examination the witness
16 shall, and the rule is mandatory, that the witness
17 shall disclose all the facts and data upon which
18 he relied.

19 As Your Honor will recall, there were
20 several instances during the direct examination,
21 cross-examination and voir dire examination of
22 Mr. Merchant over the past three days in which he
23 was unable to disclose the facts and information on
24 which he relied. That prejudices the State of
25

1 Wyoming and any other party cross-examining the
2 exhibits or the testimony because there is no
3 basis for cross-examination if the precise facts
4 and data are not disclosed.

5 I would like to review for you very briefly
6 each of the instances, and maybe go through the
7 formalities, make what is in effect, a separate
8 motion to strike with respect to each of those.

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1 MR. MERRILL: The first instance of
2 testimony is Mr. Merchant's testimony regarding
3 the nutritional requirements of the various classes
4 of livestock and the ability of various feed rations
5 to fulfill those nutritional requirements. The
6 the substance of the testimony that he was unable
7 to provide is found on page 220 of the records of
8 these proceedings; that's Volume II. The testimony
9 was provided on Monday afternoon, January 26th.

10 That testimony is important because it
11 goes ultimately to the amounts of feed, and therefore
12 their costs that are required and, of course, the
13 costs of the feed are an important element in the
14 overall feasibility of the current livestock operations
15 or expanding those operations.

16 The second motion to strike goes to Mr.
17 Merchant's testimony regarding the fact that he
18 thinks there is 50 percent underutilization of the
19 summer grazing capacity on the Wind River Indian
20 Reservation; of course, that testimony was based
21 on his professional opinion that the grazing capacity
22 could be increased by up to 50 percent.

23 He was unable to provide the exact facts
24 and data on which he relied other than naming the
25 land operations officer and the range operations

1 officer on the Reservation. That offered us no
2 basis to cross-examine the basis for that opinion
3 which is really an opinion within an opinion. That
4 testimony is found on pages 380 and 381 of the record
5 of these Proceedings; that's Volume IV. The test-
6 imony was presented Tuesday afternoon, January 27th.

7 The third motion to strike addresses Mr.
8 Merchant's testimony concerning the average number
9 of Indians per household on the Reservation. That
10 goes, of course, to the number of Indians that would --
11 that municipal, domestic and commercial water would
12 be necessary to serve.

13 He was unable to say, other than the fact
14 he spoke with someone, I think the Indian health
15 officer on the Reservation, but he was unable to
16 disclose beyond that the facts and data upon which
17 the health officer or he himself relied on in arriving
18 at that particular number. That testimony appears on
19 pages 408 and 409 of the record, Volume IV, January 27th,
20 Tuesday afternoon.

21 The fourth motion to strike goes to Mr.
22 Merchant's testimony concerning the enrollment lists.
23 As you will recall, I pointed out to the Court during
24 voir dire, I believe, of the previous exhibit that
25 we had asked for during discovery, and as of the time

1 of trial, still had not received a copy of the
2 enrollment lists of the Reservation on which the
3 population projections were based. Not having that
4 very essential data on which Mr. Merchant relied
5 directly in front of us, we were unable to cross-
6 examine him effectively about the data he selected
7 out of that list, how he used it, the way he used
8 the various numbers and information that can be found
9 there. Pages 413 and 414 of the record, also Tuesday
10 afternoon, reflect portions of testimony in which
11 the witness stated that he was unable to provide that
12 information at trial and, of course, it has not been
13 made available to the State of Wyoming otherwise.

14 The fifth motion to strike addresses Mr.
15 Merchant's testimony concerning the enrollment lists
16 because he was unable to state the names of the
17 people who gave him the information on which he
18 relied in stating that there was no migration, either
19 into or out of the Indian Reservation. As you recall,
20 Mr. Merchant stated he assumed there was no migration
21 either way, and he based this on conversations with
22 people on the Reservation. Without the names of those
23 people, we are simply unable to dig further into
24 the fact and effectively cross-examine the basis of
25 that opinion and the assumption on which it is based.

1 The admission he cannot provide us with that infor-
2 mation appears on pages 416 and 417 of the record.

3 The last motion to strike, Your Honor --
4 MS. SLEATER: Do you have the volume
5 number?

6 MR. MERRILL: Yes, that's Volume V --
7 excuse me -- Volume IV, I'm sorry.

8 The last motion to strike, Your Honor,
9 addresses Mr. Merchant's testimony that he gave
10 yesterday afternoon in which he said that the Wind
11 River Indian Reservation region is a net importer
12 of hay, which is a winter feed. Now, as Your Honor
13 will recall, I was asking Mr. Merchant why, if the
14 livestock operations were so highly profitable to
15 expand, they were not so expanded. His answer was
16 something along the lines that the winter feed, in
17 fact, constituted the greatest restraint and the risk
18 that winter feed would not be made available. Of
19 course, as Your Honor is well aware, the financial
20 or economic feasibility of expanding the livestock
21 operations is sort of a central point in the theme
22 of what water rights, if any, were reserved for live-
23 stock operations on the Reservation.

24 If it is, in fact, the winter feed that is
25 constricting the expansion of the livestock, we are

1 entitled to know the facts and data on which he
2 relied in giving that opinion. If we are unable to
3 cross-examine on that point, it may well be the
4 winter feed is not a constraint and, of course,
5 raises the question that perhaps economic feasibility
6 is the reason that the livestock operation has not
7 expanded.

8 The testimony concerning that point
9 appears on pages 720 and 721 of the record, which is
10 Volume VI, testimony that was taken yesterday after-
11 noon, January 28th.

12 I would submit each of these motions to
13 strike to you and ask that you rule separately upon
14 each one, and in so ruling consider Rule 705, which
15 is mandatory that the witness shall disclose all
16 of the facts and data on which he relies. Since the
17 witness has not done so in each of these six cases
18 that I have described to you, and since the failure
19 to do so prevents Wyoming from effectively cross-
20 examining the basis of some of his opinions and test-
21 imony, I think it is prejudicial to us to not be able
22 to go to the guts of the information on which he
23 relied; therefore, I think his testimony based on
24 each of those areas should be stricken.

25 * * * * *

1 MS. SLEATER: Your Honor, if I could address
2 some of these points.

3 THE SPECIAL MASTER: It won't be necessary.
4 I'm ready to rule on all six points. We'll take the
5 last first.

6 On Item 6, I also asked some questions on that
7 subject matter, you may recall, Mr. Merrill, and we
8 had an understanding of whether or not the net import-
9 ing of hay was a crucial reason they had not expanded
10 into the 12,000 head of cattle operation, and if it
11 was all so profitable, why it wasn't attained. And
12 at the time we didn't get any information as to whether
13 or not -- when he said that the Wind River Indian
14 Reservation is a net importer, I wonder if he included
15 the Wind River Reclamation Project in there, too, but
16 that's a matter for the parties to bring out if they
17 wish to; and if they don't want to, so be it. But I
18 don't think his reaction there would negate the value
19 of what he said, and I don't believe it's necessary
20 to strike from the record what he said on the basis
21 of the rule you cite.

22 Number 5 dealt with whether there was a net
23 migration out of or migration into the Indian Reser-
24 vation by Indians over the decades. Neither do I feel
25 that his ability there to cite with precision each and

1 every one of his authorities so impaired his testimony
2 as to render them excludable from the record.

3 I think he used and referred to those people with
4 whom he discussed, I believe -- the facts are certainly
5 available for the State of Wyoming to not just impeach,
6 but certainly to contradict his testimony or to negate
7 his probative value for me in the event it was in error.

8 Number 4, the 5.2 figure -- was what it, 5.2 people
9 per family?

10 MR. MERCHANT: Yes.

11 THE SPECIAL MASTER: I don't know that it is all
12 that inaccurate, but if it is inaccurate, the State can
13 show that it is. But I wouldn't think the basis for me
14 to strike it from the record is sufficient on the rule
15 you cited. There may be a more crucial basis for strik-
16 ing, but I don't believe that rule would warrant it.

17 Number 3 and Number 2 and Number 1 dealing with
18 the feed, the figures do leave an area of ambiguity or
19 certainly an area of doubt, reasonable doubt, as to
20 whether or not that becomes a viable and profitable
21 livestock operation with the additions to which he
22 testified, but the fact that he may not have cited
23 with precision and with accuracy each of the names of
24 those he consulted to form the judgment, I don't believe
25 is such to warrant striking that material from the

1 record. So all six motions to strike are denied.

2 MR. PARISH: Your Honor, I don't know if
3 previous stipulations have made this unnecessary, but
4 just for the record, I would like to note that the
5 City of Lander concurs with Mr. Merrill's motion --

6 THE SPECIAL MASTER: You would like to state
7 what?

8 MR. PARISH: The City of Lander concurs with
9 Mr. Merrill's motion to dismiss.

10 THE SPECIAL MASTER: That's fine.

11 MS. SLEATER: Thank you, Your Honor. At
12 this time the United States has no redirect and would
13 ask that Mr. Merchant be excused from these proceedings
14 and be allowed to return to his family and business.

15 THE SPECIAL MASTER: I don't know whether the
16 State will want him further or not, but we should in-
17 quire as to that, and now is the time to say.

18 MS. SLEATER: I believe the State of Wyoming
19 rested its cross yesterday.

20 THE SPECIAL MASTER: You believe what?

21 MS. SLEATER: I believe the State of Wyoming
22 rested its cross-examination of this witness yesterday.

23 THE SPECIAL MASTER: But I'm also asking
24 does the State wish to be heard?

25 MR. MERRILL: We have no objection to the

1 witness being excused and allowed to return to his home.
2 We would ask that you so rule that the witness is still
3 subject to the jurisdiction of the Court and amenable
4 to subpoena by the State of Wyoming should we ask that
5 he return for further testimony.

6 THE SPECIAL MASTER: I believe he is as a
7 matter of course.

8 MR. MERRILL: Thank you, Your Honor.

9 THE SPECIAL MASTER: All right, Mr. Merchant,
10 we have had the pleasure of spending most of the week
11 with you and we hope you have a good trip home.

12 MR. MERCHANT: I enjoyed it, Your Honor.

13 THE SPECIAL MASTER: Next witness.

14 MS. SLEATER: I would like to reintroduce Mr.
15 Joseph Membrino, who is participating with the Department
16 of Justice in this action.

17 MR. WHITE: I wonder if we could take just a
18 few minutes and move everyone around?

19 THE SPECIAL MASTER: Do you need a recess?

20 MR. WHITE: That will be all right.

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

23 (Whereupon a five-minute
24 recess was had.

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THE SPECIAL MASTER: Mr. Membrino.

MR. MEMBRINO: I call the government's next witness, Oliver Page.

THE SPECIAL MASTER: P-a-g-e?

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

Have you been sworn yet, Mr. Page?

MR. PAGE: No, I haven't.

THE SPECIAL MASTER: Would you stand, please, Mr. Page.

OLIVER PAGE

having been first duly sworn, was examined and testified as follows, to wit:

MR. MEMBRINO: It may be evident to you now, Your Honor, but Mr. Page has a very serious voice condition, and we'll go as long as we can with him, but we've agreed with the State we may have to take a break every now and then to give his voice a rest.

THE SPECIAL MASTER: Does ice water help you?

MR. PAGE: I've got some throat lozenges.

MR. SMITH: Your Honor, the State has been advised of Mr. Page's increasing laryngitis, and I have suggested that at any time Mr. Page would like to take a break, we would have absolutely
page - direct - membrino

1 no objection even if it's three minutes since
2 the last one. We sure appreciate his tenacity
3 getting on the stand feeling like that.

4 THE SPECIAL MASTER: All right.

5 DIRECT EXAMINATION

6 BY MR. MEMBRINO:

7 Q Mr. Page, would you state for the Court your
8 name and address.

9 A My name is Oliver Page. I live at 616 East
10 Woodward, Mill Valley, California.

11 Q And where are you employed?

12 A I'm employed with Stetson Engineers Inc.

13 Q How long have you been with Stetson Engineers?

14 A Fifteen years.

15 Q And your profession is?

16 A I'm a hydrogeologist.

17 Q What are your responsibilities in the company?

18 A Well, in addition to being a hydrogeologist,
19 I supervise the staff of our San Francisco
20 office.

21 Q Do you have any financial interest in the
22 company?

23 A No, I am not a part of the company.

24 Q What is your title for the Court your educational
25 background?

26 A Direct examination

1 background.

2 A. I received my Bachelor's degree in geology from
3 UCLA in 1963 and my Master's in hydrogeology from
4 Colorado State in 1966.

5 MR. WHITE: Your Honor, for the sake of
6 Mr. Page's voice, the State would stipulate that
7 he may be accepted as an expert in hydrogeology
8 by the Court.

9 MR. MEMBRINO: Your Honor, I was going to
10 move his qualification as an expert in hydrogeology
11 and groundwater development, and if the State
12 would stipulate to that.

13 THE SPECIAL MASTER: Also groundwater.

14 MR. WHITE: Let me take a look at the
15 resume.

16 THE SPECIAL MASTER: All right. Take a
17 few minutes. Is there a copy of the resume
18 that's going to be admitted into evidence?

19 MR. MEMBRINO: Yes.

20 THE SPECIAL MASTER: In that case, I'll
21 take a look at it.

22 MR. WHITE: We'll stipulate to that, Your
23 Honor.

24 THE SPECIAL MASTER: Mr. Page, I'll try to
25 page - direct - membrino

1 ask you a question that you can answer yes or
2 no -- strike that.

3 MR. MEMBRINO: Your Honor, for the record,
4 I have presented to Mr. Page the United States
5 Exhibit WRIR C-31 which is Mr. Page's resume, and
6 I would like that moved into evidence at this
7 time.

8 MR. WHITE: May I see a copy?

9 MR. MEMBRINO: Sure.

10 Q. (By Mr. Membrino) Mr. Page, while the State is
11 examining your resume, would you -- can you state
12 that this resume fairly describes your professional
13 and educational background?

14 A. Yes, it does.

15 MR. WHITE: We have no objection, Your Honor.

16 THE SPECIAL MASTER: Thank you. The
17 Exhibit C-31 is admitted.

18 (Thereupon US Exhibit WRIR
19 (C-31 was received in
evidence.)

20 Q. (By Mr. Membrino) Mr. Page, have you been hired
21 by the United States for work in connection with
22 this case?

23 A. Yes, I have.

24 Q. Would you describe briefly what you've been

25 page - direct- membrino

- 1 ask to do.
- 2 A. We were asked to evaluate the groundwater
3 resources of the Reservation for use in resource
4 development and for the use by the government
5 in their claim.
- 6 Q. In your study of the Reservation, what sources
7 did you refer to?
- 8 A. We referred to standard published sources by
9 the US Geological Survey, State of Wyoming,
10 and unpublished basic data collected from
11 both federal and state agencies and private
12 companies.
- 13 Q. Are these kinds of sources ordinarily relied
14 upon by persons in your profession?
- 15 A. Yes.
- 16 MR. WHITE: Objection, Your Honor;
17 foundation. How does he know what persons in
18 his profession rely upon generally? He may know
19 what he relies on, but he doesn't know what the
20 professional standard is or at least foundation
21 hasn't been laid for that yet.
- 22 Q. (By Mr. Membrino) Mr. Page, you have been
23 qualified as an expert in this case in groundwater
24 geology and groundwater development. In your
25 page - direct- membrino

1 profession, in your professional duties, to

2 yourself in their interests.

3 1. No, I do not.

4 I am not a member of the American Bar Association, which is
5 a national organization.

6 I am a member of the American College of Trial Attorneys, which is
7 an international organization.

8 I am a member of the American Arbitration Association, which is
9 a national organization.

10 2. There are a number of other organizations.

11 First, the American Arbitration Association, which is a national
12 organization, and the American College of Trial Attorneys, which
13 is an international organization. **underlie the**

14 American Arbitration Association, which is a national
15 organization, and the American College of Trial Attorneys, which
16 is an international organization. **underlie the**

17 American Arbitration Association, which is a national
18 organization, and the American College of Trial Attorneys, which
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27 organization, and the American College of Trial Attorneys, which
28 is an international organization.

29 American Arbitration Association, which is a national
30 organization, and the American College of Trial Attorneys, which
31 is an international organization.

1 These are surface, unconsolidated surface
 2 deposits on the Reservation.
 3 Was this table suggested by you?
 4 It was.
 5 This again, would you describe the source
 6 for that?
 7 Well, --
 8 I am not sure.
 9 The 100' indicated on the table, east of the
 10 well profile for the Wind River, starting at the
 11 road to the east side, the determination
 12 of the depth of the well, and the depth of the
 13 water table, and the depth of the water table,
 14 and the depth of the water table, and the depth of the
 15 water table, and the depth of the water table,
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 24 and the depth of the water table, and the depth of the
 25 water table, and the depth of the water table,

1 Q. This table was prepared by you or under your
2 supervision?

3 A. Yes, it was.

4 Q. And the last item in this exhibit, would you
5 describe that for the Court?

6 A. Table 4, this lists the sources and location
7 for the water and mineral industry. And the
8 first four columns, starting from the left are
9 essentially from Dornbusch and Associates. The
10 fifth column is merely converting the annual
11 water use in a continuous pumping rate in gallons
12 per minute as if it was pumped on a 24-hour day
13 basis 325 days in the year. And the fourth
14 column -- that is something I did. And the
15 fourth column, water sources lists potential
16 sources of water for each of the mineral developments,
17 either existing or potential sources.

18 Q. Thank you, Mr. Page. In addition to the sources
19 you described, some of which are compiled in
20 Exhibit WRRR C-21A, did you do any other work
21 in your evaluation of the groundwater resources?

22 A. Well, we made a reconnaissance study of the
23 groundwater situation on the Reservation for
24 purposes of resource development in addition to

25 Page - direct - next page.

specifically for the purpose of providing
financial assistance.

1. The total amount of the contribution
is \$10,000.
2. The contribution is made to the
company, in contact with the company, and
is intended to be used for the purpose of
the company, and is not to be used for
any other purpose.

3. The contribution is made to the company
and is not to be used for any other
purpose. In addition, the
company is to be notified of the
contribution. The contribution is to be
used for the purpose of the company,
and is not to be used for any other
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used for the purpose of the company,
and is not to be used for any other
purpose.

4. The contribution is to be used for the
purpose of the company, and is not to be
used for any other purpose.

1 Q (By Mr. Membrino) And that produces what kind
2 of indication?

3 A That gives us an indication of the character-
4 istics of the aquifer supplying that well.

5 Q Thank you. I now direct your attention to what
6 has been marked for identification as U.S.
7 Exhibit WRIR C-32 and U.S. Exhibit WRIR C-33.
8 For the sake of convenience I will be calling
9 them C-32 and C-33. If you would be more
10 comfortable, you are free to come down and have
11 a look at these close up.

12 (Witness complies.)

13 Q Turning first to C-32, would you describe what
14 that is for the Court?

15 A This is a generalized columnar section showing
16 the rocks and deposits present on the Reservation,
17 including their stratigraphic sequence, their
18 geologic range in thickness and in absolute age.

19 Q Do you mean to say these different formations
20 appear everywhere on the Reservation?

21 A No. Many of them are absent at different parts
22 of the Reservation. Some you will have one
23 missing in one place and it will be present
24 elsewhere. It is just taking all the rocks and

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1 deposits and putting them in sort of a sequential
2 order.

3 Q I notice in this first column to the left of
4 the graphic there are figures there. Could
5 you describe what they represent?

6 A Those are general ranges in thickness of the
7 deposits as they are found on the Reservation.

8 Q Does that also describe their depth?

9 A No.

10 Q Simply their thickness?

11 A That's correct.

12 Q Looking at that exhibit, would the top of the
13 exhibit, the area labeled "Surface deposits"
14 represent the ground, ground surface?

15 A Yes, those are the unconsolidated deposits you
16 will find at various locations at the surface.

17 Q There is depicted on there some areas of that
18 column in blue. What do they represent?

19 A Those are the potential major water yielding
20 formations or rocks or aquifers. You can get
21 water essentially out of most of the rocks and
22 deposits, but in a lot of them it's very few
23 gallons per minute.

24 Q Now, would you describe what you would call the
25 page-direct-membrino

1 surface deposits?

2 A Well, the surface deposits on the Reservation
3 consists of the alluvium, the sands and
4 gravels and clays of the major streams and
5 rivers. It includes terrace deposits, it includes
6 glacial deposits, landslide deposits.

7 Q As to the Wind River Formation, can you describe
8 the characteristics of that?

9 A The Wind River Formation is consolidated upon
10 sandstones and shales predominately.

11 Q Now, you have that listed -- described in this
12 graphic as being below the Wiggins Formation,
13 the Tepee Trail Formation and one or two others.

14 Q Does that Wind River Formation occur as a
15 surface feature?

16 A Yes, it does throughout most of the central
17 portions of the Reservation.

18 Q So from time to time these other formations
19 actually outcrop -- or from place to place they
20 outcrop on the Reservation?

21 A Yes, they do.

22 Q Thank you. Would you briefly describe the other
23 formations that are characterized in blue?

24 A Well, this formation is the Fort Union and then

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- 1 the Lance Formation. We treated it as one unit.
2 In some places the Lance may be missing. The
3 Mesaverda Formation, again sands and shales.
4 The Cloverly-Morrison Formation we are getting
5 down into some of the deeper formations. Down
6 here is the Park City Phosphoria Formation and
7 Tensleep Sandstone, and then this lower blue
8 group, three formations, the Madison Limestone,
9 the Darby Formation and the Bighorn Dolomite.
- 10 Q Was this exhibit prepared by you or under your
11 supervision?
- 12 A It was prepared under my supervision and in
13 part by me.
- 14 Q And the sources for that exhibit?
- 15 A Sources are listed down here. They're U.S.
16 Geological Survey, and I believe four of them
17 are essentially the same as table one.
- 18 Q Are those the kinds of sources that you in
19 your professional occupation ordinarily rely
20 on?
- 21 A That's correct.
- 22 Q I now turn your attention to U.S. Exhibit WRIR
23 C-33. Would you describe what that is for the
24 Court?
- 25 page-direct-membrino

1 A This is a geologic map of the Wind River Indian
2 Reservation taken from U.S. Geological Water
3 Supply Paper 1576-I, and it was the base
4 geologic map that we referred to in our studies.

5 Q Now, on C-32 we discussed briefly surface
6 deposits. Would you -- are they depicted on
7 this C-33, the geologic map?

8 A Yes, they're depicted by several patterns or
9 colors, but essentially this lighter yellow,
10 for instance, is the alluvium of the Wind River,
11 the alluvium of the Little Wind, the Popo Agie,
12 and you will see the light yellow elsewhere
13 on the map here depicting the alluvium. This
14 (indicating) happens to be the glacial deposits.
15 Your terrace deposits are by another pattern.
16 Generally they are yellowish in this pattern.

17 Q So the terrace, glacial deposits and alluvium
18 are what you characterize together as the
19 surface deposits?

20 A Along with the landslide and a few other miscell-
21 aneous.

22 Q Now, we also discussed the Wind River Formation.
23 Can you identify how the Wind River Formation,
24 whether it's depicted on this geologic map?

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1 A Yes. The Wind River Formation is indicated by
2 this mustard yellow color, and as you can see
3 it's present and at the surface throughout most
4 of the central portion of the Reservation.

5 Q What thicknesses does that appear at?

6 A Well, it --

7 MR. WHITE: Objection, Your Honor, he is
8 testifying from the exhibit before it is admitted.
9 If he wants to explain what the exhibit shows,
10 that's perfectly fine with the State, but to
11 start testifying from it before we have a chance
12 to voir dire and it is admitted, I do not think
13 is appropriate, Your Honor.

14 MR. MEMBRINO: I will withdraw the question
15 for the time being, Your Honor.

16 Q (By Mr. Membrino) We also discussed some deeper
17 aquifers or formations on the columnar exhibit.
18 Would you show how they are depicted on this
19 geologic map?

20 A Well, they are shown by various colors here
21 (indicating), and they are shown to be out-
22 cropping along the foot of the Wind River Range.
23 Also present in the northern part of the
24 Reservation, they would be these (indicating)

25 page-direct-membrino

1 darker colors indicated here.

2 Q Now, there is another drawing at the base of
3 that map. Could you describe what that is?

4 A That is a cross-section of the Reservation that
5 starts at about this point (indicating) and goes
6 up here like this. That is showing a slice of
7 the Reservation and looking at the subsurface
8 directly from the side.

9 Q Did you arrive at the -- strike that.

10 What level -- what kind of analysis, rather,
11 did you conduct of the alluvium?

12 A On the alluvial deposits of the principal Wind
13 River, Little Wind, Popo Agie, Mill Creek,
14 the major creeks we estimated the saturated
15 thickness from well logs. I determined the --
16 from the saturated thickness and pump test
17 information I determined the well yields. We
18 also determined the groundwater and storage.

19 Q Now, you said that the alluvium is identified
20 on the -- on Exhibit C-33 as lying along the
21 principal streams, the Wind River, Little Wind
22 River and Popo Agie. Would you describe how the
23 alluvium is formed?

24 A The alluvium --

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1 MR. WHITE: Same objection, Your Honor..

2 THE SPECIAL MASTER: He may answer, if
3 he can. He is a geologist, and if he can tell
4 how the alluvium is formed, I would like to
5 hear it.

6 MR. WHITE: If he is going to testify from
7 the exhibit, I would like to register an objection.
8 I have no objection to him answering the question,
9 but if it's part of talking about this exhibit
10 or he needs this exhibit to speak from, then I
11 think it ought to be admitted before he does so.

12 THE SPECIAL MASTER: He may answer.

13 Q (By Mr. Membrino) Mr. Page, do you need to
14 rely on the exhibit to describe the formation
15 of the alluvium?

16 A No.

17 Q Your answer to that was --

18 A No.

19 Q Would you continue then, please, and describe
20 now the conformation of alluvium?

21 A Well, alluvium is unconsolidated materials
22 transported by the rivers, particular during high
23 flow stages, and then when the low flows, they're
24 deposited. Quite often the coarser material is

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1 deposited in the upper reaches, the final
2 material being lighter is carried further down-
3 stream.

4 Q You said the alluvium was saturated. What is
5 the source of water for -- principally for the
6 alluvium?

7 A Well, the principal source of water would be the
8 surface stream flowing on top of the alluvium
9 deposits.

10 Q Is it your opinion that the water in the alluvium
11 then is hydrologically connected to the surface
12 supply?

13 A Yes.

14 MR. WHITE: Objection, Your Honor, we need
15 a definition of "Hydrologically connected" as
16 opposed to "Hydrology connected." That makes
17 a lot of difference in a particular area of
18 expertise, and I think the term ought to be
19 defined before used in a question.

20 MR. MEMBRINO: I will withdraw the question
21 and ask a more specific one.

22 Q (By Mr. Membrino) Is there a relationship
23 between the alluvium and surface water?

24 MR. WHITE: Objection, Your Honor. What
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kind of relationship?

THE SPECIAL MASTER: The objection is overruled.

THE WITNESS: The surface water is supplying your source of water for the alluvium, and when you pump from a well that is just perforated or receives its water from the alluvium, you'll be taking, depending on your pumping conditions, you will be taking some water from the surface or you could diminish the surface flow by that pumping if your pumping was of a volume in a prolonged amount. You would be taking it both from storage in the alluvium and from the surface source.

* * * * *

1 O (By Mr. Membrino) Now, you said that on your
2 field work on the reservation you conducted
3 pump tests. Did you conduct a pump test
4 in any of the alluvium on the Wind River
5 Indian Reservation?

6 A Yes, we pump tested a well at the Pilot Butte
7 oil field. It was a water well they used for
8 their secondary recovery of oil, and it was
9 about a thirty-foot deep well, as I recall,
10 and the alluvium at that point -- or pardon
11 me, it was a twenty-two-foot deep well, and
12 the alluvium was about twenty feet thick --
13 excuse me -- the saturated alluvium was about
14 twenty feet thick.

15 Q What did you conclude from that pump test?

16 A Well, we concluded that after a while the cone
17 of depression of the well had expanded, such
18 that it was getting water from the river.

19 Q Did you make any calculations as a result of
20 your research into the volume of water in the
21 alluvium, saturated alluvium?

22 A Yes, we estimated that the groundwater, total
23 groundwater and storage under what you would
24 call full conditions -- water levels and

25 page-direct-membrino

1 alluvium are at their fullest level -- that
2 about 362,000 acre-feet of groundwater are
3 in storage in the alluvial deposits of the
4 major rivers that would be included.

5 I will just check my notes to make sure,
6 but that would include the Wind River, the
7 Little Wind River, Spring Creek, Crow Creek,
8 Mill Creek, Popo Agie.

9 Q So in the alluvium of those streams you said
10 there was approximately 360,000 acre-feet of
11 water?

12 A That's correct.

13 Q Do you have a technical term to describe the
14 relationship or the connection between water in
15 the alluvium and surface water?

16 A Well, the term I've used is just hydrologically
17 connected. In other words, there's a direct --
18 the groundwater is in direct contact with the
19 surface water.

20 Q Now, with regard to the alluvium and your
21 calculation of 360,000 acre-feet of water, have
22 you concluded what the sources of that water are?

23 A You mean the source of the water in the alluvium?

24 Q Yes.

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1 A The major principal source would be percolation
 2 of the surface flow. You could have some
 3 side flow from, say, the Wind River into that
 4 formation. You could have irrigation returns,
 5 possibly a small amount from precipitation falling
 6 directly on the alluvium.

7 Q What conclusions did you make about other surface
 8 deposits? We have just described the alluvium,
 9 and that was about 360,000 acre-feet of water
 10 in storage.

11 THE WITNESS: Pardon me just a second.

12 (Pause.

13 A We briefly looked at the terrace deposits
 14 and estimated the quantity of groundwater that
 15 could be in storage in the major terrace deposits.

16 Q Before you continue, would you mind again approaching
 17 the exhibit to describe where such things as
 18 terrace deposits are depicted on that map?

19 MR. WHITE: Your Honor, I would have
 20 the same objection to testifying from the exhibit
 21 before it's introduced.

22 THE SPECIAL MASTER: Overruled.

23 What are terrace deposits?

24 THE WITNESS: These were deposits that

25 page-direct-membrino

1 were laid down by the streams when they were at
2 a higher level before they had cut down into their
3 present channels.

4 THE SPECIAL MASTER: Does this exhibit
5 purport to illustrate them?

6 THE WITNESS: Yes, it does.

7 A There's terrace deposits that's shown as Qt on the map.
8 It's with little blue greenish dots. There are
9 little scattered terraces all over. We just
10 made estimates of the potential groundwater in
11 storage of some of the major deposits up in the
12 Muddy Ridge area, in this Crowheart area, and
13 in the Riverton area.

14 Q (By Mr. Membrino) How would they compare with
15 one another, the amount of water available
16 from the terrace deposits, as opposed to alluvium?

17 A Well, the thing about terrace deposits, when I
18 say we estimated the potential groundwater
19 storage, they, for the most part, are drained
20 during the nonirrigation season, so they depend
21 on irrigation return flows -- they would get
22 some recharge from precipitation falling directly
23 on them, but quite often they are elevated above
24 the streams and the creeks, so they would not get

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1 significant quantities of infiltration of surface
2 flow, so all you could do is estimate, okay, if
3 you have five saturated feet, maybe during the
4 low season or you could have twenty saturated
5 feet, you will have this. You have that potential
6 quantity of water, but you must keep in mind that
7 during the nonirrigation season they are not a
8 major well yielding source of water, so all we
9 did was we said that with five saturated feet,
10 you would have this potential quantity of water
11 and with twenty saturated feet, you would have
12 this potential.

13 Q Turning your attention -- well, before we do that,
14 there were other deposits you described as land-
15 slide glacial deposits.

16 A We did not estimate storage in those just from
17 the standpoint that their occurrence is not
18 that significant to the groundwater supply of
19 the reservation.

20 Q Thank you. Now, let's turn to the Wind River
21 Formation, and I would like to ask you what
22 your conclusions were about the Wind River
23 Formation.

24 A The Wind River Formation essentially in the upper
25 page-direct-membrino

1 thousand feet -- and that is about the only
2 portion -- it ranges from thicknesses 5,000 or
3 more feet in parts of the reservation, but
4 essentially the available well data penetrates
5 the upper 700 or 800,000 feet.

6 In that there are three facies, a lower fine
7 grain facies, a middle course grain facies,
8 and an upper fine grain facies.

9 The well data we looked at and the work by
10 the U.S. Geological Survey indicates that the
11 higher yielding wells penetrating the Wind River
12 formation receives its water from the coarse grain
13 facies. Well yields in the fine grain facies
14 you may be talking a few gallons a minute to
15 ten or fifteen, in other words. The coarse grain
16 facies -- I probably should go back to the map
17 again.

18 Q Please.

19 A The coarse grain facies is present along the
20 northeast portion of the Big Horn Ridge and is
21 present under the City of Riverton area.

22 MR. WHITE: Your Honor, I would object
23 to the question and ask that the answer so far
24 be stricken because this is testimony that's

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1 being made from this exhibit before it's admitted,
2 and I don't believe the location and the nature
3 of the various -- the material within the Wind
4 River Formation is illustrated by that exhibit.

5 THE SPECIAL MASTER: I'll overrule
6 the objection, but I don't have 31, 32, and 33 --
7 none have been admitted yet.

8 MR. MEMBRINO: I have not moved their
9 admission, but they do illustrate at this point
10 in pictorial form what --

11 THE SPECIAL MASTER: Do you propose to
12 offer them for admission?

13 MR. MEMBRINO: I do.

14 THE SPECIAL MASTER: Is there some
15 reason why you are not offering them now?

16 MR. MEMBRINO: I was going to do it
17 at the end of Mr. Page's testimony.

18 THE SPECIAL MASTER: Well, it raises
19 a basis for these objections is the reason I
20 was asking.

21 I have further question about the geologic
22 values and structures under that area which is
23 no longer a part of the reservation, and we
24 alluded now a half a dozen times to matters

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around Riverton and areas long since sold and
actually not a part of the reservation.

We are treating this as an original
reservation before any selling, and that raises
a question I think we ought to address now.

* * * * *

page-direct-membrino

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1 MS. SLEATER: Your Honor, part of the --

2 MR. MEMBRINO: Part of our concern here is

3 to identify the aerial extent, that is where

4 groundwater is located to the extent that it

5 may, that certain groundwater formations may extend

6 off the Reservation or under other parts of the

7 Reservation including the reclamation area.

8 The issue we are going to get at is the right, if

9 any, of the tribes or the United States in their

10 behalf of the water and the amount of that water.

11 Though it's important to know --

12 THE SPECIAL MASTER: Yes, but you certainly

13 aren't going to raise a claim on water that is not

14 under the surface of the present Wind River Indian

15 Reservation, are you?

16 MR. MEMBRINO: If I could use an analogy, the

17 Wind River, the surface of the Wind River, I think

18 you would observe originates in part off the

19 Reservation. The rights of the Indians to water

20 use on the Reservation may require control of

21 off-Reservation use of the surface flow and by the

22 same token, we have to make a similar analysis of

23 the aerial extent and the conformation of the

24 groundwater on the Reservation.

25

1 MR. ROGERS: Your Honor, if I may say, I'm
2 not quite clear what Your Honor may be referring
3 to when he talks about off the Reservation, but
4 I believe you just made reference to the fact that
5 the city of Riverton as being off the Reservation.
6 The State of Wyoming, the tribes and the United
7 States have all stipulated that the parameters of
8 the Reservation -- are the parameters of the
9 Reservation as shown on Exhibit C-33. The State
10 has not stipulated to that small portion, northernmost
11 portion, I believe, dealing with the northern part
12 of Arapahoe ranch. But certainly that entire
13 picture has been stipulated to --

14 THE SPECIAL MASTER: That may be true.

15 MR. ROGERS: As the exterior boundaries of
16 the Reservation.

17 THE SPECIAL MASTER: That is true, but we
18 also have, in the case of many exhibits with
19 overlays and undisputed evidence as now, that
20 the withdrawals following the 1905 ceding of
21 the portion east of Popo Agie and north of the
22 Wind River has included hundreds of thousands of
23 acres that have gone to other people with patents
24 of United States of America. I am not of the
25

1 opinion that it's a fact, an uncontroverted one
2 in this litigation that that area is not a part
3 of the Wind River Indian Reservation.

4 MR. ROGERS: That is not correct; that is
5 a very controverted fact then. The State has
6 stipulated to the exterior boundaries of the
7 Reservation.

8 THE SPECIAL MASTER: That's true.

9 MR. ROGERS: It has not been ruled upon by
10 the Master as to the priority dates and perhaps
11 reestablishment date within the portion affected
12 by the 1905 act. The tribes, of course, as you
13 know, contend, and the United States contends that
14 that entire area is part of the Reservation. The
15 tribes contend that the entire portion within those
16 boundaries has a priority date of 1868, but at
17 this time the Master has not yet ruled upon --

18 THE SPECIAL MASTER: The evidence --

19 MR. ROGERS: -- that area.

20 THE SPECIAL MASTER: The evidence from the
21 present witness, Mr. Page, that prompted this
22 dialogue stemmed from his description of subterranean
23 formations that proceed under the next level above
24 terrace, being that which proceeds under the town of
25

1 Riverton.

2 MR. ROGERS: Which is within the Reservation
3 as the State has stipulated to.

4 THE SPECIAL MASTER: And do I understand
5 from you, that your claim runs to groundwater under
6 those areas that are no longer part of the Reservation
7 just because they were at one time a part of it?

8 MR. ROGERS: That is part of the Reservation
9 as the tribes' case goes, and as the State has
10 stipulated to.

11 MR. MEMBRINO: One thing that ought to be
12 added is that the government still holds in trust
13 for the Indians of the Reservation the mineral
14 deposits under the Riverton area.

15 MR. WHITE: Your Honor.

16 THE SPECIAL MASTER: Yes, Mr. White.

17 MR. WHITE: I'd like to make just three
18 quick points. First, the State has stipulated with
19 respect to the exterior boundaries of the Reservation,
20 but has entered into no stipulation with respect to
21 the status of lands within those boundaries, as
22 to whether or not they are in fact part of the
23 Reservation. That's a significant difference.

24 Second, the private parties are not part of

25

1 that stipulation; the private parties are involved
 2 in this case. And the third point is I think the
 3 Master will realize now why the State has been so
 4 adamant in its position that reserve rights do not
 5 extend to groundwater because of tremendous off-
 6 Reservation affects of just what Mr. Membrino has
 7 suggested, that the use of groundwater by the
 8 Indians is protected by all non-Indian uses off --
 9 against all non-Indian uses off the Reservation,
 10 so I would like to again restate our objection based
 11 on the reserve right doctrine.

12 THE SPECIAL MASTER: Ladies and gentlemen,
 13 if there's one thing that is certain in the uncertainty
 14 of geology and formations of the earth, it's the
 15 patterns that water travels in the various structures
 16 in which it's found. Where masses of reservoirs
 17 take place and massive aquifers and where they
 18 originate and how they are fed can sometimes
 19 traverse thousands of miles. And I don't purport
 20 to want to hear evidence that seeks to have me
 21 conclude that the Indians in this area or a
 22 given state, a hundred or thousand miles from
 23 Wyoming can't have a right to inject a proprietary
 24 interest in the water as they may be a thousand
 25 miles or hundreds of miles from where they are going

1 to surface.

2 MR. MEMBRINO: Your Honor, to be sure that
3 that is not what we are talking about. Mr. White
4 has suggested that there are, there may be conflicts
5 over rights to groundwater between Indians and
6 non-Indians, and for that reason, suggests that
7 there should be no -- declared to be no reserve
8 right in groundwater. The conflict is much more
9 emphatic, and has long since been litigated over
10 water rights between Indians and non-Indians
11 and reserve rights extending thereto. I --
12 it certainly no apology for -- for denying that
13 the reserve right extends to groundwater simply
14 because of potential conflicts.

15 THE SPECIAL MASTER: Earlier you mentioned
16 that you have an interest in the formations totally
17 without the boundaries of the Reservation because
18 they constitute one of the sources that might
19 very well contribute water toward some of the
20 structures under the surface of the Reservation.
21 I'm not inclined to want to agree with that.

22 MR. MEMBRINO: I think what Mr. Page was
23 testifying to is the location of the Wind River
24 formation under the Riverton area. The United
25 States is making claims for use of water, whether

1 it be surface or groundwater only for development
2 of lands held in trust or resources held in trust
3 for the Indians. We're not talking about a claim
4 for lands held by non-Indians. I think that point
5 has to be maintained.

6 THE SPECIAL MASTER: We will maintain --

7 MR. MEMBRINO: But --

8 THE SPECIAL MASTER: Yeah, but what you're
9 maintaining is that the United States has a
10 proprietary right and ownership to groundwaters
11 under, under non-Indian surface if those groundwaters
12 are necessary for the well being of the Indians
13 who live in a different area from that, where that
14 water is found. Isn't that what you're maintaining?

15 MR. MEMBRINO: I'm maintaining -- in a word,
16 yes, but it should be made clear that we have to
17 look at this just as we look at surface water.
18 The fact that surface water occurs off the Reservation,
19 perhaps a hundred miles away and is sufficient
20 only to serve the needs of the first priority,
21 be it Indian or non-Indian, then a remote water
22 user cannot interfere with that -- with that water
23 supply to the detriment of the prior right holder.
24 So it's --

25 THE SPECIAL MASTER: You think that concept

1 applies to groundwater as well as the surface
2 water?

3 MR. MEMBRINO: I think emphatically the
4 reserve right extends to groundwater and the --

5 THE SPECIAL MASTER: This concept of no
6 interference until a prior owner has a right to
7 use it does apply to groundwater as well as surface
8 water? And if so, what's your authority of that,
9 if you believe that?

10 MR. MEMBRINO: I would refer Your Honor to
11 the United States Supreme Court decision in the
12 Caepfert case, which was decided in 1976, and
13 recognized that the need for water, groundwater
14 to maintain a national monument would be held
15 paramount, the right for that -- to that water
16 would be held paramount to an off-monument groundwater
17 user. And we have gone, we have briefed this issue --

18 THE SPECIAL MASTER: You've answered my
19 question.

20 MR. WHITE: May I say one thing?

21 THE SPECIAL MASTER: Mr. White.

22 MR. WHITE: First off, the characterization
23 of the Caepfert case extending the reserve right
24 doctrine to groundwater is one that the State must
25 violently disagree with, because the Supreme Court

1 said it doesn't involved groundwater. The
2 second point I'd like to make is that the position
3 Mr. Membrino seems to be taking is a far reaching
4 one because I notice the Madison formations is one
5 of the formations beneath the formation, and carrying
6 his argument to its logical end, is that the Wind
7 River Indian Reservation would be able to control
8 the development of Madison formation because Madison
9 formation happens to be underneath the Reservation.
10 That is the reason, not the legal basis, but the
11 reason that the State is so anxious about this
12 water issue.

13 THE SPECIAL MASTER: Very good. I want you to
14 to know, Mr. Page, that the reason we've engaged
15 in this colloquy is to give your throat a rest.
16 So now, we can return to the exhibits.

17 DIRECT EXAMINATION (CONTINUED)

18 BY MR. MEMBRINO:

19 Q Did you conduct any pump tests on the Wind
20 River formation?

21 A We -- I should have kept talking, I think.

22 MR. WHITE: Your Honor, why don't we take
23 a little break?

24 THE SPECIAL MASTER: You want to take a break,
25 page - direct - membrino

1 take some medicine?

2 THE WITNESS: Yes.

3 THE SPECIAL MASTER: All right, let's

4 take a ten-minute break.

5 (Thereupon a ten-minute
6 (recess was taken.

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1 THE SPECIAL MASTER: Are we ready to
2 proceed?

3 MR. MEMBRINO: We are, Your Honor..

4 Q (By Mr. Membrino) Just as we broke, Mr. Page,
5 you were describing the characteristics of the
6 Wind River Formation. Would you care to con-
7 tinue to do that for the Court, please?

8 A Okay. Well, to just recap a little bit, the
9 Wind River Formation, you can picture it as
10 a series of beds, lenses, sort of facies of
11 gravels, sands, sandstones, shales. We have,
12 as I mentioned, a lower -- and this is in the
13 upper 1,000 feet or so -- a lower fine-grain
14 sequence; we have a middle coarse-grain
15 sequence and an upper fine-grain sequence.

16 Now, the higher yielding wells that at
17 this point have only been developed, to my
18 knowledge, in the Riverton area from the Wind
19 River Formation, taps the coarse-grain sequence
20 in that area. This coarse-grain sequence does
21 not extend clear across the central portion of
22 the Reservation where you show -- where it is
23 shown that the Wind River Formation outcrops,
24 it just thins and lenses out into the fine-grain

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1 sequence. The coarse-grain sequence has been
2 identified northeast of the Bighorn Ridge,
3 the Crowheart area and in the Alkali Butte
4 area which is the southeast corner of the
5 Reservation there.

6 In the Pavillion-Ocean Lake area you have
7 your fine upper-grain sequence present, and
8 actually most of the wells on the Reservation,
9 the domestic wells, the stock wells, the smaller
10 yielding wells, penetrate the fine-grain
11 sequence. These sequences are -- you look at
12 the existing pump well information and pump
13 test information and it indicates that you have --
14 might have a 400 foot well in one place only
15 capable of yielding a few gallons per minute,
16 and you can have a 400 foot well in the Riverton
17 area and you can be getting several hundred
18 gallons per minute.

19 Q You described the fine-grain facies and the
20 coarse-grain facies. Their conformation in
21 the Wind River Formation is what I would like
22 to ask you about. Do they have any effect on
23 the relationship of water within the formation?

24 A Well, being coarser, you have got -- they're going
25 page-direct-membrino

1 to be the higher yielding wells, and the fine-
2 grain facies where you have the two, say,
3 setting together interspersing. The movement
4 of water from the coarser into the finer is
5 going to be restricted just from a lower
6 permeability, from a total formation.

7 Q For example, then, by tapping one part of the
8 Wind River Formation, would you automatically
9 be withdrawing water from some other portion
10 of the Wind River Formation?

11 MR. WHITE: Objection, Your Honor, until
12 he indicates where this tapping is going to
13 take place or whether it's in the coarse grain
14 or fine grain. The question is ambiguous and
15 the answer would be misleading on the record.

16 THE SPECIAL MASTER: I will overrule the
17 objection. I just don't think it will be
18 ambiguous, it's too much of a generalization
19 question, to begin with.

20 MR. MEMBRINO: I will ask him more
21 specifically, Your Honor.

22 THE SPECIAL MASTER: All right.

23 Q (By Mr. Membrino) If there is a series of
24 coarse-grain facies in the Wind River Formation
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1 interspersed with a finer-grain facies, what
2 affect -- what is -- how would you describe
3 the connection of the water to yet another
4 coarse-grain facies beyond the fine-grain facies?

5 MR. WHITE: Your Honor, could I ask the
6 question be read back? I don't want to object
7 to that, I'm just not sure I understood it.

8 (Whereupon, the Reporter read
9 back, "Q If there is a series
10 of coarse-grain facies in the
11 Wind River Formation inter-
12 spersed with a finer-grain
13 facies, what affect -- what is --
14 how would you describe the
15 connection of the water to yet
16 another coarse-grain facies
17 beyond the fine-grain facies?")

18 THE WITNESS: In general terms, if they
19 were not your -- you're saying they are not
20 connected, I mean, is that correct? They are
21 separated by finer material?

22 MR. MEMBRINO: That's right.

23 THE WITNESS: One factor would be their
24 distance, but you would not have a direct effect
25 by pumping from one on the other. But there
are other factors such as the period of pumping,
quantity of pumping. It is possible to draw
some small quantities of water from the

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1 fine-grain facies and have movement between the
2 two, but very, very restricted. You may not
3 have that movement either.

4 Q (By Mr. Membrino) I see. Would you continue,
5 then? I interrupted. Would you continue then
6 with your discussion of your description of the
7 Wind River Formation?

8 A Well, essentially what you are looking at as
9 far as well yields in the Wind River Formation,
10 you are looking to penetrate the significant
11 section of these coarser materials if you want
12 what I would call a higher yielding well, a
13 few hundred gallons a minute, something like
14 that. Or the data I observed indicated that the
15 Riverton area you might be looking at 200 to 400
16 gallons per minute from wells in that area.

17 And that is the only area on the Reservation
18 at this point, to my knowledge, that has wells
19 producing that yield. It doesn't mean you can't
20 get them in these other areas, they just have
21 not been drilled to sufficient depth. You just
22 don't know for sure until you drill it. So
23 essentially what you are looking at is if you
24 want that, you have to search out the coarse-grain

25 page-direct-membrino

1 facies, penetrate a significant sequence of
2 coarse-grain facies.

3 Q Because the coarse-grain facies are generally
4 the most productive?

5 A That's right. You can get water, without a
6 blanket statement, everywhere in there, but you
7 can get water from the Wind River Formation
8 from the finer grains because you do have some
9 sandstones in there, even from fracture. You
10 can get some water from lower yielding wells
11 throughout. Much of it is outcrop area, if not
12 all.

13 Q Did you reach any conclusions on the other
14 formations?

15 A Yes. Our study was essentially we studied the
16 surface deposits individually. We studied the
17 Wind River Formation individually, and then as
18 a group we studied what I refer to as the late
19 tertiary or older formations, those formations
20 shown on the columnar section, the third blue
21 area down, all the way down. That would be from
22 the Fort Union Formation and older. Formations
23 get older as they go downward on the Reservation,
24 and there are very few wells penetrating those

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1 formations at depth. I will clarify this by
2 stating you have some stock and domestic wells
3 scattered where these formations occur at the
4 surface or slightly buried, maybe under the alluvium
5 or Wind River Formation within two or three
6 hundred feet. Those yields are very low because
7 these formations are sequentially what we refer
8 to as tight or low permeability, low trans-
9 missivity of water. So to get large quantities
10 of water, you have to have an artesian head to
11 work against.

12 Q Would you describe what an artesian head is?

13 A An artesian head is when you penetrate a
14 formation of depth, the water level in the well
15 rises above the top of the aquifer; whereas,
16 if you tap an unconfined aquifer, except under
17 special conditions, is essentially where you
18 hit the water is where it's going to stand in
19 the well. So you need that head because in order
20 to get a yield out of a well, it's a function
21 of what you would call the specific capacity
22 of the well, which is a function of the perme-
23 ability or transmissivity of the formation,
24 which is the transmitting ability of the well --

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1 or of the aquifer to transmit water, that and
2 the heads you pump against.

3 In other words, you can draw the well
4 down several hundred feet of drawdown. You
5 don't get that if you're tapping the formation
6 under unconfined conditions. So getting back
7 to where those formations are significant
8 aquifers beneath the Reservation, they are where
9 they are at depth. And to my knowledge there
10 are -- on the Reservation I found two major
11 wells that penetrate, they penetrated the
12 Madison-Bighorn Limestone where you had this
13 where available for testing and just to get
14 information on these depths. Both of these
15 are used in the recovery of oil, one at the
16 Lander oil field. It penetrated the Madison
17 at about 2,000 feet, and the others at Winkle-
18 man Dome also penetrated the Madison and, I
19 believe, the Bighorn Dolomite. That's why
20 we grouped them there, because if you drill
21 into the Madison and if the Bighorn was present,
22 you would just go the few other feet and at
23 that point the whole thing --

24 MR. WHITE: Your Honor, excuse me, but I
25 page-direct-membrino

1 would like to move to strike the testimony
2 about any of the formations other than the
3 alluvium and Wind River Formation because the
4 Statement of Claims does not extend to claims
5 of the United States to any but those two
6 sources of groundwater, the alluvium and Wind
7 River Formation. The Madison and other Form-
8 ations the witness has discussed do not appear
9 in the Statement of Claims and are not at issue
10 in this case, and consequently, any testimony
11 in respect to formations not involved in the
12 Statement of Claims are irrelevant.

13 I am very interested in what the witness
14 has to say, it's a mark of his talent, but
15 they just don't apply to this lawsuit.

16 THE SPECIAL MASTER: I would be constrained
17 to overrule that, Mr. White, on this basis:
18 That the law I believe is clear that if there
19 is a reserved right on this Reservation, it
20 will run through groundwater, and I'm not sure I
21 have the right to distinguish the groundwater
22 in the Madison Limestone from that -- and the
23 Fort Union from that in the alluvium.

24 MR. WHITE: I was just going to say, Your
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1 Honor, it is not identified in the claim.
2 The claim makes identification of the Wind
3 River Formation, talks about the alluvium, but
4 it doesn't talk about these other formations.

5 Whether or not they have reserved rights
6 to them, if they didn't claim them, they can't
7 put the evidence on about them, Your Honor.

8 MR. ROGERS: Your Honor, may I say at this
9 point that --

10 THE SPECIAL MASTER: Well, I think you
11 better.

12 MR. ROGERS: -- this is not the Tribes'
13 witness, but I would like to point out that the
14 Tribes' Statement is in no way restricted to
15 the two formations that were mentioned by
16 Mr. White. Our claim for groundwater is not
17 restricted to those two formations --

18 MR. WHITE: Your Honor --

19 THE SPECIAL MASTER: One at a time, please.

20 MR. MEMBRINO: I should also point out
21 that our witnesses began their work at a time --
22 or were in the stage of their work at the time
23 the claims statement was filed when we did not
24 know precisely the extent of our claims. As we
25 have developed our expert testimony and as

1 evidence is presented, and it turns out that
 2 water is going to be needed from these other
 3 sources, we will amend our pleadings to conform
 4 to the evidence.

5 THE SPECIAL MASTER: Well, I have already
 6 ruled on the matter, but go ahead, Mr. White.

7 MR. WHITE: I just wanted to state for the
 8 record, Your Honor, that Wyoming is now objecting
 9 to testimony concerning any issues outside those
 10 framed by the pleadings, and we preserve that
 11 objection, and when it comes time to move to
 12 amend the pleadings to conform to the evidence,
 13 I hope Your Honor will remember we made a timely
 14 objection.

15 THE SPECIAL MASTER: I appreciate that,
 16 but I stated my reason for ruling as I did.

17 Go ahead.

18 MR. MEMBRINO: Thank you, Your Honor.

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1 Q (By Mr. Membrino) Would you continue, Mr. Page?

2 A As I indicated, the two wells I was aware of
3 that penetrated the deep aquifers were these
4 two in the Madison. We obtained some
5 data on the one at Winkleman Dome which was
6 the type of information -- pardon me --

7 THE SPECIAL MASTER: Go ahead.

8 A The type of information was static pump and water
9 levels and well yield, and we determined
10 the specific capacity and made a general
11 conclusion that potentially that well and
12 the formation at that point could yield in the
13 order of 500 gallons a minute. On the Madison
14 well at the Lander oil field they allowed us --
15 they shut it down for their purposes and allowed
16 us to -- this is Amoco, the owner of the well --
17 allowed us to run a pump test of sorts.

18 The well is a flowing well. We shut it
19 down. We measured the -- we shut it down all
20 night, and then we opened it and we measured
21 the artesian flow at the surface. I believe
22 it was 160 gallons a minute.

23 We measured the pressure. We could not
24 measure the pressure with time because the

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1 instruments were not calibrated such that you
2 could take time or any measurements.

3 We let it flow until it appeared the measure
4 had essentially stabilized in the accuracy of
5 our reading and that was about eight hours later,
6 and from that information and the existing head
7 above the top of the formation concluded that
8 in that area you would be looking at 500 to 800
9 gallons a minute from one well. This does not
10 include a field with interferences, but from one
11 well, from the Madison.

12 This confirms information I had read
13 regionally on the Madison which can be in places
14 they get no water. Other places they get
15 yields like this -- pardon me --

16 Q That is they get no water or yields like this
17 out of the Madison Formation?

18 A That's right. I understand that some of the
19 testing that the USGS has done, some of the
20 holes, they were just pretty dense material
21 they penetrated. The only other formations
22 that were penetrated at depth were the older
23 formations -- I believe the Frontier, and it's
24 one not even marked there as an aquifer.

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1 I think it's at the Raft Lake field, but they
2 were talking ten or fifteen gallons a minute
3 production from it, and that's the extent of
4 the subsurface data that was available within
5 the reservation boundaries on these formations.

6 Q Did you inquire whether there were other wells
7 into the Madison Formation than the two you
8 discussed?

9 A My initial investigations I inquired wherever I
10 went, plus I contacted all known oil producers
11 because they were essentially the ones that would
12 be drilling wells that deep. You wouldn't get
13 that for domestic, even municipal within the
14 reservation, I knew that, so to my knowledge,
15 as far as the deeper Madison wells, that is --
16 I was aware of the two.

17 Q I would like to turn now from this discussion
18 of the aquifers, the different formations, to
19 a discussion of the concept of safe yield.
20 Could you describe the concept of safe yield
21 in the context of groundwater management?

22 THE SPECIAL MASTER: Did you say safe
23 yield?

24 MR. MEMBRINO: Yes, Your Honor.

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1 MR. WHITE: I would like to object
2 to the question. I'm not sure what it has to
3 do with the claim.

4 THE SPECIAL MASTER: Tell me what it
5 is, and I can rule on whether we should go into
6 it or not.

7 THE WITNESS: Well, safe yield is a
8 term that -- it's been questioned by some using
9 that term. Currently, perennial yield is used,
10 and there are many definitions for it, but a
11 simple one is it represents the quantity of
12 water that can be withdrawn from a groundwater
13 source over a long period of time without
14 causing some adverse effect which could include
15 depletion from storage, water level declines,
16 intrusion of poor quality water. It's really --
17 it's as much of a management tool and decided
18 by management as hydrologists. I mean it's --

19 THE SPECIAL MASTER: Go ahead.

20 Q (By Mr. Membrino) Is safe yield a limitation
21 on groundwater development?

22 A Not necessarily.

23 Q Could you explain why? Give me an example of --

24 A Okay. For instance, a job we did for the

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1 Peabody Coal Company in Black Mesa, Arizona --
2 they needed a water supply for their mine and
3 pipeline slurry, and in that area they had
4 a thirty-year life to their mining project.
5 The wells were artesian, lying at about --
6 or the aquifer was. It was lying at about
7 3500 feet, and we drilled a test hole and
8 determined we could get drill production.

9 As we drilled our first production well
10 and from extensive pump tests, we determined that
11 with the proper spacing and the proper restrictions
12 on the pumping rate and period of pumping, they
13 could obtain their annual water supply, which
14 was on the order of 3,000 acre-feet for that
15 thirty-year period, but at that point you would
16 be looking at the water levels in the wells
17 near the top of the formation so, in other
18 words, they were pumping -- they were mining
19 the potentiometric surface is essentially what
20 they were -- they were not depleting the aquifer,
21 but they were mining the potentiometric surface,
22 and so that's a case where you are mining --
23 mining is done in large alluvial basins,
24 particularly in California where you have a

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1 conjunctive source of water, a surface water state,
2 During drought periods you can draw on the basin,
3 It's recharged by artificial means, or during
4 wet periods, natural means.

5 So there's a flexibility, and it's a
6 management tool, and it provides a general guide
7 of what you might expect would occur if you
8 have been able to put a number to it.

9 Q Have you reached any conclusion about the safe
10 yield of groundwater sources on the Wind River
11 Indian Reservation?

12 A We did not determine the safe yield of groundwater
13 on these formations because essentially to put
14 a handle on a value that's realistic, the
15 particular groundwater body should be under
16 some development and some stress so you can see
17 how it has responded to various quantities of
18 pumping, and essentially, except for the
19 Riverton area, that little portion of the
20 Wind River Formation, groundwater use on the
21 reservation is scattered and not concentrated
22 and not of a significant quantity to come up
23 with a value you could say was realistically
24 representative of what you are talking about,

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1 so, no, we did not.

2 Q You said that at Riverton there is some
3 development. Could you describe or compare,
4 rather, what's going on in that area, that
5 part of the Wind River Formation, as opposed
6 to elsewhere?

7 A Well, I don't know if Riverton was located
8 there because you could get groundwater or
9 they were just lucky they located there, but
10 they have this coarse grain facies which is
11 believed to be recharged from water from the
12 Wind River that is percolated into the alluvium
13 under the Wind, into the ground, coarse grain
14 in the Koner and Johnstown Valley on the
15 Wind and in the Arapahoe area of Little Wind.

16 What you have in Riverton is you have your
17 municipal pumping and some private pumpers.
18 The municipal pumping, I believe, is on the
19 order of about 2,000 acre-feet a year, or at
20 least it is until they bring their surface
21 source in, and whether that's in now, I do not
22 know. I do not have a quantity on the other
23 private pumping, but I doubt if the total
24 exceeds 3,000 acre-feet.

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CASPERS, WY 82501
307 237 1431

FRONTIER REPORTING SERVICE

201 MIDWEST BUILDING
CASPERS, WY 82501
307 237 1431

1 Q (By Mr. Membrino) (Continued) Thank you. If you
2 don't mind now, I'd like you to approach the
3 exhibit WRIR C-33.

4 (Witness complied.)

5 Q I show you what's been marked as U.S. Exhibit
6 WRIR C-33A. Would you describe what that is
7 for the record, please.

8 A This is an overlay just locating the communities
9 on the reservation and the community water systems
10 that obtain their water from either groundwater
11 or subsurface underflow of the various rivers.

12 Q Did you prepare that exhibit?

13 A This exhibit was prepared by Dornbusch and Associates,
14 but drafted by us from their worksheets.

15 Q Did you have occasion to compare this exhibit,
16 that is C-33A with what was admitted into evidence
17 yesterday, WRIR C-19?

18 A Yes. That is essentially the same information.
19 The exhibit that was admitted yesterday did have
20 population figures on it. I think it had Indian
21 totals, this one does not.

22 And this is a different scale, this was
23 made to fit the same scale as the geological
24 map, and therefore, run down to the scale of one

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1 square inch equals approximately 635 people.
2 And there's a different notation, I don't know
3 the exact number on the other.

4 Q And just to refer to the Court, what do the
5 symbols, the circles and the dark circles and
6 red circles represent?

7 A It's a proportion showing the Indian population
8 to the total population.

9 Q Could you, using this, using the information
10 on the exhibit, relate those population centers?
11 What is depicted on the WRIR C-33, that is the
12 geology of the reservation?

13 MR. WHITE: Same objection, Your Honor.
14 He's testifying from an exhibit that is not in
15 evidence.

16 THE SPECIAL MASTER: I'm inclined to
17 sustain that. You're asking him to compare the
18 overlay with the geology on the main exhibit.

19 MR. MEMBRINO: Your Honor, the main
20 exhibit is a USGS map. Right now I'm using it
21 only to illustrate Mr. Page's testimony.

22 THE SPECIAL MASTER: Right.

23 MR. MEMBRINO: He can easily testify
24 without it, it's simply to orient the Court at

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1 this stage of the game to the -- to what's
2 depicted on the exhibit.

3 THE SPECIAL MASTER: What do you
4 want to elucidate from him? State your
5 question again.

6 MR. MEMBRINO: I want to -- I want
7 Mr. Page to describe the geology that underlies
8 those population centers.

9 THE SPECIAL MASTER: All right. That's
10 a different question.

11 Describe the geology underlying those
12 population centers.

13 MR. WHITE: That doesn't need to be done
14 from the map then, Your Honor.

15 THE SPECIAL MASTER: I don't care where
16 he stands, however.

17 THE WITNESS: Well, essentially what
18 we're talking about is these communities obtain
19 water from either underflowing or deep underground
20 water. And this is just showing their source
21 of water. I'm not going to discuss its general
22 geology. The area, in the case of Boulder Flats,
23 it receives its water supply underflow gallery
24 from Popo Agie, Fort Washakie, Ethete, from

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1 the Little Wind River; Arapahoe has deeper
2 wells that would obtain its water supply from
3 the Wind River formation. Pavillion also
4 receives water from the Wind River formation
5 as does the Riverton municipal system. As
6 far as their groundwater component, it comes
7 from the Wind River formation.

8 THE SPECIAL MASTER: May I ask a
9 question. You testified earlier, Mr. Page,
10 that the Wakeman field (sic) already had in
11 production a deep well to the Madison.

12 THE WITNESS: In the Winkelman?

13 THE SPECIAL MASTER: Engleman.

14 THE WITNESS: Winkelman.

15 THE SPECIAL MASTER: To the Madison.

16 THE WITNESS: That's correct.

17 THE SPECIAL MASTER: Using that water
18 in its secondary recovery.

19 THE WITNESS: That's my understanding.

20 THE SPECIAL MASTER: You also said
21 down in the southeast corner there was another
22 well in the Lander field.

23 THE WITNESS: Not southeast, right here.
24 (indicating).

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1 THE SPECIAL MASTER: Lander field area?

2 THE WITNESS: That's correct. That's
3 the one that we took some measurements on.

4 THE SPECIAL MASTER: Tests on, and that
5 is also producing water from the Madison?

6 THE WITNESS: Madison. I believe
7 the Winkelman Dome is Madison and Big Horn.

8 THE SPECIAL MASTER: And those wells
9 are all using water in the enhanced recovery
10 processes of oil production?

11 THE WITNESS: That's correct. For sure
12 the Lander does, and it's my understanding it's
13 used at the Winkelman Dome field also.

14 THE SPECIAL MASTER: Okay. You have
15 no idea whether that comes to a total of 6,000
16 acre-feet a year, do you, the total being used?

17 THE WITNESS: Oh, no, I know it
18 doesn't because there are other sources for that
19 secondary recovery.

20 THE SPECIAL MASTER: Okay.

21 Q (By Mr. Membrino) Do you know what the well yields
22 are in gallons per minute?

23 A Of these wells?

24 Q Yes.

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1 A No, I don't.

2 Q I'd like to turn your attention now --

3 A Pardon me, I know, excuse me. I know the
4 Pavillion, I think their best well is getting
5 maybe 45 gallons a minute, was a 5 or 600 foot
6 well. It's into essentially fine grain facies.
7 so we know it was that deep. The best they
8 could get out of it was 45 gallons a minute.

9 Q Thank you. I turn your attention now to what's
10 been marked for identification as WRIR -- U.S.
11 Exhibit WRIR C-33B. Would you describe for the
12 Court what that is, please.

13 A This is an overlay showing the mineral resource
14 development of the reservation as presented by
15 Mr. Merchant.

16 Q Did you prepare that map?

17 A Again, it was prepared from rough maps provided
18 by Dornbusch and Associates, and our people
19 drafted it.

20 Q Was it prepared under your supervision?

21 A Yes.

22 Q Did you compare that overlay C-33B with what
23 was introduced in evidence yesterday as U.S.
24 Exhibit WRIR C-28?

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1 A Yes, I did.

2 Q Are they comparable?

3 A Again, different scale. They're -- in this
4 one I had our people add, convert the annual
5 water requirement to a gallons per minute
6 requirement on a continuous basis, twenty-four
7 hours a day, 365 days a year so there's an
8 additional figure below each labeling from the
9 other map. There are a few minor little
10 drafting squiggles, but that's just within
11 the drafting error. And this one, gasification
12 is misspelled down here.

13 THE SPECIAL MASTER: Has what down there?

14 THE WITNESS: Gasification is misspelled
15 on this one, it has two s's, it should
16 have one.

17 THE SPECIAL MASTER: Oh, it's misspelled.
18 It's an abomination no matter how you spell it.

19 MR. WHITE: We waive the objection.
20 He's qualified as an expert not in spelling.

21 THE WITNESS: So essentially it is the
22 same map with those minor exceptions.

23 Q Would you describe the different colored areas
24 on the map?

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1 A Yes. First one represents the uranium development,
2 both -- the circle represents the yellowcake
3 process and this is a project outline of the
4 formation that would be mined.

5 This is the gypsum, the light green is
6 gypsum, again the outcropping formation containing
7 the gypsum.

8 This dark green is the outline of the
9 formations containing the coals, including the
10 coal fired electricity generating station.

11 There's also some other coal fields down
12 in this area with an in situ gasification plant
13 in there. You have a scattering of these oil
14 reserves, this one showing an enhanced oil
15 recovery operation. There's another one there.
16 This arrow points to its offsite source of water.

17 We have some gas reserves shown in yellow.
18 Part of the phosphoria outcropping on the
19 reservation has been outlined as a source of
20 phosphate.

21 In this area here you have a phosphate
22 rock beneficiation plant, and this would be
23 the brown. You have an acid production, you
24 have a sulfuric acid production shown in yellow

25 page-direct-membrino

1 there.

2 Light green, gypsum wallboard plant; light
3 yellow, anhydrous ammonia production.

4 Over here you have a natural gas, gas
5 desulfuring plant.

6 Q Now next to each of those color codes there are
7 figures, I don't need you to go through each of
8 them at the moment, but could you tell me what
9 they represent and the source of that information?

10 A The source of information is on the table, same
11 numbers show up on table 4 that we previously
12 mentioned. And these numbers are the annual
13 water requirement and its conversion into a
14 continuous flow of gallons per minute.

15 Q What is the purpose, what were you asked to do
16 by Mr. -- Were you asked to do anything by the
17 Dornbusch company when you were furnished with
18 this information?

19 A They just asked for these various things, where
20 they could get a water supply, if it was there,
21 and --

22 Q And did you arrive at any conclusions --
23 we'll go through some of them here -- as to --
24 as to the oil reserves?

25 page-direct-membrino

1 A Well, those are essentially in existence at this
2 point. We have-- As we talked about, they're
3 getting water from the Madison, the Winkleman
4 Dome Lander field. They have produced water
5 with their oil they used for their secondary
6 recovery. Then we -- finally the major use of
7 groundwater is at the Pilot Butte field here,
8 from, oh, maybe up to as many as twelve shallow
9 wells. Shallow, they're twenty or thirty foot
10 pumping underflow of the Wind River alluvial.
11 This is -- we have tested one of those wells.
12 Their production probably is in the order of
13 a thousand to 1600 gallons a minute. I've seen
14 both figures used.

15 THE SPECIAL MASTER: What use is
16 that being put to?

17 THE WITNESS: That's, again I believe
18 secondary recovery.

19 THE SPECIAL MASTER: And is there a
20 return of that flow to the river or is it
21 recycled?

22 THE WITNESS: Not to my knowledge it
23 isn't.

24 Q (By Mr. Membrino) Could you tell the Court what --
25 page-direct-membrino

1 THE SPECIAL MASTER: Well --

2 Q (By Mr. Membrino) What the acre-foot requirement
3 for that is on an annual basis for that purpose?

4 A You mean the total?

5 Q Yeah.

6 A I'll refer to this.

7 THE SPECIAL MASTER: While you're looking,
8 I have a question too. It doesn't sound
9 reasonable to me, without further explanation or
10 further facts, that that secondary recovery
11 operation there will utilize the amount of water
12 you mentioned and recycle its use to recover
13 oil and not have some tremendous amounts of
14 water gaining, building up somewhere somehow.
15 There's got to be, to reinject it or flowed
16 into the river if they're taking what you
17 mentioned earlier every hour.

18 THE WITNESS: I cannot address the
19 subject on their facilities there.

20 THE SPECIAL MASTER: Very well.

21 THE WITNESS: The total annual
22 requirement is 6,580 acre-feet for all these
23 uses.

24 Q (By Mr. Membrino) For all the secondary recovery?
25 page-direct-membrino

1 A And this is my understanding, these are existing
2 uses.

3 Q Are you able to tell us -- you may not be able
4 to, but are you able to tell us how that
5 secondary recovery process works?

6 A No.

7 Q Turning to the coal fields described on that
8 map, could you describe what you were told
9 the water requirements would be and whether or
10 not you were able to find the source of water
11 for that?

12 A In the case of the mine here, the requirement
13 was 25 acre-feet a year. That represents 15
14 gallons a minute for that small usage. They
15 could get it from shallow, shallow being two,
16 three, four, five hundred feet wells, like stock
17 and domestic type wells at the mine here. I
18 don't know specifically where the mine's going
19 to be, but they could get that on the site
20 from formations that would not necessarily --
21 and these would be up in this area. You're
22 looking at formations of -- you're looking in
23 this, it wouldn't necessarily be one of these
24 marked as a major aquifer, but would yield

25 page-direct-membrino

1 15 gallons a minute. They could have three, four,
2 five wells, whatever they needed to get that
3 quantity.

4 This larger requirement of 2,490 acre-feet,
5 which represents about 1,540 gallons per minute
6 for the coal fired electricity generating system,
7 they would have to come to the nearest major
8 source of water, which would be down to the
9 Wind River and through wells like Pilot Butte,
10 pumping underflow. I would envision a similar --
11 a similar type of setup as at the Pilot Butte oil
12 field for that.

13 And let me just add one thing here. The
14 way Pilot Butte, the way they have most of their
15 wells, they are strung out on a levy right next
16 to the river up about ten feet above normal flow
17 stage, would have a couple out on pads out on
18 the river itself. It's actually surrounded by
19 water, at least when I was there, so I would
20 envision the same type of thing in this area.

21 Q Tell me about whether you were able to find,
22 locate a source of water for the requirements
23 for the phosphate rock development?

24 A Phosphate rock development, the mine would be
25 page-direct-membrino

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5 acre-feet a year, 3 gallons per minute.
 Again, they could get it where the specific
 mine is located. I would begin to doubt that
 they couldn't get it locally there from not
 even one of the major aquifers.

* * * * *

page-direct-membrino

1 Q (By Mr. Membrino) Now, is there additional
2 processing of that phosphate rock that's required?

3 A Yeah. You have in the Riverton area here
4 phosphate rock beneficiation and acid production --
5 I'll move these numbers -- beneficiation re-
6 quires 425 acre-feet per year, which you're
7 looking at 260 gallons a minute.

8 THE SPECIAL MASTER: Isn't this repetitious?
9 Wasn't this just given a few minutes ago?

10 MR. MEMBRINO: I apologize for that, Your
11 Honor. What I would like to get as is whether
12 or not you have been able to locate and where
13 you were able to identify sources of water that
14 would meet these requirements.

15 THE WITNESS: Well, essentially in the
16 Riverton area it's the Wind River Formation
17 as your groundwater source for both -- for
18 these phosphate rock beneficiation and acid
19 production.

20 Q Okay. So maybe to speed this along, generally
21 you were able to identify water sources for
22 all the mineral and resource developments de-
23 picted on the map?

24 A Those that I was requested to do that weren't
25 page-direct-membrino

1 being served by surface water.

2 Q Okay, thank you.

3 Mr. Page, have you a total, by the way,
4 of the water requirements for all these develop-
5 ments?

6 A Have I totaled them?

7 Q Yes.

8 A No, I haven't personally totaled them.

9 Q Thank you. Just to recapitulate, then, all of
10 these exhibits were prepared; that is WRIR C-32,
11 C-33, C-33-A and 33-B were all prepared by you
12 under your supervision?

13 A Yes.

14 THE WITNESS: May I talk to Counsel for
15 just a second? We left off one. I'm sorry.

16 Q (By Mr. Membrino) We left off one exhibit?

17 A No, one mineral that I just realized.

18 Q I'm sorry. Please elaborate.

19 A Okay. I wasn't sure. We have the coal deposits
20 and in situ gasification down at Alkali Butte.
21 We talked about the coal up here (indicating),
22 and I forgot to go down there. In that case
23 we are looking at groundwater and we have
24 aquifers available there, the Wind River,

25 page-direct-membrino

1 Fort Union, Lance and Mesaverde Formations
2 are present in that region there, and that
3 would be the source of water.

4 Q Source of water?

5 A Yeah. I think that covers it all.

6 THE SPECIAL MASTER: Let me ask a question,
7 please. You testified, among other things, that
8 there were examples of water wells going to
9 the Frontier Formation.

10 THE WITNESS: That's correct.

11 THE SPECIAL MASTER: And drawing comparatively
12 modest amounts of water, even though it is not
13 marked as one in blue on C-32, is that correct?

14 THE WITNESS: That's correct.

15 THE SPECIAL MASTER: How many other similar
16 formations, for example, the Cody Shales or the
17 Popo Agie Formations down in the Triassic,
18 how many other formations are there under this
19 Reservation that may hold water which there
20 is a proof like that Frontier well?

21 THE WITNESS: Essentially all of them. If
22 you -- we refer to this table here (indicating)
23 where we have table one.

24 MR. WHITE: Your Honor, I would object to
25 page-direct-membrino

1 the witness testifying from the table. It is
2 not in evidence.

3 THE SPECIAL MASTER: 31-A is in evidence.
4 31 table --

5 MR. WHITE: No, it's not, Your Honor.

6 THE SPECIAL MASTER: I guess it isn't.
7 It has been offered, but not received.

8 THE WITNESS: Anyway, I don't have to refer
9 to it.

10 THE SPECIAL MASTER: All right.

11 THE WITNESS: To my knowledge, other deep
12 penetrating these formations at greater depth
13 than the Reservation, I would -- there may be
14 a few others, but I'm not aware of them, but
15 penetrating at great depth.

16 I know the Frontier. Usually the wells,
17 they were not water wells drilled to the
18 Frontier, they have an oil well or plugback
19 oil well.

20 THE SPECIAL MASTER: That brought in water?

21 THE WITNESS: Yes, or the oil-producing
22 zone below maybe is not sufficient and they
23 need water so they plugged off the oil producing
24 zone and they had water they needed.

25 page-direct-membrino

1 Now, these formations that you mentioned
2 where you see them outcropping, and we won't
3 go into the detail of each color, but the other
4 colors other than that yellow and dark brown in
5 that south corner there where there is out-
6 cropping or where they're at shallow depths --
7 well, I don't need the exhibit -- where they
8 are at shallow depth underlying by, say, the
9 glacial deposits, where they join the Wind River,
10 where you have overlaps, you have stock wells.
11 Some domestic wells, quite a few of those wells
12 in sort of the range type area are penetrating
13 these formations, including the Cody Shale,
14 which you say is a shale, is not a water-bearing
15 aquifer, but it will give a few gallons a minute
16 which is sufficient for stock.

17 THE SPECIAL MASTER: Would that be true
18 also of the Indian Meadows Formation and other
19 similar formations where they come near the
20 surface?

21 THE WITNESS: That is true for these other
22 formations near the surface. The only possible
23 exceptions are up in the northwest corner of
24 the Reservation where some of these formations,

25 page-direct-membrino

1 some of these formations lie well above, and
2 their topographic highs I think would be
3 drained. They may have permeability properties.
4 Even in that case, you would be looking at
5 getting a few gallons per minute out of them.
6 It's just that, for instance, the Indian
7 Meadows are something they have a lot of sands
8 and gravels that if they were saturated would
9 give more significant yields.

10 THE SPECIAL MASTER: Let me ask one more
11 question, which is my obsession. In your
12 studies on this Reservation and of its water
13 resources and all to which you have testified,
14 have you any knowledge whether or not surface
15 characteristics would allow the construction
16 of key dams or the impoundment of surface water
17 that could be engaged in beneficially and store
18 water in sizeable quantities?

19 THE WITNESS: I didn't look into that or
20 investigate it.

21 THE SPECIAL MASTER: Okay, thank you.

22 (CONTINUED) DIRECT EXAMINATION

23 BY MR. MEMBRINO:

24 Q I will refer you, Mr. Page, then to U.S. Exhibit
25 page-direct-membrino

1 WRIR C-31-A. This was -- was this prepared by
2 you?

3 A Yes, it was.

4 Q Is it the product of your research?

5 A It is essentially abstracted from the sources
6 listed below. The final column called Develop-
7 ment Potential was general conclusions reviewing
8 this other information. But the information
9 was abstracted from these various sources with
10 the bulk of the information in a similar table
11 to this -- the first reference, U.S. Geological
12 Survey Water Supply Paper 1576-I is just this
13 presents a synopsis of the groundwater resources
14 on the Reservation.

15 Q And as to the other tables in the exhibit,
16 they're also your work product?

17 A Well, table two, the well yields, that was --
18 except for those with asterisks -- I mean, the
19 preparation of the table was my work. The well
20 yields, except those with the asterisks which
21 I indicated were from the U.S. Geological
22 Survey, are all of my research.

23 Table three, that's from Dornbusch and
24 Associates.

25 page-direct-membrino

1 Q And table four?

2 A Table four, the first four columns are
3 essentially from Dornbusch and Associates.
4 The fifth and sixth columns are from me.

5 Q Is this information either prepared by you or
6 your staff or derived from sources; for example,
7 the USGS or Dornbusch and Company, the kinds
8 of information you ordinarily rely on in
9 carrying out your professional responsibilities?

10 A Yes.

11 Q And does this exhibit accurately express that
12 information?

13 A Just a moment, please.

14 (Brief pause.)

15 Yes, to the extent other than the infor-
16 mation provided by Dornbusch and Associates,
17 which I did not generate, did not research and
18 I won't speak for that, they can speak for it,
19 but the well yields, this summary sheet and my
20 contribution to table four, yes.

21 Q But even as to the work provided by the Dornbusch
22 Company, that is something that you as an
23 expert ordinarily rely on in your work, that is
24 the work product?

25 page-direct-membrino

1 A Yes, as qualified consultants. Yes, I do.

2 Q Thank you.

3 Now, I turn your attention to the WRIR C-32.

4 This exhibit was prepared by you?

5 A That's correct, under my supervision.

6 Q And it accurately depicts the information

7 contained on it?

8 A Yes.

9 Q It's something you would rely on in carrying
10 out your professional responsibilities?

11 A Yes.

12 Q I'll turn now to U.S. Exhibit WRIR C-33 and
13 ask you the same. Did you prepare that exhibit?

14 A That's the geologic map?

15 Q That's correct.

16 A I didn't prepare it. The map itself is prepared
17 by the U.S. Geological Survey.

18 Q Did you make any alterations on that map?

19 A No, I did not.

20 Q Is that the kind of map you ordinarily rely
21 on in carrying out your responsibilities?

22 A Yes.

23 Q Turning to U.S. Exhibit WRIR C-33-A, you prepared
24 that exhibit?

25 page-direct-membrino

- 1 A Yes, or it was prepared under my direction.
- 2 Q Based on the information from the Dornbusch
- 3 Company?
- 4 A That's correct.
- 5 Q Is the kind of information the Dornbusch
- 6 Company provided you ordinarily relied upon in
- 7 your work?
- 8 A Yes.
- 9 Q I'll ask you the same question now of WRIR
- 10 C-33-B. Was that exhibit prepared by you?
- 11 A Under my direction, yes.
- 12 Q Under your direction. And the source of that
- 13 information?
- 14 A Dornbusch and Associates, with the exception
- 15 of the gallon per minute number, the gallon
- 16 per minute requirements.
- 17 Q Which were your addendum?
- 18 A That was correct.
- 19 Q Does the -- this is the kind of information
- 20 you would ordinarily rely on in carrying out
- 21 your work?
- 22 A That is correct.
- 23 Q Do WRIR C-33-A and B accurately depict the
- 24 information intended to be displayed on them?
- 25 page-direct-membrino

1 A That's correct.

2 MR. MEMBRINO: At this time, Your Honor,
3 I move the admission into evidence of U.S.
4 Exhibit WRIR C-33-A, WRIR C-32, WRIR C-33,
5 WRIR C-33-A and WRIR C-33-B.

6 THE SPECIAL MASTER: Don't you want 31-A
7 included?

8 MR. MEMBRINO: I said that at the top.

9 THE SPECIAL MASTER: All right. You want
10 31-A, 32, 33, 33-A and 33-B, is that true?

11 MR. MEMBRINO: That's right.

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1 MR. WHITE: Your Honor, maybe the witness
2 could take a short break from the stand while I
3 get ready for voir dire on the exhibit.

4 THE SPECIAL MASTER: Well, it's fifteen
5 to twelve --

6 MR. WHITE: I would just as soon go
7 ahead.

8 THE SPECIAL MASTER: Do you want to take
9 a five-minute break?

10 Go ahead, Regina.

11 MS. SLEATER: If I could request that
12 we break for lunch at this time.

13 THE SPECIAL MASTER: Do you want to
14 break for lunch at this time?

15 MS. SLEATER: Yes, I have a previous
16 commitment.

17 THE SPECIAL MASTER: Well, in that
18 event, we will break for lunch and be back at
19 1:15 if that sounds agreeable, and we will take
20 the fifteen minutes on the other end of the
21 lunch hour.

22 We'll recess until 1:15, and we have not
23 yet admitted the exhibits and we will reconvene
24 at 1:15.

25

(Thereupon a lunch break was
(taken from 11:45 a.m. until
1:15 p.m.)