
IN RE: NON-BINDING ARBITRATION PURSUANT TO THE FINAL
SETTLEMENT STIPULATION, KANSAS v. NEBRASKA and COLORADO
No. 126 Original, U.S. Supreme Court

TRANSCRIPT OF ARBITRATION PROCEEDINGS
before
KARL J. DREHER, ARBITRATOR

Wednesday, March 11, 2009

VOLUME III

BE IT REMEMBERED that the above-entitled matter came on
for Arbitration before KARL DREHER, Arbitrator, held at
Byron Rogers Building, 1929 South Street, Room C-205,
Denver, Colorado on the 11th day of March, 2009.

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1 P R O C E E D I N G S

2 ARBITRATOR DREHER: Good morning.

3 We're all ready to begin the third day of
4 the hearing in this Nonbinding Arbitration. We're
5 beginning at about 8:20 or so.

6 Before we start with Kansas' rebuttal case,
7 after thinking about the exchange yesterday on the
8 various accounting issues, I would like to have both
9 Kansas and Nebraska submit to me the spreadsheets that
10 were used to do the calculations that were set forth in
11 their respective expert report.

12 So in the case of Kansas, what I am looking
13 for is the spreadsheets that would be necessary for me
14 to essentially walk through all of the calculations that
15 the results of which were presented in the report titled
16 "Engineering Analysis of Losses to Kansas Water Users
17 Resulting From Overuse of Republican River Supply in
18 Nebraska."

19 And, again, I'm not asking for anything
20 new, I'm asking for what -- you know, what was used to
21 actually make the calculations that are reported in this
22 report.

23 And then similarly for Nebraska, I would
24 like to get the spreadsheets, I assume that there are
25 spreadsheets that were used to determine the results

1 that are set forth in the report titled "Review of the
2 20 January 2009 Report Prepared by Spronk Water
3 Engineers for the State of Kansas."

4 And my reasoning for doing that is it's
5 another way to evaluate the thinking that was behind the
6 various approaches that were used, so I would appreciate
7 getting -- I don't know how long that will take.

8 My understanding is that the States would
9 submit what they would propose to submit to me, first to
10 each other; and then once they're in agreement, then
11 they could be submitted to me. From my perspective, the
12 sooner the better.

13 So if this could be done in the week
14 following the conclusion of this hearing, that would be
15 great. If it takes a little longer than that, I
16 understand, but I would like to get started going
17 through that.

18 I assume that that's going to be
19 acceptable.

20 MR. DRAPER: That is acceptable, I think,
21 to the three states.

22 MR. BLANKENAU: Mr. Groff actually
23 approached me, indicated we had already provided that
24 information to the parties. He handed me a CD with it;
25 but before I hand it over to you, I'll make sure that

1 both of the States are comfortable with that.

2 MR. DRAPER: Well, I think we -- as we
3 agreed earlier, we should confer in advance of providing
4 the information; and so if you could hold off, at least
5 until we have a chance to talk together, I would
6 appreciate that.

7 MR. BLANKENAU: Absolutely.

8 ARBITRATOR DREHER: All right.

9 With that, Mr. Draper, you can begin your
10 rebuttal.

11 MR. DRAPER: Thank you.

12 Your Honor, I just might mention, for the
13 record, our conversation with counsel and you prior to
14 going on the record about our arrangements that we're
15 trying to work out with the Bureau of Reclamation
16 witnesses.

17 Our hope at this point -- we need to
18 contact the Bureau about the specific proposal -- is
19 that, given the fact that the Bureau witnesses are not
20 available until April 6, that we would endeavor to go to
21 McCook and take their deposition on April 7 and would
22 ask them to come down here to Denver a week later, say
23 the 14th, to present testimony in a supplemental date
24 hearing, which could also include closing arguments by
25 the States.

1 And in conjunction with that, we would like
2 to move our date for submitting posttrial briefs to you
3 back one week so that it wouldn't be due in the same
4 week as the final trial date.

5 So we'll check with the Bureau about that
6 and be back in touch as soon as we have some
7 confirmations.

8 ARBITRATOR DREHER: All right, thank you.

9 MR. DRAPER: We would call as our first
10 witness on rebuttal Mr. David Barfield.

11 ARBITRATOR DREHER: Good morning,
12 Mr. Barfield.

13 THE WITNESS: Good morning.

14 DAVID W. BARFIELD,
15 having been first duly sworn, was examined and testified
16 as follows:

17 DIRECT EXAMINATION

18 BY MR. DRAPER:

19 Q. Please state your full name, professional
20 position and address for the record.

21 A. Sure. My name is David W. Barfield. I am
22 Chief Engineer with the Division of Water Resources,
23 Kansas Department of Agriculture, which is at 109
24 Southwest 9th Street in Topeka, Kansas.

25 Q. Mr. Barfield, are you a member of the

1 Republican River Compact Administration?

2 A. I am. I am Kansas Commissioner.

3 Q. And have you been, prior to that, the
4 Kansas representative on the, I'll use "RRCA" for short
5 for the Republican River Compact Administration, of the
6 RRCA Engineering Committee?

7 A. Yes, I was, starting in 1994.

8 Q. I would like to ask you a couple of
9 preliminary questions. You will be back to testify
10 later, but there were some questions that were asked by
11 the Arbitrator.

12 And I would, therefore, ask that you
13 explain for the Arbitrator the precise status of the
14 agreement of the States and acceptance by the RRCA of
15 the Compact accounting for the years in question here,
16 which are 2005 and 2006.

17 And in aid of your response to the
18 question, I have provided you and the States and the
19 Arbitrator with what we have marked as Kansas Exhibits
20 48 and 49; if you would please explain the answer to my
21 question and also what those two exhibits consist of.

22 A. Right. Well, Exhibit 48 is the first one,
23 John?

24 Q. Yes.

25 A. And that's the 2006 Annual report?

1 Q. Yes.

2 A. Right. Yes, I thought I would just use
3 excerpts from this report to just tell you the status of
4 this matter.

5 On page 7 of the 2006 Annual Report in
6 which the 2005 accounting was compiled and presented by
7 the Engineering Committee, under the "Engineering
8 Committee Report" on page 7, it basically discusses the
9 status of that accounting.

10 Under the second assignment at the bottom
11 of page 7 there, and it basically says that the
12 Engineering Committee, you know, compiled all the data
13 necessary to develop the accounting and exchanged that
14 data. Pursuant to the FSS and its accounting
15 procedures, developed and ran the RRCA Groundwater Model
16 and developed, actually, two separate accountings in
17 this case as there was a dispute that arose in the
18 committee in this year with respect to non-Federal
19 reservoir evaporation for Harlan County. The State of
20 Nebraska believed that that should not be included in
21 the accounting, due to the language in the FSS.

22 And so the Engineering Committee's response
23 was to develop two accountings based upon the input data
24 and the model runs: One under Nebraska's interpretation
25 that non-Federal reservoir evaporation below Harlan

1 County should not be included and one including all
2 non-Federal reservoir evaporation. And the committee
3 presented those two accountings to the administration.

4 And on the top of page 8, toward the end of
5 that discussion, the committee said, "The Committee
6 requests the Administration determine which of these two
7 accountings should be considered in the final
8 accounting." So the committee presented two accountings
9 to the Administration under the two interpretations and
10 said, When the administration determines which
11 interpretation on one issue in dispute was the right
12 interpretation, then we would have the final accounting.

13 Just one more comment, you know, the 2003
14 accounting and 2004 accounting were adopted without any
15 dispute, so this is the first time we had a dispute.

16 So that is the status of the accounting. I
17 think -- yeah, I'll leave it at that.

18 Q. So to summarize with respect to 2005, the
19 first year --

20 A. Right.

21 Q. -- at issue here, the Compact accounting is
22 agreed, except for the issue of whether non-Federal
23 reservoir evaporation should be included or not?

24 A. That's correct. On page 9, you know, the
25 Administration accepted the Engineering Committee

1 report. It states, "Commissioner Bleed moved to accept
2 the Engineering Committee Report which includes two sets
3 of accountings dependent on the non-Federal reservoir
4 evaporation below Harlan County," and then it was
5 accepted. So it's my view that, once the issue is
6 decided, we have -- you know, we have a final
7 accounting.

8 ARBITRATOR DREHER: Mr. Barfield, but that
9 decision, that has not been decided. I mean, I've told
10 the States what I think, but the RRCA has not finally
11 decided that issue; is that correct?

12 THE WITNESS: That's correct. There has
13 been no subsequent action on this matter by the
14 Administration.

15 Q. (BY MR. DRAPER) And then with respect to
16 the year 2006?

17 A. Right. And again, I would refer here to --
18 what is the exhibit number, John?

19 Q. That's Kansas Exhibit 49.

20 A. Kansas Exhibit 49, which is excerpts from
21 the Annual Report of the Compact Administration for the
22 year 2007 when we were dealing with the 2006 accounting.

23 Once again, the Engineering Committee was
24 assigned by the Administration to complete an accounting
25 for the 2006 year and, again, it was the second

1 assignment that was provided to the Engineering
2 Committee. Page 9 of the Annual Report discusses the
3 Engineering Committee's work on developing that
4 accounting.

5 And let me just read the pertinent section.
6 Starting the third full paragraph, it states, "The
7 second assignment was to complete the accounting for
8 2006 using preliminary information provided by April 15,
9 2007 and the final exchange by July 15, 2007. As per
10 the settlement's requirements, each state exchanged its
11 model data sets and supporting data and other accounting
12 data by April 15 or shortly thereafter. The states
13 exchanged final model sets and supporting data by July
14 15 or shortly thereafter." It goes on to discuss a
15 minor error that was found.

16 The next paragraph, I think, essentially
17 gives the final status. It states, "The 2006 model
18 input and accounting data is considered final. The
19 accounting for the virgin water supply, the computed
20 water supply, and the beneficial consumptive uses in the
21 Republican River Basin were not completed due to
22 disputes regarding the following matters." Again,
23 non-Federal reservoir evaporation below Harlan County;
24 division of evaporative charges from Harlan County Lake
25 for 2006, and c) while Nebraska believes the current

1 method of model runs properly calculates the mound
2 credit, it believes it improperly includes, in its
3 consumptive use computation, some consumption of the
4 imported water.

5 So no final accounting was developed by the
6 committee and none was presented to the Compact
7 Administration. What was agreed to by the Engineering
8 Committee and provided to the Administration was the
9 final model run results and all the accounting input
10 data was considered final by the committee, but no final
11 accounting was developed by the committee.

12 MR. DRAPER: I have no further questions.

13 ARBITRATOR DREHER: All right.

14 Nebraska, do you have any questions for
15 this witness?

16 MR. DRAPER: Actually, if I may, I forgot
17 one, more or less, housekeeping matter, if I may.

18 ARBITRATOR DREHER: Please.

19 Q. (BY MR. DRAPER) I wanted to ask the witness
20 to identify Kansas Exhibit 21, which is in the
21 compendium for the record.

22 A. Right. It's basically a set of letters
23 that the Compact commissioners received from the Bureau
24 of Reclamation with respect to their determination of
25 the Harlan County Lake water supply calculations

1 pursuant to the Final Settlement Stipulation. The
2 Bureau is asked to make these computations.

3 John, did you have something?

4 Q. I just wanted to be sure everybody had a
5 chance to find that set of documents in their stack of
6 exhibits.

7 If you could again summarize what this
8 exhibit contains.

9 A. Right. Well, pursuant to the FSS, the
10 Bureau each month, starting in October, makes a
11 computation of the water supply that they anticipate to
12 be available from Harlan County Reservoir for that year.

13 The FSS has water-short year provisions and
14 it's dependent upon this calculation. It's considered
15 final in the end of June of each year, but the Bureau
16 provides these monthly estimates of their expected water
17 supply calculation every month, starting in October, so
18 the States can sort of plan accordingly.

19 MR. DRAPER: Okay. With that, I have no
20 further questions.

21 ARBITRATOR DREHER: Okay.

22 Nebraska, do you have any questions for
23 this witness, Mr. Wilmoth?

24 MR. WILMOTH: We do. Pete, do you have?

25 MR. AMPE: I do not.

1 CROSS-EXAMINATION

2 BY MR. WILMOTH:

3 Q. Good morning, Mr. Barfield.

4 A. Good morning.

5 Q. This is the third time in a month I think
6 we've spent together.

7 A. That's right.

8 Q. I will hand you what I will mark as
9 Nebraska Exhibit 14.

10 Mr. Barfield, were you in attendance
11 yesterday during the depositions -- I'm sorry, during
12 the testimony?

13 A. I was here parts of the day and not all
14 day.

15 Q. Which portions did you attend?

16 A. I wasn't here for the economist, but I
17 think I was here for the rest of the day, the afternoon
18 session, for the most part.

19 Q. Are you familiar with the concept in this
20 damages component of indirect impacts?

21 A. Well, I really haven't been involved in
22 that part of our case. So, no.

23 Q. Are you aware that Kansas is claiming an
24 entitlement to damages for indirect impact?

25 A. Yes.

1 Q. And suffice to say that there was some
2 testimony yesterday that the indirect effects of any
3 direct economic impact and the potential benefit of any
4 damage payment would depend on how money was spent.

5 Does that seem reasonable?

6 A. Well, I was not here for that testimony,
7 but I know we're claiming indirect effects damages.

8 Q. I would like to talk to you about this
9 document in front of you.

10 Before we get to that, though, when did you
11 first send the demand letter associated with this
12 process to the State of Nebraska?

13 A. December 19, 2007.

14 Q. And for the record, could you identify this
15 document?

16 A. This document in front of me?

17 Q. Yes.

18 A. It is dated January 31, 2008. It's
19 testimony to the Kansas House Agricultural Natural
20 Resources Committee on a substitute for Senate Bill 89
21 on the disposition of moneys recovered from Republican
22 River Compact litigation.

23 Q. So this document is about -- this is
24 testimony you provided; is that correct?

25 A. Yes.

1 Q. So am I correct that about 40 days after
2 you sent the demand letter initially, you were in front
3 of the legislature testifying on how the funds from this
4 proceeding might be spent?

5 A. Yes.

6 Q. And what is the sum and substance of your
7 testimony in this paper?

8 A. Well, House -- substitute for Senate Bill
9 89 was actually -- this legislation carried over from
10 the previous year when the legislature also considered
11 the same subject. It's legislation that was modeled
12 after a similar provision on recovery of Ark River money
13 where the legislature decided in advance before any
14 moneys were going to be recovered what might happen to
15 that money.

16 So as the anticipation that there may be
17 money coming from the Republican River matter, as that
18 began to be talked about among the legislature, they
19 decided again that they needed to pass legislation to
20 determine what should happen to that money. And they
21 considered in the 2007 legislative session and did not
22 get the consensus. And so the Senate initiated the
23 process in 2008.

24 And so --

25 Q. This process was actually begun in 2007,

1 before the demand letter was sent?

2 A. That's my recollection, yes. They
3 considered the matter over two different sessions.

4 Q. And there are three -- I would direct your
5 attention, excuse me, to the third paragraph of the
6 first page of this document.

7 It appears that there are three separate
8 funds that are listed in here. Could you identify each
9 of those and explain them.

10 A. Right.

11 So the substitute for Senate Bill 89 that
12 the House was considering at this time anticipated three
13 different funds where damage money would be deposited.

14 The first was an Interstate Water
15 Litigation Fund. The second is Republican River Compact
16 Compliance and Enforcement Fund. And the third is a
17 Republican River Water Conservation Project Fund.

18 The litigation fund already exists. That
19 was created and funded initially from the Ark River
20 statute that I referenced earlier that this was modeled
21 after.

22 Q. Can any money in that fund prior to the
23 passage of SB89 be spent on the Republican River
24 litigation?

25 A. Yes.

1 Q. Do you have any idea what the approximate
2 value of that fund was when this letter -- or I'm sorry,
3 when this testimony was provided?

4 A. Well, approximately \$20 million was put
5 into the fund as a result of the Ark River litigation.
6 Essentially, the legislature determined that the cost of
7 the Ark River litigation was the proper amount for the
8 Interstate Water Litigation Fund.

9 And, you know, I don't know the exact
10 amount that resides, still in there. It was over
11 15 million still resided in there -- I don't know the
12 exact amount -- at the time of this testimony.

13 Q. And that Interstate Water Litigation Fund,
14 that, I infer, can be spent on litigation in any part of
15 Kansas or any interstate river, I suppose?

16 A. Yes. It has to be an interstate, or I
17 think there was also the expectation it might be used
18 for tribal disputes, as well.

19 Q. Involving the State of Kansas, I assume?

20 A. Involving the State of Kansas.

21 So it could be any of our compacts, tribal
22 matters, Missouri River disputes. I think those are the
23 main things.

24 Q. And there was a Republican River Compact
25 Compliance and Enforcement Fund mentioned in that

1 paragraph. Could you identify and explain that fund?

2 A. Yes. I think ultimately this was not
3 included in the final legislation that was passed; but
4 it was anticipated that a small amount of money, or
5 5 percent, I think, might go into this fund to be used
6 for my office and others that are responsible to monitor
7 compliance and that sort of thing.

8 Q. And I believe you said that was not
9 provided for in the final bill; is that correct?

10 A. That's my recollection, that was not
11 included in the final bill.

12 Q. Was the Interstate Water Litigation Fund in
13 the final bill?

14 A. Yes.

15 Q. And was this Republican River Water
16 Conservation Projects Fund, the third fund referenced,
17 included in the final bill?

18 A. It wasn't called that. In the final bill,
19 there was actually -- essentially two funds, one for the
20 Upper Basin and one for the Lower Basin, were created
21 depending upon where moneys were received.

22 Q. That's the Republican Basin?

23 A. Right, right.

24 Q. And what is nature of that fund? What are
25 the kinds of projects that are contemplated?

1 A. Essentially, water conservation projects,
2 you know. Might be expanding storage, it might be
3 different works to improve and make more efficient use
4 of the waters, canal lining, you know. Installing more
5 efficient irrigation systems. Anything that we could do
6 to make better use of our water supply or limited water
7 supply.

8 There is a process that those funds could
9 be considered and potentially funded.

10 Q. Those projects, though, were within the
11 Republican River Basin, either Upper or Lower portion?

12 A. That's correct. Actually, let me correct
13 that.

14 In the Ark River litigation, two-thirds of
15 it was to be funded in the affected basin and one-third
16 went to the State Water Plan for statewide use.

17 Q. And is that consistent with the structure
18 of this bill as finally passed?

19 A. You know, I would have to review the final
20 bill. I believe that's the case.

21 Q. If I understood you correctly, some
22 component would be in the basin and some component would
23 be for statewide water?

24 A. Right. And the majority was for use in the
25 basin.

1 The bill went through a lot of different
2 gyrations over the course of the legislature. It was a
3 very interesting bill.

4 Q. They often do, don't they?

5 A. They do, yes.

6 Q. And are these funds -- aside from the
7 Interstate Water Litigation Fund, are the others funded
8 currently?

9 A. No.

10 Q. In other words, do they have moneys in them
11 for prosecution?

12 A. No, they do not have moneys in them.

13 Q. And is it true that, either the
14 establishment or the implementation of these funds
15 depends entirely on the success or lack thereof of
16 Kansas in this proceeding?

17 A. Yes.

18 Q. And they're not independently funded; there
19 is no backup funding?

20 A. No.

21 Q. One of the things that you sought in your
22 demand letter of December 19, 2007, I believe, was
23 attorneys fees; is that correct?

24 A. That's correct.

25 Q. I don't intend to ask you the dollar figure

1 expended to date, but the relevant question is whether
2 or not your attorneys are working on a contingent basis
3 or not.

4 Do you know the answer to that question?

5 A. I don't.

6 Q. What is the current state of the Kansas
7 budget?

8 A. The Kansas budget. Well, we have -- for
9 fiscal year '09, are -- we currently, we go on a fiscal
10 year that goes July 1 to June 30 each year, so we're in
11 fiscal year '09. So, you know, we've had some budget
12 reductions that we each have had to take as agencies
13 that have been challenging, but we've been able to get
14 through that.

15 Q. Do you know what the statewide budget
16 deficit is in Kansas?

17 A. Well, we don't have a budget deficit. We
18 are required to operate with reserve funds. You know,
19 the legislature has, you know, essentially made some
20 determinations as to our final '09 budgets, which
21 involve some reductions in budgets and they're currently
22 in the process of developing the fiscal '10 budget.

23 Q. How has that affected your statewide water
24 planning projects?

25 A. I don't know of any effect. Can you be

1 more specific?

2 Q. Has the Kansas Department of Water
3 Resources budget been reduced this year?

4 A. Yes, it has.

5 Q. Has the Kansas Water Office been reduced
6 this year?

7 A. It has. Something in the order of 5 to
8 10 percent, something in that range.

9 Q. And has that affected the statewide water
10 planning that they typically do?

11 A. Not to any significant extent, I think,
12 yes. We're still doing the business we normally do.
13 There are certain, you know, positions that are being
14 held open and certain things that we're foregoing; but
15 we've been able to get by fairly well to date, I think.

16 MR. WILMOTH: That's all we have.

17 Thank you very much, Mr. Barfield.

18 ARBITRATOR DREHER: Mr. Wilmoth, do you
19 intend to introduce this as an exhibit?

20 MR. WILMOTH: I do, but I thought I would
21 wait until the redirect was finished.

22 ARBITRATOR DREHER: Mr. Draper, redirect?

23 MR. DRAPER: Can we take our customary
24 couple of minutes before redirect?

25 ARBITRATOR DREHER: Certainly, certainly.

1 (Break was taken.)

2 ARBITRATOR DREHER: Mr. Draper, you may
3 proceed.

4 MR. DRAPER: Actually, we have no further
5 questions of Mr. Barfield.

6 ARBITRATOR DREHER: Okay.

7 MR. WILMOTH: In that case, Mr. Arbitrator,
8 we would move the admission of Nebraska Exhibit, I
9 believe it's 14.

10 ARBITRATOR DREHER: Any objection?

11 MR. DRAPER: No objection. And we would
12 move the admission of the three exhibits that were
13 identified by Mr. Barfield. Those are Kansas Exhibits
14 48, 49 and 21.

15 MR. AMPE: No objection to either.

16 MR. WILMOTH: No objection.

17 ARBITRATOR DREHER: All right. They are
18 admitted.

19 (WHEREUPON, Nebraska Exhibit 14 and Kansas
20 Exhibits 21, 48 and 49 were admitted into evidence.)

21 MR. DRAPER: Your Honor, we would call as
22 our next rebuttal witness, Mr. Dale Book.

23 ARBITRATOR DREHER: Mr. Book, you're still
24 under oath.

25 DALE BOOK,

1 having been previously sworn, was examined and testified
2 as follows:

3 DIRECT EXAMINATION

4 BY MR. DRAPER:

5 Q. Mr. Book, good morning.

6 A. Good morning.

7 Q. In the course of the testimony on the
8 responsive case, there have been questions raised
9 concerning the transit losses in the Courtland Canal
10 between Guide Rock and the stateline.

11 Have you done a comparison of the positions
12 of the parties on this issue?

13 A. Yes, I have.

14 Q. Is that what has been marked as Kansas
15 Exhibit 53?

16 A. Yes, it is.

17 Q. What is the title of Kansas Exhibit 53?

18 A. Courtland Canal Transit Loss Guide Rock to
19 Stateline.

20 Q. Is that a one-page table?

21 A. Yes, it is.

22 Q. Would you explain what this table contains
23 and what significance it has for this proceeding.

24 A. Yes. I've got a compilation of the annual
25 totals and the two-year totals for several components of

1 the water budget between the Guide Rock diversion and
2 the stateline gage on the Courtland Canal, which is
3 referred to here as the stateline.

4 In the first block of information, I have
5 the actual historical diversions on an annual basis,
6 which shows approximately 49,000 in '05 and 50,000 in
7 '06 as the Guide Rock diversion. And then the
8 stateline -- the corresponding stateline flow for those
9 two years with the resulting loss and the percentage of
10 loss for each of those two years.

11 The losses of actual diversions, based on
12 what occurred, was 26 percent in '05 and 24 percent in
13 '06.

14 Below that, I have included a tabulation of
15 the summary of the results from the Flatwater analysis,
16 which shows both the increases in flow calculated by
17 Mr. Groff for each year, as well as the resulting total
18 flows.

19 The increased flow reduction between Guide
20 Rock and stateline for each of those two years was
21 16 percent. This compares with a longer-term average
22 annual loss rate derived in the Flatwater report of
23 14 percent. The average loss that I had testified to
24 out of my report over a longer period of time was
25 12.9 percent, which is fairly close to the 14 percent.

1 The reason the 16 percent values are
2 higher, in my opinion, is because of the monthly
3 distribution that Nebraska chose to use, which resulted
4 in slightly higher loss factors for this incremental
5 flow.

6 Below the increased flow, I then tabulated
7 the total -- the resulting totals of both Guide Rock and
8 stateline with the resulting loss percentage. And this
9 is a combination of the increased flow and the actual
10 historical flow from above, which reflects losses
11 resulting in the Flatwater analysis of 19,000 acre-feet
12 in 2005 and 16,100 acre-feet in 2006. Those percentages
13 are 21 percent respectively of the Guide Rock diversion.

14 For comparison purposes, then, I've added a
15 block of data at the bottom of this chart. It's under a
16 heading entitled "Required at Guide Rock for Kansas
17 Stateline with 12.9 percent Canal Loss."

18 The canal loss -- the physical canal loss
19 that I had tabulated from the record and testified to
20 was 12.9 percent.

21 What I have done in this block of
22 information is taken the additional stateline flow from
23 my analysis and combined that with the historical to
24 compute the adjusted stateline flow for my analysis and
25 then calculated the loss at 12.9 percent. And for those

1 two years, for those amounts respectively are about
2 11,400 acre-feet and 10,600 acre-feet.

3 Assuming that level of canal loss, that
4 would result in a total required water at Guide Rock
5 diversion at the river of approximately 170,000
6 acre-feet, which is 70,600 acre-feet in excess of what
7 was historically diverted, which is shown at the very
8 top of the chart.

9 Q. And what conclusions do you draw from the
10 comparisons that you have put in this table?

11 A. I draw two conclusions. First is that the
12 transit loss -- the incremental transit loss being
13 assessed by Nebraska in their analysis to convey water
14 between the Guide Rock diversion at the river and the
15 stateline is excessive when it's compared to a
16 historical canal loss for a more normal water supply.
17 That's indicated by the composite 21 percent values in
18 each of the two years.

19 And also that the amount of water that
20 would have been available at the Guide Rock diversion
21 would have been sufficient to supply the stateline flows
22 that Kansas is using when you use a 12.9 percent transit
23 loss, which is the historical average for this reach of
24 canal.

25 Q. Let me turn your attention now, if I may,

1 to Kansas Exhibit 54. What is that exhibit?

2 A. Kansas Exhibit 54 is a set of charts that I
3 prepared. The second page includes the summary of
4 records that provides the backup for what is plotted on
5 the front page.

6 The purpose of this exhibit is to provide a
7 comparison between the results of the Kansas analysis
8 and the Nebraska analysis for the two years combined,
9 '05 and '06. I show several historical totals on the
10 graph page.

11 First, I show the historical '05 and '06
12 for flows that actually occurred. Then I show the
13 historical average for '94 to '07, and then I compare
14 that with the results for the Kansas analysis and the
15 Nebraska analysis, respectively.

16 One of the significant differences between
17 the Nebraska analysis and the Kansas analysis which I
18 did was the amount of conveyance or canal and lateral
19 loss within the KBID system below the stateline down to
20 Lovewell Reservoir and then in the lower system.

21 I have split the comparison between the two
22 sections, the above-Lovewell section and the
23 below-Lovewell section. I have used as a baseline for
24 the above-Lovewell section the stateline, so these
25 components are expressed as percentages of the stateline

1 flow in the Courtland Canal.

2 For the below-Lovewell section, I have
3 expressed the components as a percentage of the amount
4 of water released out of Lovewell Reservoir into the
5 lower section.

6 Q. Would you just cover, so we can make sure
7 the colors are corresponding, what each color
8 represents.

9 A. On the top set of charts, we have three
10 categories. The tan represents the farm delivery; the
11 blue represents the canal and lateral losses between the
12 stateline and the points of delivery, both to the farm
13 as well as to the Lovewell Reservoir. And the red are
14 the Lovewell inflows. On the bottom below Courtland the
15 blue is -- are the losses and the tan are the farm
16 delivery portions.

17 Q. You said "below Courtland," on the bottom
18 row, is that Below Lovewell?

19 A. Yes, that should be below Lovewell.

20 Q. And those colors represent what?

21 A. The tan on the below Lovewell are the farm
22 delivery percentages and the blue are the loss
23 percentage.

24 Q. And how does the table on the second page
25 relate to these pie charts?

1 A. I have simply provided summaries or totals
2 of the various components that are graphed on the front
3 page on the second page with the corresponding
4 percentages derived from the historical records and from
5 the results of the two analyses -- the Kansas and
6 Nebraska analysis.

7 Q. And looking at the first page, could you
8 describe what you believe is significant that is shown
9 there?

10 A. Yes. I think the significant aspect here,
11 which focuses on the difference between the two
12 analyses, is reflected in the blue percentages. The
13 resulting loss percentage for the above Lovewell is
14 reflected for both the Kansas and Nebraska analysis. In
15 the Kansas analysis, the total loss was 26 percent and
16 in the Nebraska analysis, it is 38 percent.

17 Q. How does that compare -- how do those two
18 compare with the historical?

19 A. The longer-term historical period of 1994
20 through 2007 resulted in a loss within this reach of the
21 canal of 26 percent.

22 Q. And how do the two analyses compare to that
23 historical loss figure?

24 A. Well, the analysis that I did has resulting
25 total losses that are corresponding to the average

1 losses for the '94 to '07 period. The Nebraska results
2 are somewhat higher for this section of the Courtland,
3 resulting in one of the reasons why the Nebraska
4 analysis results in less water delivered to the farm of
5 the Courtland Canal.

6 Q. And what significance appears in the bottom
7 row of the pie charts?

8 A. The resulting statistics for the below
9 Lovewell section indicates that for the two years, '05
10 and '06, the actual delivery percentage for those two
11 years was 50 percent, as compared to the more normal
12 efficiency for the longer period of 57 percent.

13 The analysis that I did actually has a
14 higher loss and lower farm delivery percentage than that
15 historical period. The farm delivery was 55 percent.

16 The Nebraska analysis was somewhat lower
17 farm delivery. The resulting delivery for their two
18 years, for the '05 and '06, which was actually very
19 close to the '05 and '06 actual efficiency, of
20 50 percent.

21 Q. Does this allow you to draw any conclusion
22 with respect to which of the approaches is preferable,
23 from an engineering standpoint?

24 A. Well, the analysis that I described was to
25 reflect the historical system efficiency for a more

1 normal water supply, and I did that by comparing the
2 losses for the total combined additional plus historical
3 to the longer-term average losses.

4 The Nebraska analysis applied average loss
5 rates to the incremental amount of water, but left the
6 larger losses for the '05-'06 period, resulting in total
7 losses that were above average for the system
8 efficiency, reflecting system efficiency in their
9 analysis.

10 And I believe it's more appropriate to use
11 the longer-term period canal system efficiency, which is
12 what I have been referring to as a more normal water
13 supply reflective of the amounts of water that we're
14 adding to the system for these two years.

15 Q. Next, I would like to ask you about what
16 has been marked as Kansas Exhibit 55. What is this
17 document?

18 A. Exhibit 55 is a two-page tabulation. The
19 first page is a summary of information for which more
20 detail is provided on the second page relating to the
21 return flows from the KBID irrigated lands and the
22 canals and lateral seepage that we had calculated was
23 available as net return flows to the Republican River
24 and the tributaries below that.

25 I prepared this exhibit to respond to your

1 request, during my direct testimony, to provide you with
2 the information on the backup for how we computed the
3 delayed return flows to the stream.

4 My understanding is I will be providing the
5 spreadsheet to you also, so you will have this in
6 electronic version.

7 But the second page shows the split that we
8 had calculated between groundwater return flows, both
9 from canal and lateral seepage, as well as from farm
10 deliveries, as well as surface return flows, which are
11 the wasteway discharges.

12 As I described in my direct testimony, I
13 used a fairly simplified lagging approach for each of
14 the two years. I split the year into two seasons and
15 simply lagged the deep percolation groundwater returns
16 back in a uniform rate over, both the irrigation season
17 and the following nonirrigation season for each year.

18 Q. Are there any special parts of that
19 analysis that need to be brought out at this time?

20 A. I don't believe so.

21 MR. DRAPER: That completes my questions of
22 Mr. Book.

23 ARBITRATOR DREHER: Okay. Cross?

24 MR. WILMOTH: Mr. Arbitrator, if you
25 wouldn't mind considering we're so far ahead of schedule

1 and we've got three new exhibits to peak at, would you
2 mind if we take a 15-minute break?

3 ARBITRATOR DREHER: No. That will be fine.

4 (Break was taken 9:13 to 9:35.)

5 ARBITRATOR DREHER: Are you ready?

6 MR. WILMOTH: Yes.

7 ARBITRATOR DREHER: All right, you may
8 proceed.

9 MR. WILMOTH: Thank you.

10 CROSS-EXAMINATION

11 BY MR. WILMOTH:

12 Q. Good morning Mr. Book.

13 A. Good morning, Mr. Wilmoth.

14 Q. A couple of quick questions to start, and
15 then I wanted to ask you about your Exhibit 54, if you
16 would like to get that handy.

17 A. Sure.

18 Q. In addition, just to speed things along, I
19 will hand Mr. Book one of Nebraska's prior exhibits. I
20 will need it back; but just for the record, I'm handing
21 Mr. Book the Flatwater Group report, which is Nebraska
22 Exhibit 8.

23 Mr. Book, do you know what Nebraska's
24 compliance point is on the river?

25 A. For the two-year test, it's at the -- at

1 Guide Rock.

2 Q. Thank you.

3 And then in the Compact, does Nebraska have
4 to stay within her allocation annually, essentially?

5 A. There is the two-year test and the
6 five-year test. And if you're in a year-end water-short
7 situation, then it's a two-year test and the two-year
8 total for average is the test for compliance comparison
9 of use of allocation.

10 Q. Thank you.

11 Your question was better articulated -- or
12 your answer was better articulated than my question was
13 phrased.

14 But there is no requirement, to your
15 knowledge, that Nebraska essentially delivered water
16 during the growing season to Kansas; is that correct?

17 A. That's correct.

18 Q. I wanted to turn your attention to Kansas
19 Exhibit 54, which is, I think, your pie charts.

20 A. Yes.

21 Q. Am I generally correct in understanding
22 that the pie chart, for example, the third one from the
23 left Kansas 2005, Kansas 2006 on the top, is that
24 generally derived from your report?

25 A. Yes.

1 Q. The Book report?

2 A. Yes.

3 Q. And Figures 2 and 3, essentially, in your
4 Book report; is that correct?

5 A. I will have to check that.

6 Q. And for the record that's, I believe,
7 Kansas Exhibit No. 1.

8 A. Well, Figure 2 and 3 in my report were
9 plots of the canal loss and lateral loss. Those don't
10 necessarily correspond directly with the results for '05
11 and '06. They reflect the results that I derived for
12 '05 and '06 from these relationship-combined lateral and
13 canal loss.

14 Q. What are those relationships?

15 A. Those are losses as a percentage of the --

16 Q. Total annual flow?

17 A. Yes. These plots were made of April
18 through September flow, both 2 and 3 are for the above
19 Lovewell section.

20 Q. But the general relationship is
21 efficiencies versus flow; is that correct?

22 A. Yes.

23 Q. These are a percentage of flow?

24 A. Yes.

25 Q. Are there any other factors that affect

1 system efficiencies, other than flow?

2 A. Yes. Condition of the canal, operations.
3 There may be others.

4 Q. Does precipitation, for example, affect
5 that?

6 A. That's possible it may, yes.

7 Q. And would the timing of precipitation be a
8 relevant consideration?

9 A. Yes.

10 Q. And the timing of the flow, I suppose,
11 would probably be a relevant consideration; if all that
12 flow came in three months and very little flow came in
13 the other nine, would that be relevant?

14 A. Yes.

15 Q. Do your Figures 2 and 3 capture those
16 additional functions somehow, or are they solely based
17 on flow volume?

18 A. They capture the various considerations
19 about canal efficiencies by just -- it's a comparison of
20 the observed data expressed as a function of flow.

21 Q. And that observed data, I think you
22 mentioned was, I'm trying to recall your exact phrase,
23 but more normal efficiencies; is that what you were
24 relying on?

25 A. Yes.

1 Q. And how did the conditions of the canal and
2 the precipitation in '05 and '06 relate to those more
3 normal efficiencies?

4 A. The conditions in '05 and '06 were
5 significantly lower quantities of water, water delivered
6 through the system, at least on a volumetric basis.
7 There was actually more time when water was run through
8 the canal in these years because of the wintertime
9 diversions that were being made; but in terms of the
10 quantity of water, they were lower.

11 My understanding of the precipitation for
12 the two years was that it was about normal.

13 Q. Now, I would like to turn your attention to
14 Figure 4-10 of the Flatwater Group report --

15 A. Yes.

16 Q. -- which is Nebraska Exhibit 8.

17 A. Yes, I have that.

18 MR. WILMOTH: I will let the Arbitrator get
19 there.

20 Do you have that, Mr. Arbitrator?

21 ARBITRATOR DREHER: I do.

22 MR. WILMOTH: Would you like a copy?

23 ARBITRATOR DREHER: No. I have it.

24 Q. (BY MR. WILMOTH) There are various plots
25 here relating efficiencies to flow volume; is that

1 right?

2 A. Yes.

3 Q. And, for example, if you look at the --
4 sorry, there are multiple plots.

5 But if you look at the second one down, in
6 kind of the northwest corner of this document, Courtland
7 Canal (State Line to Lovewell) from March, do you see
8 that?

9 A. Yes, I see that.

10 Q. And if you look at, say, a flow of 4500 to
11 5000 acre-feet, there are multiple efficiencies
12 reflected in this figure; is that right?

13 A. Yes.

14 Q. So for any given flow, then, there may be
15 quite a variation in efficiencies; is that correct?

16 A. Yes, there could be. March --

17 Q. Excuse me, go ahead.

18 A. March is probably kind of a swing month.
19 It may be a month when there is not diversion, as
20 indicated by the few data points in here. It may be a
21 month when they're starting out and you may have higher
22 losses. The first several weeks running the canal, it
23 is going to be a higher loss period, and so always at
24 the beginning of the diversion season. Then there are
25 other months in this period of record where they had

1 been running pretty much continuously since October
2 where you would have a different loss relationship for
3 March.

4 Q. What about June; do you see the June
5 figure?

6 A. Yes.

7 Q. I assume folks are generally diverting in
8 June?

9 A. Yes, there are quite a few data points on
10 this. This -- my understanding of this first in this
11 exhibit is that this is a quantification of losses for
12 the part of the stateline flow that's delivered to
13 Lovewell Reservoir, which is separate from the losses
14 that are tabulated on the next Figure 4-11 for Upper
15 KBID, which are the losses for farm deliveries in the
16 upper section of the canal. So this represents one part
17 of the losses for this segment of the canal.

18 The Bureau tabulates their data as
19 separately for water delivered to Lovewell and water
20 delivered to the farms in the Upper Courtland system.
21 So sometimes they are running water to Lovewell in June.

22 Q. Just for clarity sake, then, in this June
23 figure, is it correct that generally at a flow of 5000
24 acre-feet, it appears that the efficiencies range
25 anywhere from 10 to 65 percent for the same flow?

1 A. Yes. I think I would be a little bit
2 careful in using some of the high percentages off of
3 this graph, again because of the way I think the splits
4 are being done between the amount of water delivered to
5 Lovewell Reservoir, compared to the amount of water
6 delivered into -- excuse me, to the farms, because this
7 graph is plotted as a function of total stateline flow,
8 which, for a month like June, would include both
9 deliveries to Lovewell as well as farm deliveries.

10 And I notice that there were a couple of
11 months in this category of losses in the Nebraska
12 analysis where they actually had negative, as you see
13 when you look at the July and the August percentages for
14 this category. So I think part of what you're looking
15 at on this particular graph is somewhat of an artifact
16 of the way the splits are made.

17 Q. But we are generally in agreement that for
18 the same flow you might have varying efficiencies; is
19 that correct?

20 A. Yes.

21 Q. And would that be due to these other
22 factors, precipitation -- potentially due, I should say,
23 to precipitation or canal condition, et cetera?

24 A. Yes.

25 MR. WILMOTH: That's all we have, Your

1 Honor.

2 ARBITRATOR DREHER: I have, I guess, one
3 question, not necessarily related to the new exhibits.

4 But in thinking about this loss issue, the
5 accounting procedures included as part of the Final
6 Settlement Stipulation in Section IV.A.2.c. -- and you
7 don't have that in front of you, but I'm sure you've
8 dealt with this enough that if I read it to you, it will
9 bring back some memories, because it does relate to --

10 MR. WILMOTH: Mr. Arbitrator, would you
11 mind repeating the citation?

12 ARBITRATOR DREHER: I will, yes, just a
13 minute.

14 It does relate to Appendix B in your
15 report. So, again, the citation that I'm looking at,
16 I'm looking at the accounting procedures that are part
17 of the Final Settlement Stipulation, and I'm looking at
18 Section IV.A.2.c. in those accounting procedures.

19 THE WITNESS: Yes.

20 ARBITRATOR DREHER: And basically, what it
21 says -- and I will just read from the procedures. It
22 says, Quote, Computed Beneficial Consumptive Use of
23 diversions by Federal canals will be calculated as shown
24 in Attachment 7. For each Bureau of Reclamation Canal
25 the field deliveries shall be subtracted from the

1 diversion from the river to determine the canal losses.
2 The field delivery shall be multiplied by one minus an
3 average system efficiency for the District to determine
4 the loss of water from the field. 82 percent of the sum
5 of the field loss plus the canal loss shall be
6 considered to be the return flow from the canal
7 diversion.

8 As I understand it, in your Appendix B, on
9 the right side of that table, you have a category of
10 losses that do not recharge, and you note that with
11 18 percent.

12 THE WITNESS: Yes.

13 ARBITRATOR DREHER: And that's consistent
14 with this part of the accounting procedures that
15 basically says 82 percent of the sum of the field loss,
16 plus the canal loss shall be considered to be the return
17 flow from the canal -- in other words, recharge.

18 THE WITNESS: Yes.

19 ARBITRATOR DREHER: How was that derived?
20 Where did that come from?

21 THE WITNESS: I'm not sure of the exact
22 origin. Are you talking about the specific figure?

23 ARBITRATOR DREHER: The figure of
24 82 percent.

25 THE WITNESS: Yes. I'm not sure if the

1 Bureau of Reclamation may have had some involvement in
2 that. I think it's a figure that the Republican River
3 Compact Administration Engineering Committee had been
4 using for some time prior to the settlement and
5 probably, over time, did rely, to a certain extent, on
6 Bureau of Reclamation input or recommendations.

7 ARBITRATOR DREHER: But it's a static
8 figure that doesn't vary with changing conditions?

9 THE WITNESS: That's correct.

10 ARBITRATOR DREHER: And given the
11 variations that Kansas and Nebraska are both talking
12 about, that strikes me as odd.

13 THE WITNESS: I think one thing to note is
14 that -- what is constant is the percentage that's
15 considered to be consumptively consumed, as opposed to
16 the canal loss, which is based on actual measurements of
17 diversions and farm deliveries, which the Bureau does
18 record for all the canals. And so the actual canal loss
19 will vary from year-to-year based on records --

20 ARBITRATOR DREHER: Sure, I understand.

21 THE WITNESS: -- where this factor is a
22 constant that's applied.

23 ARBITRATOR DREHER: But that strikes me as
24 somewhat odd, because -- I mean, I recognize that, you
25 know, the canal losses can vary substantially; but it

1 would seem to me that, depending upon why those canal
2 losses are varying so much, would suggest that the
3 amount that's considered consumptive probably isn't
4 static and yet, the procedures have it as a static
5 amount.

6 And I was -- so, you know, the line of my
7 question, I was simply trying to understand -- or I was
8 hoping that somebody could help me understand -- where
9 that figure of -- what that figure of 82 percent is
10 based on or the companion figure of 18 percent
11 consumptive, what that's based on.

12 THE WITNESS: I think one consideration,
13 there is -- there is parameters that can be measured and
14 parameters that cannot be measured. And obviously, the
15 consumption of canal loss is something that cannot
16 really be measured in the field.

17 So, in my experience, it has been fairly
18 common modeling approach to assume some sort of
19 incidental loss factor as a constant as a percentage, as
20 opposed to some sort of relationship to flow, because
21 you really can't measure it.

22 And so there are assumptions, and I've used
23 different assumptions, like 10 percent, similar to what
24 I did on the Courtland losses, as opposed to 18 percent.
25 But where you can't measure, you would tend to use a

1 constant. Where you can measure, which is the canal
2 loss based on deliveries to the fields, you would use
3 the actual data. And you would probably find other
4 constants like that in the accounting procedures.

5 ARBITRATOR DREHER: And I acknowledge that,
6 that's probably a good assessment, but it has to be
7 based on something, because the number 18 -- it's not
8 15, it's not 20 -- it's 18, so it has to be based on
9 something, but you don't --

10 THE WITNESS: I personally don't know.

11 ARBITRATOR DREHER: Okay. Thank you.

12 MR. DRAPER: If there is no further
13 cross-examination, we might take a brief break and
14 finish up with Mr. Book.

15 ARBITRATOR DREHER: Okay.

16 (Short break was taken.)

17 ARBITRATOR DREHER: All right, Mr. Draper.

18 MR. DRAPER: No further questions of
19 Mr. Book.

20 ARBITRATOR DREHER: Well, I have a couple
21 more.

22 Mr. Book, I'm trying to understand the
23 significance of the last section of Kansas Exhibit 53
24 entitled "Required at Guide Rock for Kansas Stateline
25 with 12.9 percent Canal Loss."

1 THE WITNESS: Yes.

2 ARBITRATOR DREHER: Can you reexplain that
3 to me?

4 THE WITNESS: That's simply the calculation
5 of what the equivalent flow would be at the Guide Rock
6 diversion using the Kansas stateline -- Courtland Canal
7 at the stateline and a 12.9 percent physical canal loss.

8 ARBITRATOR DREHER: And the 12.9 percent
9 physical canal loss is something that you would -- I
10 presume you believe is appropriate?

11 THE WITNESS: Yes. That was based on the
12 historic records for the '94 to '07 period.

13 ARBITRATOR DREHER: Well, here is the
14 difficulty I'm having.

15 Referring to your original report, looking
16 at the table on page 3 titled "Additional Losses in
17 Nebraska Assigned To Kansas."

18 THE WITNESS: Yes.

19 ARBITRATOR DREHER: And if I look on the
20 right side of that table, there is a column titled "Net
21 Available Stateline Supply."

22 THE WITNESS: Yes.

23 ARBITRATOR DREHER: And for the year 2005,
24 that net available stateline supply you calculated to be
25 40,600 acre-feet.

1 THE WITNESS: Yes.

2 ARBITRATOR DREHER: And for 2006, you
3 calculated it to be 32,600 feet.

4 THE WITNESS: Yes.

5 ARBITRATOR DREHER: So now if I look at
6 Kansas Exhibit 53 and I look at the first line in this
7 lower section titled "Additional Kansas Stateline," for
8 2005, I see 40,551.

9 THE WITNESS: Yes.

10 ARBITRATOR DREHER: Which --

11 THE WITNESS: That's rounded.

12 ARBITRATOR DREHER: With rounding, it's
13 essentially the same number?

14 THE WITNESS: Yes.

15 ARBITRATOR DREHER: And for 2006, I see
16 32,605, which essentially corresponds with what was in
17 your report. But then when you go through these
18 calculations, and I understand how you did the
19 calculation, you end up with an increase of Guide Rock
20 at 39,446 acre-feet for 2005 and 31,202 acre-feet at
21 Guide Rock for 2006. And those don't seem to be very
22 close -- well, it's a relative term.

23 I'm struggling with the differences between
24 what you computed in Exhibit 53 as the increase at Guide
25 Rock versus what you show in Attachment 1 for the

1 hypothetical increase at Guide Rock that you started
2 with.

3 THE WITNESS: Are you referring to the
4 78,960?

5 ARBITRATOR DREHER: I am.

6 THE WITNESS: Yes, that's the two-year
7 total, and the one fairly significant number you have to
8 reduce that by is the additional Harlan County
9 evaporation before you get to water available to the
10 Courtland Canal.

11 Yes, on page 3 there is 4000 acre-feet over
12 the two years of Harlan County evaporation. So there is
13 75,000 acre-feet, after you subtract the additional
14 Harlan County evaporation; and then I had deducted 1800
15 acre-feet, which would leave a total of 73,200 net
16 available supply at the stateline.

17 ARBITRATOR DREHER: Which is still about
18 5 percent different than what you're showing in Exhibit
19 53?

20 THE WITNESS: Yes, Exhibit 53 is a
21 comparison of what it would take to provide that yield
22 at the stateline in the Courtland Canal.

23 ARBITRATOR DREHER: Right. But I guess if
24 I -- I expected that if I added back in the Harlan
25 County Lake evaporation -- the additional Harlan County

1 Lake evaporation, and this 1800 acre-feet that you
2 subtract -- and I don't remember what that was offhand,
3 what that was for.

4 THE WITNESS: That was for -- that was the
5 18 percent factor, coincidentally 1800 acre-feet; but
6 that was the consumptive use portion of the canal loss
7 in the Courtland Canal above the stateline that I
8 deducted from the net stateline.

9 ARBITRATOR DREHER: I just would have
10 expected, had I added those numbers back into this
11 imputed calculation at Guide Rock on Kansas Exhibit 53,
12 that the results would have been closer.

13 THE WITNESS: Well, the purpose with this
14 Exhibit 53 is to demonstrate my perspective that there
15 was sufficient water available in the river at Guide
16 Rock to supply the water at the stateline that we are
17 using.

18 ARBITRATOR DREHER: But offhand, you don't
19 know why there is still, like a 5 percent difference if
20 I try to back-calculate?

21 THE WITNESS: Well, I didn't use the
22 12.9 percent in my calculations. I didn't actually
23 calculate a diversion at the river in Guide Rock in my
24 original analysis.

25 I had gone through the steps that I

1 described, which included the deduction of 1800
2 acre-feet of consumed transit loss to get to the net
3 stateline, but the 12.9 percent was not part of my --

4 ARBITRATOR DREHER: Okay, all right. I
5 think I understand now. Okay, thank you.

6 MR. DRAPER: No further questions.

7 ARBITRATOR DREHER: All right.

8 MR. DRAPER: I would move the admission of
9 the exhibits to which Mr. Book testified. Those are
10 Kansas Exhibits 53, 54, 55.

11 ARBITRATOR DREHER: Any objection?

12 MR. WILMOTH: No.

13 ARBITRATOR DREHER: Wasn't there one other
14 one? I guess not. All right, they're admitted.

15 (WHEREUPON, Kansas Exhibits 53, 54 and 55
16 were admitted into evidence.)

17 ARBITRATOR DREHER: Mr. Draper, you can
18 call your next witness.

19 MR. DRAPER: We call to the stand Dr. Terry
20 Kastens.

21 ARBITRATOR DREHER: Dr. Kastens, you're
22 still under oath.

23 THE WITNESS: Yes.

24 TERRY LEE KASTENS,
25 having been previously sworn, was examined and testified

1 as follows:

2 DIRECT EXAMINATION

3 BY MR. DRAPER:

4 Q. Dr. Kastens, good morning.

5 Let me first ask you, Mr. Dreher requested
6 that you provide your notes on your analysis of the
7 question whether acres in the Upper KBID area were less
8 productive and, therefore, that was the reason that they
9 were higher.

10 Were you able to locate those notes?

11 A. Yes, I was.

12 Q. And those are the notes that have been
13 extracted and appear as Kansas Exhibit 47?

14 A. Yes.

15 Q. Would you describe what those notes
16 contain?

17 A. Okay. This was actually some notes I had
18 taken in response to Dr. Pritchett's comment that idling
19 acres perhaps increased the corn yield for the overall
20 area.

21 And certainly, we had large idling of acres
22 in the Republic County in '04 and '05 -- those were the
23 two years he was referencing -- not '05 and '06, but
24 rather, '04 and '05. And certainly, we had idling of
25 acres in Republic County because there is a lot of KBID

1 acres in Republic County.

2 But I thought I would just look at the
3 yields in 2003 and 2006, kind of along with '04 and '05
4 just to try to get a feel for whether or not we saw, you
5 know, whether yields were a lot higher due to idling of
6 acres.

7 In those two counties, in Cloud and Jewell
8 counties, really the only point I'm making there is that
9 the yields were very high in 2004 and 2005 relative to
10 2003 and 2006. And the second point was that there was
11 very little idling of acres in those counties.

12 So the point I was just trying to make is
13 that I think that the yields were quite high in those
14 two years, independent of the idling of acres issue.

15 The other thing, and it's not in these
16 notes -- I had just looked and it kind of got mentioned
17 yesterday someplace -- that I looked at the 1994 to 2000
18 corn yields Above Lovewell and Below. And as I recall,
19 it was about 9 bushel-acre difference with Above
20 Lovewell having actual higher productivity than Below,
21 and yet, it's typically that Above Lovewell area that
22 has gotten questioned about whether or not we're idling
23 less productive acres on the idling, hence increasing
24 yields on the other acres.

25 Q. And would you just to conclude -- state the

1 conclusion that this analysis led you to.

2 A. Oh, I just -- I don't think that the yield
3 differences we're seeing in any of our analysis are due
4 to idling less productive acres.

5 Q. Let me turn now to Dr. Sunding's report.

6 A. I do not have that in front of me, if I
7 need the report in front of me.

8 ARBITRATOR DREHER: Mr. Draper, before you
9 proceed, I need some help in understanding where Cloud
10 County and Jewell County are in relationship to the
11 Kansas Bostwick Irrigation District.

12 THE WITNESS: They're adjoined. There are
13 some Kansas Bostwick irrigators in -- acres in Jewell
14 County. I think I'm right in saying that the river
15 flows from -- get it straight here -- from Republic down
16 through Cloud. Is that a fair statement? So they're
17 basically adjoining counties, those three counties
18 collectively we talk a lot about. It's kind of a
19 representative of KBID, perhaps.

20 ARBITRATOR DREHER: In looking at Kansas
21 Exhibit 41, even though it's hard to tell, I think -- I
22 think I'm now finding the county lines. Jewell County
23 is shown at the bottom of 41.

24 THE WITNESS: Jewell County is where
25 Lovewell is at, right. Yeah, Lovewell Reservoir is in

1 Jewell County.

2 ARBITRATOR DREHER: And Jewell County
3 extends north up to --

4 THE WITNESS: -- the stateline, and then
5 Republic County would be east of Jewell County.

6 ARBITRATOR DREHER: Okay. I'm seeing it
7 now, okay.

8 So the majority of the KBID lands are in
9 Republic County?

10 THE WITNESS: That's correct.

11 ARBITRATOR DREHER: I can't tell for
12 certain whether there is any KBID lands in Cloud County
13 or not because on this map, Cloud County incorporates
14 some lands that are denoted in the explanation on Kansas
15 Exhibit 41 as being lands benefited, but I don't know if
16 that means --

17 THE WITNESS: Well, it's kind of downstream
18 for some of the acres outside of KBID that we considered
19 in the analysis that we did. Others, perhaps.

20 ARBITRATOR DREHER: So some of those lands
21 are in Cloud County?

22 MR. BLANKENAU: Right.

23 ARBITRATOR DREHER: But none of the KBID
24 lands are in Cloud County?

25 THE WITNESS: I believe that's correct.

1 ARBITRATOR DREHER: But there are some KBID
2 lands, particularly in the upper section, it looks like,
3 that are in Jewell County?

4 THE WITNESS: I believe that's correct, as
5 well.

6 ARBITRATOR DREHER: All right. Thank you.

7 MR. DRAPER: Yes, that sounds correct.

8 And for your reference, there is a
9 particularly helpful map that appears in one of the
10 other exhibits with respect to the county lines
11 vis-a-vis the KBID area. And this is the Kansas Exhibit
12 No. 1, the Spronk report, Figure 1-A shows the major
13 canals of the KBID area and Lovewell Reservoir,
14 Courtland Canal and how those are located with regard to
15 the county lines.

16 ARBITRATOR DREHER: Okay. And yesterday
17 Dr. Kastens, we were talking about the maximum actual
18 yield of something like 187 bushels, and what year was
19 that?

20 THE WITNESS: I have to look at my notes.
21 That was in -- well, you're saying the maximum? The
22 yield in 2005 was, I believe, 187 bushels an acre.

23 ARBITRATOR DREHER: In KBID?

24 THE WITNESS: Yes.

25 ARBITRATOR DREHER: Okay. You may proceed.

1 MR. WILMOTH: For the record,
2 Mr. Arbitrator, I think that information is in Nebraska
3 Exhibit 3.

4 ARBITRATOR DREHER: Okay. You may proceed.

5 Q. (BY MR. DRAPER) Dr. Kastens, I would now
6 like to turn to Dr. Sunding's report.

7 Perhaps counsel can remind me which number
8 that is, for the record.

9 MR. WILMOTH: It's Nebraska Exhibit 6,
10 John. Do you need a copy?

11 MR. DRAPER: I think I'm all right. Thank
12 you.

13 Q. (BY MR. DRAPER) Doctor, have you had a
14 chance to review the Sunding report and listen to
15 Dr. Sunding's testimony?

16 A. Yes, I have.

17 Q. In summary, what did Dr. Sunding do as he
18 went about his analysis of the Kansas losses in this
19 case?

20 A. Basically to establish the -- the dollar
21 figure number that he considered as an alternative for
22 Kansas damages.

23 It was really a very simplistic approach.
24 He merely looked at the rent differences in 11 counties
25 in north central Kansas, divided them by one and a

1 quarter foot to get a value per acre-foot and, hence,
2 multiplied them by either Book's water shortage number
3 or Groff's water shortage number to provide a range.

4 That was it; that was the sum total of the
5 calculations that computed the damages that he suggested
6 that Kansas is due. That was it.

7 Now, there was a lot of peripheral and a
8 lot of supplementary information in the very standard
9 affair of an academic review where you rightfully
10 caution the authors to ensure that they have taken
11 things into consideration.

12 And so there was a host of graphical
13 depictions and some little statistical regression models
14 and so forth, but none of them had anything to do with
15 the dollar amount that actually -- that he came up with
16 to provide the dollar worth of damages that he suggests
17 that Kansas is due.

18 Q. Now, with respect to what he actually did,
19 which was to take the difference in rents between
20 irrigated and nonirrigated lands in north central
21 Kansas, I believe it was testified to that the ownership
22 of the equipment on that land, the irrigation equipment,
23 was an important factor that needed to be determined as
24 part of a comparison of rents; is that true?

25 A. He did.

1 Q. And would you describe why that's important
2 and what his assumptions were.

3 A. It's important because of the issue of rent
4 being a return to both land and irrigation equipment
5 owned by the landowner.

6 Dr. Sunding's model asserted in his
7 testimony yesterday that he assumed that the irrigation
8 equipment was 100 percent owned by the tenant. That had
9 to fall from his capitalization of the difference in
10 irrigated land values approach that he took; if cash
11 rents were, indeed, a capitalization of land values,
12 which he asserted had nothing to do with irrigated
13 equipment, but rather were raw land with water
14 potential, then he asserted that cash rents must also be
15 the return to that. And so he said that would have to
16 be the case, that tenants owned 100 percent of the
17 equipment in his analysis.

18 Q. Were you able to make any determinations on
19 this assumption as to whether it was reasonable or not?

20 A. Yes. I was able to actually pull off of
21 our department's website last night a discussion of
22 ownership shares of irrigation equipment in not exactly
23 the same region that Dr. Sunding used. Dr. Sunding used
24 north central Kansas, which comprised 11 counties. This
25 particular study comprised 12 counties, which

1 encompassed that area, but it's a fairly close overlap.

2 Q. And they both include KBID?

3 A. And they both include KBID, as well,
4 correct.

5 Q. Is this the same website from which
6 Dr. Sunding obtained his rent data?

7 A. Yes, it is.

8 Q. For 2005 and 2006?

9 A. Yes, it is.

10 Q. Let me ask that you turn to what has been
11 identified as Kansas Exhibit 46 in that regard. Is this
12 the information that you were just referring to?

13 A. Yes.

14 Q. What is Kansas Exhibit 46?

15 A. Kansas Exhibit 46 is a publication entitled
16 "Irrigated Crop-Share Leasing Arrangements in Kansas"
17 where two authors have compiled the results of the
18 survey of rental arrangements by region in Kansas.

19 Q. What is the date of that report?

20 A. The date is October 2008.

21 Q. What part of this report is relevant to the
22 question you're discussing?

23 A. I would say Table 4 on page 11.

24 Q. What is shown on page 11?

25 A. If you look down, what is shown there is

1 the kind of percentage of various items of irrigation
2 equipment that is owned by the land -- by the landowner
3 and by region.

4 And, in particular, the north central --
5 north central Kansas area, the percentages are generally
6 in the 90-some percent of the various equipment, 85- to
7 90-some percent of the equipment is owned by the
8 landowner.

9 Q. And how is the north central Kansas data
10 identified in this table?

11 A. NC-40. And you can see two separate
12 categories there as "Flood" and "Sprinkler," two
13 different types of irrigation delivery systems.

14 Q. And the title of this table?

15 A. "Average Landlord Ownership Share of
16 Irrigated Equipment."

17 Q. And the NC-40 columns are about two-thirds
18 across the Table towards the right?

19 A. That's correct.

20 Q. And, in general, what do these percentages
21 that are typically in the 80 or 90 percent area, what do
22 they indicate?

23 A. Well, they indicate that landlords do own
24 quite a little of equipment in the area, contrary to
25 what was assumed by Dr. Sunding.

1 Q. Now, this is not the KBID area
2 specifically, is it?

3 A. No. And it should definitely be mentioned,
4 that this -- one of the reasons we have some
5 reservations of using data, because it's not
6 representative of KBID; but in this particular case, Dr.
7 Sunding referenced the rents for the broader area, north
8 central Kansas, so these data should be relevant in his
9 analysis.

10 Q. And are these data consistent with the
11 assumption that he made with respect to ownership of the
12 equipment?

13 A. No, they are not.

14 Q. Now, what was his assumption?

15 A. He, Dr. Sunding, assumed that 100 percent
16 of the irrigation equipment was owned by the tenant.

17 Q. And what does this show?

18 A. This shows in the 85 to 95 percent
19 categories actually owned by the landowner, meaning, you
20 know, 15 to -- 10 to 15 percent is actually only owned
21 by the tenant, not the 100 percent.

22 Q. In the course of his report, Dr. Sunding
23 also criticized the use of a crop production model, the
24 one that you identified as the IPYsim Model.

25 Is that a valid criticism, in your opinion?

1 A. No, I don't think it is at all. I think he
2 testified yesterday he used a crop production model in
3 his study of the Central Valley report that got talked
4 about yesterday a number of times.

5 In my estimation, that study wasn't a lot
6 different than it was here. He basically used
7 optimization of farmer profit-maximization model where
8 farmers were choosing water to use for the purpose of
9 crop production to maximize profits. He did -- he held
10 those costs he considered to be sunk -- sunk -- so that
11 they were truly sunk. It was all part of that analysis.

12 So, no, I think it's -- in our case it was
13 the only reliable way that we had to approach the
14 problem, in our opinion. And I don't think that it --
15 obviously, his testimony yesterday would suggest that he
16 has no problem using production models, either, that
17 happen to maximize farm profits.

18 Q. There was also criticism with respect to
19 aggregating farm level results to the larger KBID area.

20 Is that in your opinion a valid criticism?

21 A. No, I don't think it is for basically the
22 same -- it's something that is routinely done.

23 We develop representative models, if you
24 were. We -- we then consider that to be representative
25 of larger area. Again, this was done in Dr. Sunding's

1 California study. I don't -- he did allow some
2 variation crossed with some water quantities; but
3 basically, he was using fixed costs and variable costs
4 that were kind of representative of the area. All of
5 the same potential problems associated with aggregation
6 there as there is with any of these issues.

7 Generally, even though economists often
8 recognize the theoretical issues of nonlinearities
9 associated with aggregation, usually we don't have good
10 solutions.

11 And certainly in the case of our study here
12 at KBID -- and we did discuss this at great length -- we
13 didn't feel like we had, or didn't believe we had a lot
14 of good alternative ways to view it; you know,
15 alternative ways to posit the nature of the individual
16 farms outside of kind of a representative farm
17 framework.

18 I mean, we believe that it was perfectly
19 appropriate to use a farm optimization model aggregated
20 up to a broader area. And as I asserted and Dr. Sunding
21 testified yesterday, he used the similar farm
22 optimization process and used it as representative of
23 much broader area as well.

24 Q. Now, market value research is relevant to
25 the approach that Dr. Sunding took; isn't that right?

1 A. Yes. He is asserting that the rent
2 differences that he report, divided by the one and a
3 quarter acre-feet is, in fact, the market value of
4 water. And that's the reason he finds it an appealing
5 approach to estimate the damages, because it's appealing
6 for him to find it to be the market value of water.

7 Q. In regard to that, and in response to a
8 question by Mr. Dreher, I would like to direct your
9 attention to Kansas Exhibit 44.

10 Doctor, what does this memorandum consist
11 of?

12 A. It looks like it's a memo from Ann Bleed to
13 someone else describing the water purchases made in the
14 year 2006.

15 Q. And does that contain market data?

16 A. Yes, it most certainly is market data.

17 Q. And what kind of market data does it show?

18 A. It's the market data of water, irrigation
19 water, in particular.

20 Q. And is there a dollar-per-acre-foot cost
21 shown?

22 A. Yes, there is. I would issue a word of
23 caution there that the dollar-per-acre-foot there, my
24 estimation are that these quantities of water are
25 actually evaluated further upstream and certainly not at

1 the farm level, where all of our discussion on the
2 economic side has been involved.

3 And so the dollars-per-acre-foot numbers
4 you would see in that report would have to be doubled or
5 more to make them comparable to the market value of
6 water at the farm level.

7 Q. And are these values consistent with the
8 \$26.80 figure for the value of each acre-foot of water
9 that Dr. Sunding determined?

10 A. No, they are not. They are much larger.

11 Q. And related to that and in further answer
12 to Mr. Dreher's question, I would like to address your
13 attention to Kansas Exhibits 50, 51 and 52. And have
14 you determined whether these are the underlying
15 contracts that are referred to in the Table on Kansas
16 Exhibit 44?

17 A. I would say they certainly look like
18 they're lining up with this memo, as far as the
19 contracts go: Frenchman Valley, Riverside, Bostwick, so
20 forth, so, yes. I think these are the contracts that
21 goes with those water purchases that Ann Bleed was
22 referring to in her memo.

23 MR. DRAPER: No further questions.

24 ARBITRATOR DREHER: Okay. Before we go to
25 cross, I've got a couple.

1 First off, in referring to Kansas Exhibit
2 46, and in particular this Table 4, "Average Landlord
3 Ownership Share of Irrigated Equipment," I thought I
4 understood -- understood you to say that this was a
5 12-county area that included the Kansas Bostwick
6 Irrigation District.

7 THE WITNESS: Yes, that's seen on Figure 1
8 on page 8 of that document.

9 ARBITRATOR DREHER: And which of these
10 subdivisions is the Kansas Bostwick Irrigation District
11 in?

12 THE WITNESS: NC-40.

13 ARBITRATOR DREHER: I mean, I'll just ask:
14 Do you have an opinion as to what the rental rates for
15 this equipment would be?

16 THE WITNESS: The rental rates for the
17 equipment?

18 ARBITRATOR DREHER: Correct.

19 THE WITNESS: My intuition would be the
20 annual value of that on a combined flood and pivot area
21 like this would probably be in the range of \$35 per acre
22 per year.

23 ARBITRATOR DREHER: Do you have any
24 references that I could look at to -- that would support
25 that?

1 THE WITNESS: You could -- I could get you
2 the reference of our Farm Management Guides where we
3 list irrigation equipment, and I could show you, say, a
4 corn production budget where we suggest how the -- how
5 we typically depreciate the equipment, you know, to get
6 at kind of that annual cost of irrigation equipment.

7 I don't have anything with me at the
8 moment.

9 ARBITRATOR DREHER: Well, this is one of
10 those areas where I guess if you have some
11 documentation, that would be helpful if you could
12 provide that. In this case, I guess it would be Kansas
13 providing it to Nebraska and Colorado for their
14 examination. And then if it is agreeable, if that could
15 be forwarded on to me, I would like to take a look at
16 that.

17 MR. DRAPER: Very good.

18 ARBITRATOR DREHER: The second question
19 deals with the calibration issue that Dr. Sunding
20 identified yesterday where, by distorting the shape of
21 the yield curve with water, the slope of the
22 relationship at a point was steepened so that if you
23 were looking at changes by steepening that slope, you
24 increase the magnitude of yield associated with a given
25 change in water.

1 And I guess I'm curious to know what your
2 response to that would be.

3 THE WITNESS: Most of what -- most of what
4 he was drawing yesterday was associated with the
5 calibration suggested precisely the way -- by Stone the
6 way such models should be used.

7 Now, the part that was not suggested by
8 Stone was our taking a proportional difference in our
9 models times the observed yield to say this is what we
10 expect the yield to be.

11 That was not something that Stone
12 suggested; that was something we're dealing with in this
13 particular situation. But most of the stuff he was
14 drawing was just stuff that was very -- something that
15 was expected the way the model was to be used by Stone.

16 So I -- I can't answer. I guess I
17 wasn't -- I don't know about the change in the shape or
18 anything, but the shape was changed in the way Stone
19 would have wanted it to be changed, given that you have
20 different yield goals, because the model was designed to
21 target a yield goal.

22 The basic idea is that you have -- if you
23 think about zero irrigation water in places where you
24 have higher rainfall, you have a lot higher y intercept
25 on the graph that he was drawing, than you would, say,

1 where you have less rainfall.

2 And so you've got a situation where the y
3 intercept changes and because of rainfall that's
4 implicit in the model, the effective y intercept comes
5 in to be higher. And so the shape does change, it does
6 change with different quantities of rainfall and
7 different quantities of -- or different yield goals --
8 you know, different yield potential by area.

9 I didn't see anything -- I didn't see any
10 problem with what we had done on changing the shape of
11 those curves.

12 ARBITRATOR DREHER: Well, the concern I
13 have is that by changing the shape, you increase the
14 slope of the yield -- that you increase the slope of the
15 relationship between yield and water, which would --
16 could, I guess that's the question: Does that tend to
17 overstate the additional yield that would be derived
18 with a fixed quantity of water?

19 THE WITNESS: Okay, I want to be sure that
20 I understand your question.

21 Thinking about a yield model, such as what
22 we were talking about, such as Dr. Sunding drew
23 yesterday, are you questioning whether if we changed the
24 yield goal from 150 to 175, that that change in shape of
25 the curve could be a problem? I mean, is that what

1 you're asking?

2 ARBITRATOR DREHER: Well, I don't have the
3 exhibit.

4 MR. AMPE: You have the full-size exhibits.

5 ARBITRATOR DREHER: I have the full-size
6 exhibits, I guess that's true.

7 MR. WILMOTH: Mr. Arbitrator, we can help
8 you put those up, if you would like to take a quick
9 break.

10 ARBITRATOR DREHER: All right, that would
11 be good.

12 (Break was taken.)

13 ARBITRATOR DREHER: Without having the
14 benefit of being able to go back and read Dr. Sunding's
15 testimony, I mean, I may -- I'm going to simplify this
16 to some extent.

17 But here was the concern that I was left
18 with from Dr. Sunding's testimony on the calibration
19 issue: That if you start with a yield water
20 relationship and it's calibrated to a particular yield
21 goal, and then you force it to -- you force it to match
22 a different yield, essentially you change the slope of
23 these relationships. So that now, you know, if you had
24 a unit change in water availability with the original
25 curve, you would have a certain amount of additional

1 yield; but now if you take that same additional
2 increment of water and you apply it to this calibration
3 curve with this steepened slope, now you get a
4 significantly greater incremental yield, and I -- that
5 is bothersome to me.

6 THE WITNESS: Okay, a couple things.

7 First, recognize that if this is irrigation
8 water, that the -- this is changing simultaneously over
9 here --

10 ARBITRATOR DREHER: Yes.

11 THE WITNESS: -- because you have other
12 factors, rainfall. More importantly, this is a model of
13 expected yield response to water, okay.

14 In any given year, when you see what took
15 place, I applied this many inches of water more and I
16 got this yield. That might change dramatically, due to
17 other factors, typically not measured in an expectation
18 framework, maybe temperatures; you know, maybe just less
19 insect problems.

20 And what I'm asserting, in fact, when you
21 go back and look at any given year and you compute the
22 change in yield associated with change in water, it's
23 going to be a lot different than what you see on an
24 expectation graph. If it was a really good year,
25 typically when we would -- in expectation framework,

1 kind of averaged over the process, we would kind of
2 expect, you know, let's say, 4 to 7 bushels an acre for
3 every inch of water increase, okay.

4 Now, you observe a year that was a really
5 good year, for some reason, with the other interacting
6 factors that make water more useful in that kind of a
7 year, suddenly you might have 10 to 12 bushels per acre
8 increase when you compute it that way, because you have
9 other factors going on.

10 And so you can't just say it bothers one
11 that this slope changes, because what you're asserting
12 really is that the response is different on a particular
13 year.

14 And the only reason we did that is to bring
15 in the information that we do have an observed yield
16 that year, and we say we're going -- and we also show
17 that it was a pretty good year in -- 2005 especially was
18 a pretty good year for crop production. That's the only
19 reason we do that.

20 So I don't think what we're doing is
21 inconsistent with the modeling process, I don't believe
22 it is.

23 ARBITRATOR DREHER: Except that it's tied
24 to speculations, not necessarily reality?

25 THE WITNESS: That's correct.

1 ARBITRATOR DREHER: That's my problem.

2 THE WITNESS: Okay, but the expectations
3 are along the curve only from this point to this point,
4 all right, the expectation. I'm not jumping between
5 curves.

6 When I'm saying expectations of fully
7 watered versus what actually was received, that's along
8 the curve. And so I don't -- there shouldn't be any
9 problem.

10 You should expect a difference in the slope
11 of the function -- if you're getting 4 inches of water
12 versus if you're getting 8, you should expect a lot
13 higher yield response. That inch between 4 and 5 is
14 much more valuable than the inch between 8 and 9, for
15 example. So we do expect that to deviate.

16 ARBITRATOR DREHER: Sure, but it's the
17 calibration, I mean, you're not on the same curve.
18 You've changed the curve that has a different shape.
19 That's my difficulty, and it's based upon expectations.

20 THE WITNESS: Okay. There is no curve
21 associated with the adjustment on the individual point
22 yield estimate that we declare is the appropriate number
23 for 2005 and 2006 for fully irrigated yields. It's not
24 a point on the curve. That's just saying we have a
25 situation on here and here, and that was a proportional

1 difference, and we adjusted it that way.

2 And so -- okay, I do understand your
3 question.

4 What I am saying is if that really was a
5 particularly good year or particular bad year, because
6 it can go the other way too, then you would expect that
7 computed response to be better or worse than what we
8 expected on the model, okay, because of all the other
9 factors that come into play.

10 I might just actually address something
11 that never came up was in Dr. Pritchett, he was
12 suggesting that our calibration indicated that we were
13 not assuming diminishing returns, because he computed
14 out that kind of what we're doing here and said, I'm
15 computing the change in water -- the change in yield
16 associated with the particular change in water, and I'm
17 getting a number that makes it look like you don't have
18 diminishing returns.

19 Well, what he is doing is comparing across
20 different years effectively when that's not the way to
21 think of diminishing returns. Diminishing returns is to
22 think about it within a framework of not getting an
23 expected unusually good year, especially bad year.

24 In fact, he used just one particular
25 example. If you went to one of the other examples, it

1 was reversed; it was reversed. It was, in fact,
2 diminishing returns, but that wasn't really diminishing
3 returns.

4 He just said, I'm going to take a given
5 yield, you're saying 206 bushels or whatever it was,
6 above Lovewell, and I'm going to say you acquired that,
7 compared to what actually happened in that year and
8 said, I'm going to compute this efficiency and it looks
9 like you're getting really high yield response per inch
10 of water.

11 That was not an issue of diminishing
12 returns, but it's this issue about good year, bad year,
13 other factors that we don't include in a model and how
14 to think about point estimates that we're trying to make
15 some sense out of. We want to use that point estimate.

16 I guess that's about all I can say.

17 ARBITRATOR DREHER: Well, I appreciate the
18 response and I'll have to review the transcript of
19 Dr. Sunding's testimony and your response and try to
20 sort this out.

21 All right. Mr. Wilmoth.

22 MR. WILMOTH: I defer to Colorado to start
23 and then I will finish up if that's all right.

24 ARBITRATOR DREHER: Sure, that's fine.

25 CROSS-EXAMINATION

1 BY MR. AMPE:

2 Q. You just mentioned, I believe you said
3 that's just one of the many factors that's not included
4 in the model. How many factors are there that are not
5 included in the model?

6 A. Infinite, probably.

7 Q. What are some examples of what are not
8 included in your model?

9 A. Temperature, if you think about important
10 ones.

11 Q. Of what you considered important ones?

12 A. Insect, yeah, insect infestation for a
13 year. I could talk about -- well, I don't know. Those
14 are the two obvious ones that come to mind.

15 Q. And you assume a rational producer, with a
16 high level of information, a rational producer who will
17 attempt to maximize yield?

18 A. A high level? I don't know what you mean
19 by a "high level."

20 Q. You're assuming a producer that takes
21 factors, such as -- who makes the calculation of, you
22 know, how to maximize profits every year?

23 A. In association with irrigation water,
24 nitrogen fertilizer in this case, yes.

25 MR. AMPE: Thank you. Nothing else.

1 CROSS-EXAMINATION

2 BY MR. WILMOTH:

3 Q. Good morning, Dr. Kastens.

4 A. Good morning.

5 Q. In the series of questions that just
6 addressed issues that have come up today and I will try
7 to take these loosely in the order that they came up.

8 Did I understand you to say at the
9 beginning of your testimony that in response to
10 something Dr. Pritchett said, that you did not believe
11 that Upper KBID is any less productive than Lower KBID?

12 A. That's correct, in terms of corn yields,
13 just looking at corn yields from 1994 to 2000, I think I
14 looked at.

15 Q. And would you be so kind as to look at
16 Table 10 of your report, please.

17 A. Okay.

18 Q. Doesn't Table 10 demonstrate that your
19 model predicts that Upper KBID is, in fact, less
20 productive than Lower KBID, specifically with respect to
21 corn?

22 A. I'm not sure where you're observing that.

23 Q. Well, I'm looking at the model yield, the
24 actual reported yield, the expected yield -- well, the
25 model yield for actual irrigation, for example, in 2005,

1 the Below Lovewell is 150.5, Upper Lovewell is 120.3; is
2 that correct?

3 A. Yes, that was the dryland projected yield
4 effectively that year because there was no water
5 delivered.

6 Q. And what about 2006?

7 A. It was -- that was our projections, based
8 on the actual water that was delivered from the model.
9 That's not an indication of productivity; that's only an
10 indication of water quantity.

11 Q. What about the fully irrigated numbers?

12 A. The fully irrigated number are -- I'm not
13 sure what you're asking. We don't differentiate that by
14 "above" and "below."

15 Q. Well, let's look at the actual reported
16 yield, for example, in 2006. Below Lovewell was 167,
17 above Lovewell was 146.9; is that correct?

18 A. Yes.

19 Q. And that doesn't indicate to you anything
20 about the relevant productivity of Upper versus Lower
21 KBID?

22 A. Absolutely not. That's a one-year example.

23 Q. Very good. You also indicated that -- I
24 can't remember your exact phrase. I interpret it to
25 mean "noise" in Dr. Sunding's report about statistical

1 analyses and things.

2 Do you recall that particular conversation?

3 A. Okay.

4 Q. Could you turn to Dr. Sunding's report,
5 please, which is Nebraska Exhibit 6. Do you have a copy
6 of that report?

7 A. Yes, I do.

8 Q. Would you please look at Figure 4 on page
9 12?

10 A. Okay.

11 Q. What does this figure tell you about yields
12 in 2005?

13 A. It tells me yields were trending upward and
14 they were very high in 2005.

15 Q. In fact, yields in 2005 were the best ever
16 reported, weren't they?

17 A. Yes.

18 Q. Yet, we're talking about a year in which
19 water was allegedly short in KBID, correct?

20 A. Well, yeah. But remember, we don't
21 actually have an observation of irrigated yields, for
22 example, Above Lovewell in that example, so we have to
23 be careful what we're inferring here. But, yes, it's
24 not surprising to see high yields with less water in
25 some years.

1 I mean, that's just natural variation of
2 the data.

3 Q. So insofar as we're talking about the
4 actual impact, though, of some alleged deprivation of
5 water by Nebraska, to me, Figure 4 basically is telling
6 us that there really isn't much relationship between the
7 volume of water available and the actual yield, at least
8 in 2035?

9 A. Why is it telling you that?

10 Q. Well, I should ask you that.

11 What is it telling you about the
12 relationship of irrigation water availability and yield
13 in 2005?

14 A. It tells me absolutely nothing. This
15 figure shows a trend yield over time.

16 Q. Turn to the next issue.

17 One of the criticisms, I guess, that was
18 leveled against Dr. Sunding's analysis is he relied on
19 land rent values; is that right?

20 A. Yes.

21 Q. And when Dr. Sunding assigned a value of
22 \$33 roughly per acre, that was an average number from
23 the region; is that your understanding?

24 A. Yes.

25 Q. And so wouldn't that essentially capture

1 the value of irrigation equipment?

2 A. Yes, if it were representative of the area
3 we're interested in.

4 Q. And I would like to turn your attention to
5 Kansas Exhibit 46 again.

6 A. Okay.

7 Q. Could you tell us again what this tells you
8 about the ownership of that irrigation equipment.

9 A. It says that the landowners own a large
10 percentage of irrigation equipment.

11 Q. And if those individuals were renting land
12 in the area or paying \$33, a portion of which goes to
13 that equipment, what does that tell you about the value
14 of the water component?

15 A. If the data are right, it would say that it
16 was nearly -- nearly zero.

17 Q. Nearly zero?

18 A. Nearly zero.

19 Q. One of the things you mentioned in
20 critiquing Dr. Sunding's report is that he basically was
21 doing this -- I'm sorry, his earlier report from 2008,
22 was it?

23 A. I believe so.

24 Q. What's the exhibit number? Kansas Exhibit
25 42, I believe?

1 A. I don't have it in front of me.

2 Q. May I help present you with a copy?

3 MR. DRAPER: That's Kansas Exhibit 42.

4 MR. WILMOTH: Yes.

5 Q. (BY MR. WILMOTH) This is a paper, again for
6 the record, that Dr. Sunding and some colleagues
7 authored in the San Joaquin Valley; is that correct?

8 A. Yes.

9 Q. And I think you mentioned that in this
10 paper, Dr. Sunding employed crop production functions,
11 just as you did?

12 A. Crop production model.

13 Q. Just as you did?

14 A. Not just as we did, but similar.

15 Q. Can you point out in that document where
16 Dr. Sunding attempts to relate water availability to
17 yield?

18 MR. DRAPER: While he is looking, could I
19 ask, do you happen to have an extra copy of that?

20 MR. WILMOTH: I don't know. We have one.

21 MR. DRAPER: Thank you.

22 A. I may read what I inferred was a yield
23 response. "The model maximizes net farm income subject
24 to a constraint set. Net farm income is defined" -- I'm
25 on page 8, I'm sorry, "Model Objective Function."

1 Net farm income is defined as the
2 difference between unrealized crop revenue and remaining
3 variable production cost. Remaining variable production
4 cost depends on the month the project water was
5 delivered and the extent of the additional groundwater
6 pumping.

7 I will say I don't know that he modeled
8 exactly yield.

9 Q. Fair enough. That's all I need to know.
10 Thank you.

11 I would like to direct your attention to
12 the Kansas Exhibit 44, please.

13 A. Yes.

14 Q. There are quite a few numbers on this
15 document, and I want to make sure that we're -- that
16 there is no confusion about what you're implying are the
17 relevant numbers in this proceeding.

18 A. Okay.

19 Q. Could you identify what you think are the
20 relevant numbers.

21 A. Probably the most relevant numbers would be
22 the dollar-per-acre-foot cost, but --

23 Q. Would that be the --

24 A. That would be the column that says dollars
25 per AF.

1 Q. And that's 63 and 50?

2 A. 63, 50 and 198.

3 Q. And 104?

4 A. Yeah. That's the most relevant series,
5 yes.

6 Q. Would you take a quick look at the first
7 paragraph about two-thirds of the way down, there is a
8 sentence that begins "Another year." Could you read
9 that sentence for me, please.

10 A. In the first paragraph, second sentence, is
11 that what you said?

12 Q. First paragraph about two-thirds of the way
13 down on the right-hand side.

14 A. Okay, I got it. "Another year of leasing
15 surface water would bring us closer to Compact
16 compliance and help to assure Kansas that Nebraska is
17 serious about Compact compliance."

18 Q. Thank you.

19 So is it your understanding that the
20 purpose of this water was essentially for Compact
21 compliance?

22 A. Yes.

23 Q. It wasn't to irrigate ground, in other
24 words?

25 A. Ultimately, it would be to irrigate Kansas

1 ground.

2 Q. Fair enough.

3 Not ground in Nebraska, obviously?

4 A. That's correct.

5 Q. And if Nebraska was purchasing this water
6 for the purpose of Compact compliance, do you agree
7 there is some inherent additional value to Compact
8 compliance?

9 A. I don't know why it should be worth more
10 because of that. I mean, that's what our discussion is
11 about.

12 Q. What if I told you that in this proceeding
13 Kansas has asked for a payment of around \$72 million by
14 virtue of noncompliance on Nebraska's part?

15 A. Well, to the extent that they fear having
16 to pay \$72 million, they might have -- they might have
17 booted up the price of it.

18 Q. So in addition to their desire to simply
19 comply with their obligation under the Compact, there is
20 a very serious risk of penalty, isn't there?

21 A. Well, I don't think it's in addition. I
22 think it would be the penalty you're talking about,
23 because I think they desire to comply with the Compact,
24 it should be what it's worth.

25 Q. Purely economically speaking, Nebraska

1 might be willing to pay a little more to ensure it
2 avoids a \$72-million-dollar-damage claim, wouldn't it?

3 A. Yes.

4 Q. A little more than someone in KBID might
5 pay, for example, for irrigating the next acre of
6 irrigation land?

7 A. I don't know. I mean, in my take, it would
8 be kind of interesting, I would like to have these deals
9 offered to KBID, and I wonder how their reaction would
10 be, whether they would have taken them or left them on
11 the table. I don't know, I can't answer that.

12 Q. So you don't really know how this would
13 relate at all to KBID, do you?

14 A. No. I did this on market -- it's a
15 market -- it's one indication of a market, much like
16 rent differences are an indication of market.

17 Q. But rent differences on agricultural lands
18 are probably a little closer analogous -- closer
19 analogous market than this particular market, which
20 really has one buyer than if you sell it, perhaps?

21 A. Actually, I disagree, because I don't think
22 that rent differences are measuring what we want to get
23 at. So no, I would disagree.

24 Q. So you don't think that either one,
25 frankly, has anything to do with trying --

1 A. I think both are market numbers and there
2 is always issues with market numbers. That's what we're
3 talking about.

4 Q. Very good.

5 MR. WILMOTH: I believe that's all we have.

6 ARBITRATOR DREHER: All right.

7 Would you like some time before you do
8 redirect?

9 MR. DRAPER: Yes, please.

10 (Break was taken.)

11 ARBITRATOR DREHER: Mr. Draper, you may
12 continue.

13 MR. DRAPER: Thank you.

14 REDIRECT EXAMINATION

15 BY MR. DRAPER:

16 Q. Dr. Kastens, during your cross-examination
17 by Mr. Ampe, you were asked whether you had included
18 other factors that might affect yield, such as
19 temperature and insects.

20 Was it necessary to include such factors in
21 your analysis?

22 A. No, I don't think they were materially
23 important. They would have small impacts, but I don't
24 think it would be significant enough to change the
25 outcome that we ended up with.

1 Q. And did Dr. Sunding include such factors in
2 his analysis in the Central Valley study?

3 A. I'm not sure, I guess. I don't think so,
4 but I'm not sure. I better stay with that.

5 I will say that in Dr. Sunding's
6 recommended potential alternative yield model that he
7 suggested to us, he did not have even rainfall in that.
8 That was just a model of yield as a function of
9 irrigation water and some other kind of technology
10 factor.

11 Q. Now, you responded to Mr. Wilmoth, when he
12 asked you to compare the intuitive value of the
13 equipment to the rental difference determined by
14 Dr. Sunding as to what that implied about the value of
15 water, and I think you responded that it said that water
16 was worthless.

17 Is that a reasonable result?

18 A. No. The reality is, that's why we don't
19 use the data. I don't like to say we don't trust the
20 data, but we don't. And I can say that because anybody
21 that has ever heard me speaking in Kansas have heard us
22 say this for years and for hundreds of presentations,
23 the irrigated rent data in Kansas, we don't believe
24 them. That's all I can say.

25 We have plenty of anecdotal evidence to

1 suggest otherwise, but we don't believe the data and so
2 we don't use them for anything.

3 ARBITRATOR DREHER: Let me have a
4 clarification.

5 You don't believe which data?

6 THE WITNESS: The Kansas Ag data on
7 irrigated lands in Kansas.

8 Q. (BY MR. DRAPER) Is this an indication --

9 A. And this is an indication, because they
10 often end up applying zero value to water, and we know
11 that's not true, because people irrigating in a lot of
12 different places, right? And yet, even in western
13 Kansas, like it implies there, zero to very low value on
14 water.

15 Anyway . . .

16 Q. Would people across the stateline in
17 Nebraska be using water if its value were zero or less?

18 A. No, they wouldn't; but ironically, we can
19 look at right across the stateline, and they're much
20 larger, more like \$70.

21 Like I said, it doesn't make any sense to
22 me, never has. We've had this discussion with the
23 States, we still haven't resolved it. We just don't use
24 the data.

25 Q. Let me turn your attention to Kansas

1 Exhibit 44. That's the Ann Bleed memo.

2 A. Yes.

3 Q. Mr. Wilmoth suggested that the values
4 agreed to by Nebraska that are listed on the first page
5 of this exhibit were affected by the Kansas demand of
6 December 2007. When was this memo written?

7 A. March 5, 2007.

8 Q. So that was before the demand?

9 A. That was before.

10 Q. Turning your attention also to Kansas
11 Exhibits 50, 51 and 52, the contracts themselves.

12 A. They typically were in -- well, the 10th of
13 May in 2006 is when the contracts were entered to
14 purchase the water, which was a long time before the
15 letter threatening Nebraska with larger damages.

16 Q. And does this type of data represent market
17 data that's relevant?

18 A. Yes, it does, and yes, it's relevant.

19 MR. DRAPER: No further questions.

20 MR. WILMOTH: Excuse me, Mr. Arbitrator,
21 there is one point of clarification. Just for the
22 record, I don't want to -- I would like to offer into
23 evidence an exhibit, which is the data that Dr. Kastens
24 is explaining is untrustworthy. And you will see that
25 it has Dr. Kastens' name on it.

1 ARBITRATOR DREHER: Do I have that?

2 MR. WILMOTH: I would like to offer that as
3 Nebraska Exhibit 15.

4 MR. DRAPER: This is out of line.

5 MR. WILMOTH: This is cited in
6 Dr. Sunding's report -- specifically cited in
7 Dr. Sunding's report.

8 ARBITRATOR DREHER: Is it referenced in
9 Dr. Sunding's report?

10 MR. WILMOTH: Yes, I believe it is.

11 ARBITRATOR DREHER: And where --

12 MR. DRAPER: There is some that is in an
13 attachment to Dr. Sunding's report and, therefore, it is
14 already in.

15 MR. WILMOTH: I believe if you allow
16 Dr. Sunding -- can you demonstrate where it is cited?

17 ARBITRATOR DREHER: Just tell me.

18 MR. WILMOTH: He needs a copy.

19 ARBITRATOR DREHER: It's his report, he
20 should have a copy.

21 THE WITNESS: I would like to respond to
22 that as well.

23 MR. WILMOTH: I don't have any questions.

24 MR. DRAPER: Could you hand me a copy of
25 the document you're talking about?

1 DR. SUNDING: It's on the bottom of page 14
2 of my report.

3 ARBITRATOR DREHER: Mr. Draper, this does
4 appear to be the document that is specifically
5 referenced.

6 MR. DRAPER: Well, I think we may not have
7 any reason for a disagreement between the States on
8 this. My copy of Dr. Sunding's report has it attached.
9 Now, I think it is already part of that --

10 ARBITRATOR DREHER: Where in your copy is
11 it attached? Because I'm trying to -- if it's attached
12 in what you've got, I would like to see if it's attached
13 in the record copy here.

14 MR. DRAPER: Well, let's see if I can give
15 you a good reference here. If we turn back through his
16 report, it has a copy of the Kansas experts report
17 attached. Behind that there is a Kansas Bostwick
18 bulletin.

19 THE WITNESS: There are no page numbers.
20 It's right after the Courtland Canal, Below Lovewell,
21 delivery numbers. Are we looking in Dr. Sunding's
22 report?

23 MR. DRAPER: Yes.

24 MR. AMPE: It's a little less than halfway
25 back.

1 ARBITRATOR DREHER: Now, I've got a sheet
2 here that says "Courtland Canal, Kansas BELOW LOVEWELL."

3 THE WITNESS: It should be the next one.

4 ARBITRATOR DREHER: So it is in the record
5 copy, it has already been admitted?

6 Mr. Wilmoth, it is in the record copy, it
7 has already been admitted.

8 MR. WILMOTH: Very good. I'm sorry, my
9 mistake. As long as it's part of the record, that's
10 what is important. Thank you.

11 We have nothing further.

12 Q. (BY MR. DRAPER) And if I may ask the
13 witness about this document.

14 A. Yeah, let me explain the document.

15 First of all, these are not our data. It
16 has been constantly mentioned that since we authored
17 this publication, these are our data.

18 All we do is repackage what comes out from
19 National Ag Statistics so we can show more years.

20 Anybody that has ever heard us talk about
21 these data in the country will hear us say, Here are the
22 data. Now ignore the irrigated numbers. That's exactly
23 the words we use. It's bizarre, but that's what we do.

24 ARBITRATOR DREHER: Well, Mr. Draper --

25 THE WITNESS: That's just -- that's just

1 the way -- the reality of the way we treat it.

2 ARBITRATOR DREHER: If I might ask, is
3 there any such qualifier in the published version of
4 this data?

5 THE WITNESS: No, no, because it's just
6 repackaging data that are out there from Kansas Ag
7 Statistics.

8 ARBITRATOR DREHER: It would seem, as
9 strongly you feel about it, that you would put a
10 qualifier on it.

11 THE WITNESS: I don't know. It has been
12 that way for years.

13 ARBITRATOR DREHER: All right.

14 MR. DRAPER: I would ask you to, if you
15 have a copy -- do you have a copy of it?

16 THE WITNESS: Let me look back in this
17 report again.

18 MR. WILMOTH: I have an extra copy, Doctor.

19 THE WITNESS: I have it, I have it. All
20 right.

21 Q. (BY MR. DRAPER) If you look at the first
22 page of this document, which is identified as MMF-1100
23 in the upper right-hand corner, and you look at the
24 first paragraph, would you read the last sentence of the
25 first paragraph.

1 A. Yeah, it says, "Thus, these data are more
2 appropriate for analyzing trends than for establishing
3 market value or rental rates for specific tracts of
4 farmland."

5 Q. So that is some indication of the
6 importance on the data?

7 A. Yeah, it's just -- yeah.

8 MR. DRAPER: Nothing further.

9 ARBITRATOR DREHER: All right. You may
10 proceed with what I believe is your last rebuttal
11 witness.

12 MR. DRAPER: Yes.

13 And as I mentioned before, it's merely a
14 housekeeping return of Dr. Leatherman to provide
15 information that you requested.

16 ARBITRATOR DREHER: Dr. Leatherman, you're
17 still under oath.

18 MR. DRAPER: Before we get started with my
19 single question for Dr. Leatherman, I might just move
20 the admission of the exhibits that were discussed during
21 Dr. Kastens' testimony so we keep ourselves on track.

22 ARBITRATOR DREHER: That would be fine.

23 MR. DRAPER: Those were Kansas Exhibits 44,
24 46, 47, 50, 51 and 52.

25 ARBITRATOR DREHER: Any objection?

1 MR. WILMOTH: No. I don't think we offered
2 anything that wasn't already in the record.

3 ARBITRATOR DREHER: They're admitted.

4 (WHEREUPON, Kansas Exhibits 44, 46, 47, 50,
5 51 and 52 were admitted into evidence.)

6 ARBITRATOR DREHER: Before you ask your
7 single question, in the stack of exhibits that I have
8 here, I seem to be missing Kansas 45, and I don't know
9 what that is.

10 MR. DRAPER: That's a reserve number at the
11 moment.

12 ARBITRATOR DREHER: All right.

13 MR. DRAPER: You may see that at a later
14 point.

15 MR. WILMOTH: Excuse me. John, did you
16 move Kansas 46?

17 MR. DRAPER: Yes, I did.

18 MR. WILMOTH: And that has been received?

19 MR. DRAPER: Yes.

20 MR. WILMOTH: Thank you.

21 JOHN LEATHERMAN,
22 having previously been sworn, was examined and testified
23 as follows:

24 DIRECT EXAMINATION

25 BY MR. DRAPER:

1 Q. Dr. Leatherman, good morning.

2 A. Good morning.

3 Q. You were asked a question about some
4 follow-up by Mr. Dreher regarding the information shown
5 in your report, which is Kansas Exhibit 5 in a Table on
6 page 20, Table 15, regarding a disposable income factor.

7 And his question was: What was the source
8 of the percentage factors shown in Table 15 for
9 disposable income?

10 Could you provide that answer?

11 A. At least in part, I believe I can.

12 Following my testimony yesterday, I did go
13 downstairs and try to make some phone calls to get some
14 clarification about that. And, indeed, I, at least,
15 received some partial explanation until Sam Speed came
16 down and took the phone away from me and dragged me back
17 upstairs.

18 The start of the bottom-line answer is that
19 this is actually much more complex than you might
20 imagine.

21 In discussing this with the IMPLAN people,
22 there are multiple sources of government data that are
23 used to begin with and then otherwise to estimate values
24 that should be subtracted from the total personal
25 income, the taxes, the savings and so forth.

1 And, indeed, it became apparent that this
2 would be a long and tedious and complex discussion that
3 would even boil down to: What is the definition of
4 income?

5 At the bottom line, what I would assert is
6 the source for this data is IMPLAN and their diversions
7 and distribution of these types of estimates.

8 I would say that it is within the context
9 of a consistent national accounting system that adds up
10 to observed values.

11 Having said that, they do utilize -- they
12 do internally distribute it between the nine income
13 household sectors -- household income sectors that they
14 include within their model.

15 That is the point at which I cannot point
16 to some government report. That is -- that is a
17 distribution that they split apart a single household
18 expenditure consumption pattern into those nine separate
19 parts.

20 Now, having constructed Social Accounting
21 Matrices myself independently, I can only tell you that
22 you otherwise utilize the best available data, good
23 judgment, sound techniques, to the best of your ability.

24 And in the case of IMPLAN, this is a system
25 that is transparent, it adds up to known quantities that

1 we can observe, and it is nationally accepted as being,
2 perhaps, at least one of the standards that we would
3 utilize.

4 So ultimately the source of this data is
5 the Kansas Social Accounting Matrix produced by the
6 Minnesota IMPLAN Group and the procedures whereby I come
7 up with this particular proportion as disposable income
8 I've detailed in the report.

9 MR. DRAPER: Thank you. No further
10 questions.

11 ARBITRATOR DREHER: All right. Do you have
12 any cross?

13 CROSS-EXAMINATION

14 BY MR. WILMOTH:

15 Q. Dr. Leatherman, hypothetically speaking, if
16 the direct economic impacts in this proceeding were
17 zero, what would the indirect impacts be?

18 A. As I have previously testified, I hate
19 dealing with some of these hypotheticals. Because why?
20 It's not real.

21 But to answer your question, you know,
22 nothing on top -- the impact of nothing is nothing.

23 MR. WILMOTH: Thank you. No further
24 questions.

25 MR. AMPE: Nothing.

1 ARBITRATOR DREHER: All right. We'll
2 adjourn for lunch.

3 (Break was taken from 11:48 to 1:40.)

4 ARBITRATOR DREHER: Are we ready to
5 proceed, Mr. Draper?

6 MR. DRAPER: Yes, we are, Your Honor, ready
7 to proceed with the second segment regarding future
8 compliance. And I would propose to again give a short
9 opening remark and then we would call our first witness.

10 ARBITRATOR DREHER: Please, go ahead.

11 MR. DRAPER: And I'm happy to note that I
12 think we're ahead of schedule.

13 ARBITRATOR DREHER: We are, half a day.

14 MR. DRAPER: We weren't expecting to reach
15 this point until, at a minimum, Wednesday morning and we
16 allowed for the possibility it might be a little later
17 than that, so we're making progress.

18 We're now opening the second segment of
19 this proceeding with regard to future compliance, and I
20 think it's worth noting that, as we saw this morning,
21 there are very different views about the value of water
22 in Nebraska. If the water is in Nebraska, it's very
23 valuable; if it's in Kansas, it's worthless. And, thus,
24 it is clear that Nebraska must be required to comply
25 with the Compact, the Decree and the Final Settlement

1 Stipulation.

2 And as our first witness to this most
3 important part of the arbitration, from our point of
4 view, with regard to our proposal as to how, at a
5 minimum, future compliance by Nebraska can be attained,
6 we will call Mr. Book.

7 He will testify to the amount of reduction
8 in stream depletions necessary to enable Nebraska to
9 achieve yearly compliance with the Compact allocations,
10 in most years.

11 Mr. Larson will be our second witness. He
12 will describe the use of the agreed RRCA Groundwater
13 Model to determine the reduction in pumping necessary to
14 achieve the reduction in depletions determined to be
15 necessary by Mr. Book.

16 Mr. Larson will also describe his analysis
17 of the hydrologic effect of the Nebraska integrated
18 management plans.

19 Following Mr. Larson, Mr. Pope will -- and
20 he's the former chief engineer of Kansas, will testify
21 to other aspects of the proposed compliance plan.

22 Then Mr. Barfield will testify regarding
23 his expert report on compliance.

24 Looking at our hearing outline, I would
25 note that the final two witnesses that we listed are the

1 Bureau witnesses that we have discussed handling on a
2 separate day, after the States have had a chance to take
3 their depositions.

4 I have communicated our agreement this
5 morning as to our proposal and I hope to hear back later
6 today from the Bureau.

7 With that, I would call Mr. Book to the
8 stand.

9 ARBITRATOR DREHER: Mr. Book, you're still
10 under oath.

11 THE WITNESS: Yes.

12 DALE BOOK,
13 having previously been sworn, was examined and testified
14 as follows:

15 DIRECT EXAMINATION

16 BY MR. DRAPER:

17 Q. Mr. Book, you have already testified. I
18 would now like to ask you to turn to another topic,
19 which is covered by your expert report, which has been
20 identified as Kansas Exhibit No. 2. This is entitled
21 "Requirements for Nebraska's Compliance with the
22 Republican River Compact."

23 Would you describe what you were asked to
24 do, how you went about doing that and at that point I'll
25 ask you to briefly describe the contents of your report.

1 A. Yes. This report was prepared in December
2 of 2007 at the request of Mr. Barfield and the State of
3 Kansas. The purpose of the analysis was to determine
4 the amount of reduction in groundwater consumptive
5 beneficial consumptive use in order to be able to be in
6 compliance with the allocations under the Compact
7 Administration accounting for the years that had
8 recently been completed and analyzed, 2002 through 2006.

9 To do this analysis, I reviewed and
10 utilized the Compact Administration, RRCA, the
11 accounting data for the five years. I compared the
12 results of the beneficial consumptive use in the state
13 of Nebraska with the Nebraska allocation and computed
14 the difference and determined what the resulting
15 required reduction in beneficial consumptive use would
16 be to achieve a balance between the allocation and
17 consumptive use for the five years.

18 I then made an estimate of the amount of
19 reduced consumptive use resulting from reducing
20 groundwater pumping that would be resulting in increased
21 surface water use within the state of Nebraska and
22 adjusted for that in the calculation.

23 The result of the analysis was a
24 recommendation for a level of groundwater consumptive
25 use that would balance with the allocations for this

1 five-year period.

2 ARBITRATOR DREHER: Mr. Draper, the copy of
3 the report that I have is dated January 20, 2009, and
4 Mr. Book, I think, said that he prepared this in --
5 sometime in 2007?

6 MR. DRAPER: This is a current version of
7 one that was prepared at about the time you're
8 mentioning and was attached to the original December 19
9 letter -- December 19, 2007 letter to the State of
10 Nebraska.

11 ARBITRATOR DREHER: Okay.

12 Q. (BY MR. DRAPER) To what degree, Mr. Book,
13 does this report dated January 20, 2009 differ from your
14 report that was submitted with the December 19, 2007
15 letter?

16 A. In all respects, it is virtually identical.
17 I believe there was a slight change in the 2006 RRCA
18 accounting to reflect corrections that were required
19 after December 2007. Other than that, the analysis is
20 the same.

21 Q. Would you please describe briefly what is
22 contained in each part of the report.

23 A. The report provides an Introduction on page
24 1, which sets out the general purpose of the analysis,
25 that purpose being to calculate the amount of reduced

1 consumptive beneficial consumptive use due to
2 groundwater pumping to achieve a balance that I referred
3 to. The Introduction makes note that the period used
4 for this analysis was the five-year period 2002 through
5 2006. The purpose of this analysis is to focus on the
6 five-year accounting period.

7 The Introduction also notes what the actual
8 status of consumptive use and allocations were for the
9 period 2002 through 2006, using the accounting
10 procedures contained in the FSS, which is described
11 later in a table.

12 Following the introduction, I have a brief
13 section on the basic criteria and assumptions that were
14 used in this analysis.

15 The primary assumptions that were used or
16 criteria were that the five-year accounting test would
17 be used to achieve a balance. The reductions in
18 consumptive use would be achieved through a reduction in
19 groundwater pumping.

20 The information that I was developing was
21 provided to the other members of the team for the
22 purpose of groundwater modeling analyses.

23 I included an assumption backed up with
24 some analysis that the reduction of groundwater
25 consumptive use would have some effect on surface water

1 use within the state of Nebraska, which would increase
2 that use, and I consider that effectiveness in the
3 overall balance.

4 Following the criteria, there is a brief
5 description of the analysis. The description of the
6 analysis includes a reference to the calculations that I
7 did for this period of time to estimate the impact of
8 reduced pumping on the surface water use in Nebraska.

9 The result of that analysis was a
10 45 percent -- 45 percent of the change in consumptive
11 use would then accrue to increased surface water use in
12 Nebraska.

13 I also note that I used the imported water
14 supply credits which were being predicted by the
15 groundwater model with the compliance proposal being
16 developed by the modelers. That is reflected also in
17 Table 1.

18 This is followed by a section describing
19 the results of the analysis.

20 And then there is a Conclusion, paragraph
21 or two, and that is followed by a table which provides
22 the historical 2002 through 2006 allocations consumptive
23 use and status and then provides the derivation of the
24 reduced amount of groundwater consumptive use in order
25 to achieve a balance with the allocation for those five

1 years.

2 Q. You might say another word about your
3 determination that surface water use would increase in
4 Nebraska if groundwater pumping were reduced.

5 Would you explain why that would occur.

6 A. Yes. Nebraska has a significant amount of
7 surface water use, primarily through the large projects
8 with the Bureau of Reclamation, several large
9 reservoirs, as well as a number of -- well, a lot of
10 surface water users, small private pumpers or canals
11 from the stream system. Those uses are impacted by
12 groundwater effects in Nebraska. And during periods of
13 low flows, those uses are impacted to the point of the
14 yields being below normal or high-year yields.

15 When you reduce pumping and the stream
16 depletions due to pumping in a basin which supports
17 significant surface water use, where surface water users
18 are senior in priority as streamflows are improved,
19 those uses will also be increased. And it was necessary
20 to account for that in this analysis, that there would
21 be some compensating increase in surface water
22 consumptive use as you reduce depletions to wells.

23 Q. Could you describe your ultimate
24 conclusions from this analysis.

25 A. Yes. The ultimate conclusions are

1 displayed on the Table 1.

2 The top part of the table shows the actual
3 Compact accounting for the five-year period. This is
4 Nebraska's five-year accounting, which comes out of
5 Table 3.C in the accounting procedures for this
6 five-year period, the average statewide allocation was
7 211,000 acre-feet per year.

8 The consumptive use is separately shown for
9 the groundwater, which is derived from the RRCA
10 Groundwater Model and the surface water consumptive use.
11 Those numbers averaged for this period 200,000 acre-feet
12 for groundwater and 54,000 acre-feet for surface water.
13 The imported water supply credit for this period is also
14 shown, an average 12,000 acre-feet per year.

15 The net effect was an overuse in Nebraska
16 for this period, which is shown for each of the five
17 years and the average -- five-year average for that
18 period was 31,000 acre-feet per year.

19 On the bottom part of the table is shown
20 the derivation of the amount of groundwater consumptive
21 beneficial use -- computed beneficial consumptive use,
22 excuse me -- that would result in a balance with the
23 allocation for this same five-year period. This table
24 shows how the change in surface water was also figured
25 in this allocation, increasing from 54,000 acre-feet per

1 year under actual conditions to 66,000 acre-feet per
2 year with this reduction in groundwater depletion.

3 The imported water supply credit, as I
4 mentioned, was obtained from the RRCA Groundwater Model
5 results with the -- this level of pumping and that was
6 averaging 30,000 acre-feet per year. The result is a
7 balance for the five-year period.

8 It should be noted there that there are
9 both positives and negatives in this five-year period,
10 including a pair of overuse numbers retained for the two
11 years, 2005 and 2006, with the groundwater consumptive
12 use reduced to 175,000.

13 Q. How did you determine the 175,000 acre-foot
14 figure in the second column from the left in the
15 "Adjusted" part of the table?

16 A. The ultimate calculation is a
17 trial-and-error calculation to account for the increased
18 surface water consumptive use in order to achieve a
19 balance between the allocation and the total consumptive
20 use shown in the last column, and that was done on the
21 basis of an average to achieve a balance on the average.

22 Q. And, therefore, what conclusions for
23 purposes of the Kansas proposal for achieving
24 compliance, what were the ultimate take-home figures
25 from this analysis?

1 A. The primary result of this analysis is the
2 value of 175,000 acre-feet per year to which the
3 groundwater consumptive use projected into the future
4 would need to be reduced to in order to achieve
5 compliance with a five-year test at this level of water
6 supply allocation. That figure then was provided to the
7 rest of the team for groundwater modeling to take that
8 result and then determine pumping reductions with the
9 groundwater model.

10 MR. DRAPER: Those are all the questions I
11 have for Mr. Book at this point.

12 ARBITRATOR DREHER: Well, I have several.

13 To start with, in the first paragraph of
14 your report you state "The expected result for the
15 five-year period of 2003 through 2007..." I note that
16 your analysis period was 2002 through 2006.

17 But you make a statement that: The result
18 for the five-year period of 2003 through 2007 is that
19 Nebraska's statewide computed beneficial consumptive use
20 will exceed its corresponding allocation.

21 And given that this report was first
22 prepared in 2007, I'm wondering if that statement is
23 still applicable.

24 THE WITNESS: Yes, it is.

25 ARBITRATOR DREHER: And yet, this -- well,

1 this part of the proceeding has to do with future
2 Compact compliance, but the earlier part had to do with
3 just the compliance during 2005-2006.

4 This 45 percent figure that you developed
5 for the additional surface water use that would occur in
6 Nebraska, how did you derive that? And you used the
7 terminology "consumed." Do you mean consumed or do you
8 mean diverted? Let me give you an example.

9 On page 3, you make the statement, "The
10 amount of additional streamflow that would be consumed
11 by surface water uses in Nebraska was estimated to be
12 about 45 percent."

13 And so the question really is twofold:

14 How did you derive the 45 percent factor?
15 And by "consumed," do you mean consumptively used or
16 diverted for consumptive use?

17 THE WITNESS: Yes, I do mean consumptively
18 used.

19 I used an analysis which I would consider
20 for years of low water supply. I used two years out of
21 this period 2003 and 2006, I believe. And I took the
22 results of the groundwater modeling with compliance, and
23 based on the distribution of the groundwater depletions
24 that come out of the model and go into the individual
25 subbasin accounting in the RRCA accounting made

1 estimates of the amount of water and how that water
2 would be subsequently utilized within the projects. The
3 assumption here is that it would be utilized within the
4 projects, the reservoirs.

5 And so I looked at where those depletions
6 were with respect to the various project reservoirs in
7 the basin. And then because of the storage condition in
8 the reservoirs for these two years, I assumed that the
9 water would be used because of the low supplies or that
10 water during the off-season would be stored and then
11 held for either later use or -- and there would be some
12 evaporation loss.

13 I did not construct a basin model. I made
14 estimates basin-by-basin and project-by-project as to
15 how water would be retained in the project reservoirs
16 and then would generate return flows back to the system.

17 ARBITRATOR DREHER: And for 2006, I assume
18 that in your calculation of beneficial consumptive use,
19 you assigned all of the evaporation from Harlan County
20 Lake to Nebraska -- no. You split it between -- I
21 assume that you split it between Kansas and Nebraska --

22 THE WITNESS: That's correct.

23 ARBITRATOR DREHER: -- rather than
24 assigning it all to Kansas?

25 THE WITNESS: That's correct.

1 ARBITRATOR DREHER: You think with the
2 strong difference of opinion, I could keep Nebraska and
3 Kansas straight.

4 MR. DRAPER: We sometimes get them mixed up
5 ourselves when we try to speak.

6 ARBITRATOR DREHER: Also, at the bottom of
7 page 3 you make reference to the need to reduce stream
8 depletions due to groundwater pumping in Nebraska from
9 200,000 to 175,000 acre-feet.

10 And I understand -- or at least I think
11 what you said and what you have written here is that
12 that was based upon trial-and-error runs using the
13 groundwater model.

14 And if I understand the package of reports
15 that I was given, the groundwater model results, they're
16 set forth in this expert report of Steven Larson and
17 Samuel Perkins.

18 But when I read that report -- and maybe
19 this is a question I have to reserve for them -- they
20 describe reducing depletions to the Republican River
21 streamflow to 164,700 acre-feet, not 175,000 acre-feet
22 per year.

23 And I wondered if you could comment on the
24 differences between the 175,000 that you stated and the
25 164,700 that they stated. And then, also, there is a

1 difference in the imported water supply credit. You
2 used 30,000 acre-feet per year and they used something
3 along the line of 27,600 acre-feet per year.

4 THE WITNESS: Yes, I can speak better to
5 the imported water supply credit.

6 I don't recall from that report exactly
7 what the 164,000 is referring to. That probably is a
8 better question for Mr. Larson.

9 ARBITRATOR DREHER: The reason I ask it of
10 you is because in your Introduction when you talk about
11 using the ground -- the RRCA Groundwater Model to
12 determine reductions in pumping, your parenthetical
13 reference says, See Larson and Perkins report. So
14 that's . . .

15 THE WITNESS: Yes. Yes, I provided them
16 with the value of 175,000.

17 The trial and error that I'm referring to
18 really does not refer to going back and forth between
19 this analysis and the groundwater model, other than to
20 obtain a value for the imported water supply credit.

21 The 30,000, I believe, is the credit late
22 in the period that was being modeled. And, in my view,
23 that would be somewhat of a steady-state value for the
24 imported water supply credit. So that's the value that
25 I used for my table; but the derivation of the 175,000

1 is based on the allocations for these five years, and
2 the changes to the surface water use in order a achieve
3 a balance in the Compact accounting.

4 ARBITRATOR DREHER: Am I correct, in
5 looking at this -- I mean, in Table 1, you show the
6 average overconsumption for the 2002-2006 time period
7 being 31,000 acre-feet per year.

8 THE WITNESS: Yes.

9 ARBITRATOR DREHER: And so you reduce
10 groundwater consumptive use by 25,000 acre-feet per
11 year, which is less than the 31,000 of overage; but the
12 reason it works is because, along with the -- well,
13 along with the reduction in groundwater computed
14 beneficial consumptive use, the imported water supply
15 credit is increasing because of groundwater
16 restrictions; is that accurate?

17 THE WITNESS: That is correct, yes. There
18 is some interaction within groundwater modeling between
19 where pumping occurs in Nebraska and, ultimately, the
20 imported water supply credit calculations tied to water
21 levels, which is dependent upon pumping levels as you
22 change pumping, as well as other aspects of the modeling
23 related to hydrology; but that does have an effect on
24 the imported water supply credit.

25 And we're simply reflecting here the

1 reality from the modeling that this imported water
2 supply is projected to increase at this level of pumping
3 that's reflected in the remedy.

4 And so it is that increase in the imported
5 water supply credit that allows the reduction in pumping
6 depletion to be smaller than the deficit for this
7 period.

8 ARBITRATOR DREHER: Okay.

9 Mr. Wilmoth.

10 MR. WILMOTH: Thank you.

11 CROSS-EXAMINATION

12 BY MR. WILMOTH:

13 Q. Good afternoon, Mr. Book, welcome back.

14 A. Good afternoon.

15 Q. Can't have enough fun, can we?

16 I don't have any questions about your
17 paper. I simply would like to ask you if you provided
18 any information or assistance to Drs. Larson, Perkins;
19 and if so, if you could identify essentially what that
20 was.

21 A. I think the assistance I provided was --
22 is basically as set out in Table 1 to provide a -- what
23 I would call a target value of groundwater consumptive
24 use, and that's the value -- the 175,000 acre-feet.

25 Q. Okay, very good.

1 And that target value for CBCU groundwater
2 is based on a relatively dry period. Is that the '02 to
3 '06?

4 A. Yes.

5 MR. WOLMITH: I think, with your
6 indulgence, I'll reserve the rest of my questions for
7 Dr. Larson.

8 ARBITRATOR DREHER: Okay.
9 Colorado?

10 MR. AMPE: No questions.

11 ARBITRATOR DREHER: Redirect?

12 MR. DRAPER: Well, I'll take my ceremonial
13 five minutes, if I may.

14 ARBITRATOR DREHER: Sure.

15 (Break was taken from 2:07 to 2:16.)

16 ARBITRATOR DREHER: Mr. Draper, do you have
17 any direct?

18 MR. WILMOTH: Mr. Ampe is not here yet.

19 ARBITRATOR DREHER: All right.

20 Now, Mr. Draper, do you have any redirect?

21 MR. DRAPER: No redirect of Mr. Book.

22 ARBITRATOR DREHER: All right, you may call
23 your next witness.

24 MR. DRAPER: And I would at this juncture
25 also move the admission of Mr. Book's expert report,

1 Kansas Exhibit No. 2.

2 ARBITRATOR DREHER: Any objection?

3 MR. WILMOTH: No.

4 ARBITRATOR DREHER: Colorado?

5 MR. AMPE: No.

6 ARBITRATOR DREHER: All right. Admitted.

7 (WHEREUPON, Kansas Exhibit 2 was admitted
8 into evidence.)

9 MR. DRAPER: We'll then call our next
10 witness, Mr. Steven Larson.

11 I neglected to mention, Your Honor, we are
12 prepared to put on our -- even though we're ahead of
13 schedule, we're prepared to put on our first two
14 witnesses: Mr. Book and now Mr. Larson.

15 If we get through with Mr. Larson,
16 we're going to need to ask to break until tomorrow
17 morning. Our next witness is not arriving until later
18 today.

19 ARBITRATOR DREHER: Okay.

20 MR. DRAPER: But I think we'll still be
21 well ahead of schedule if that's the case.

22 ARBITRATOR DREHER: That will be fine.

23 MR. DRAPER: Thank you.

24 STEVE P. LARSON,

25 having been first duly sworn, was examined and testified

1 as follows:

2 DIRECT EXAMINATION

3 BY MR. DRAPER:

4 Q. Good afternoon, Mr. Larson.

5 A. Good afternoon.

6 Q. Please state your full name and your
7 professional position and address.

8 A. My name is Steven P. Larson. I'm a
9 groundwater hydrologist and a principal with S.S.
10 Papadopoulos & Associates, Incorporated in Bethesda,
11 Maryland.

12 Q. And do you have with you a copy of your CV,
13 which has been marked as Kansas Exhibit No. 9?

14 A. Yes, I do.

15 Q. Would you briefly describe the
16 qualifications and experience that you had that relate
17 to the issues in this proceeding.

18 A. Well, my original career, my career began
19 with the U.S. Geological Survey back in 1971, working in
20 their Water Resources Division. My initial work with
21 them was dealing with water-related projects, especially
22 a smaller investigation area in western Minnesota that
23 not only included irrigation, but it also included the
24 development of a groundwater model to evaluate the
25 potential impacts of that irrigation.

1 As a consequence of some of that work, I
2 was transferred to the headquarters of the U.S.
3 Geological Survey in Reston, Virginia, where my job was
4 to basically develop groundwater models for use
5 throughout the U.S. Geological Survey at their district
6 offices in various parts of the country.

7 And one of my other jobs in that position
8 was to help consult with people who were utilizing these
9 groundwater models in their various projects.

10 Subsequently, I went to work for S.S.
11 Papadopoulos & Associates. My work there over the last,
12 I guess, 25 or 30 years has been, in part, related to
13 environmental matters, generally groundwater
14 contamination matters and, in part, related to water
15 resources matters, such as those that we deal with here.

16 I've also been working for the State of
17 Kansas for some time. I worked for the State of Kansas
18 on their actions associated with the Arkansas River. I
19 assisted in the modeling of that problem and the
20 analysis of that problem and in several other regions
21 throughout the country.

22 Q. How long have you been working on
23 groundwater issues in the Republican River Basin?

24 A. I'm trying to think back. Probably around
25 1996, 1997, somewhere in that neighborhood.

1 Q. Did that include work on what we call the
2 RRCA Groundwater Model?

3 A. Yes, it did. I was the lead modeler, I
4 guess, for the Kansas team associated with that
5 activity.

6 Q. I would like to first identify Kansas
7 Exhibit 3, which is one of the two expert reports that
8 you have prepared and that Kansas has submitted for
9 purposes of this proceeding.

10 Did you utilize the RRCA Groundwater Model
11 in the work that you did that resulted in your report in
12 Kansas Exhibit 3?

13 A. To make sure I have the proper Exhibit 3
14 here, that's Attachment 5?

15 Q. Yes --

16 A. Yes.

17 Q. -- entitled "Attachment 5: RRCA groundwater
18 model analysis (revised) Impact of Nebraska pumping and
19 proposed remedy," dated January 4, 2008?

20 A. Yes.

21 Q. What investigation did you pursue with the
22 RRCA Groundwater Model?

23 A. Well, the investigation was to make a
24 determination of how much reduction in pumping would be
25 necessary and how that reduction in pumping would be

1 structured in order to achieve, at least in a short run,
2 a fairly rapid, or as rapid as possible, decrease in the
3 groundwater -- the computed groundwater consumptive use.

4 And then in the longer term, to be able to
5 maintain that computed groundwater consumptive use at or
6 below the levels that Mr. Book had determined the
7 175,000 acre-feet per year number.

8 So the goal -- or the goal was basically to
9 reduce the groundwater CBCU as quickly as possible and
10 then to maintain it, recognizing that over the long term
11 there is going to be a general upward trend in the
12 groundwater CBCU, just due to the lag effects of
13 historical pumping within the basin.

14 Q. Would you walk us through your report,
15 please, and briefly describe each of the important
16 elements.

17 A. Well, the first -- first page just provides
18 some introductory information and sort of a summary of
19 what we ultimately determined was necessary in order to
20 produce a groundwater -- a computed groundwater
21 beneficial consumptive use that would reach the levels
22 that Mr. Book had determined.

23 And as shown on that page, we estimated
24 that about 514-, 515,000 acres of groundwater irrigation
25 would have to be reduced. That's the amount it had to

1 be reduced by.

2 And it would be reduced in two ways: One,
3 a curtailment of pumping within the proximity of the
4 stream systems within the model -- within close
5 proximity to those streams so that we could get a fairly
6 rapid response to the reduction in pumping.

7 And then in areas beyond the immediate
8 areas of the stream, a further reduction, if you will,
9 or limitation on the amount of irrigated acreage to be
10 able to maintain the level of computed groundwater
11 consumptive use, such that over the long term we can
12 stay below the 175,000-acre-foot-per-year estimate
13 derived by Mr. Book.

14 So that's what we explain in the first
15 page, was the basic conclusions that we reached about
16 that. The remainder of the report goes on to discuss
17 how we made our assessment.

18 The first step was to develop basically a
19 sequence of future conditions to use as a marker for
20 what we can expect to see going down the road. We need
21 to look out into the future quite a number of years
22 because the system is very large and responses can be
23 very slow and very lagged in terms of their effect on
24 the stream.

25 So what we did is we selected a repeated

1 cycle of about a 17-year period. We focused on the data
2 from 1990 to 2006. That was the reason for that, was it
3 was more reflective of more recent updated conditions.
4 It also included both some wet periods and some dry
5 periods, so it had a mix of above normal water supply
6 conditions and below normal water supply conditions.

7 We then repeated that cycle three times to
8 give us basically a 51-year sort of calculation horizon
9 for looking at future conditions.

10 We then developed what we called a status
11 quo scenario, where we took the current level of
12 development; and with some adjustments to reflect
13 current conditions generally, we developed then a
14 scenario of what -- under those conditions, what the
15 future pumping would be like and used the cycle of the
16 three -- the repeating cycle of historical hydrology to
17 determine what would happen if, in fact, that level of
18 development continued into the future. And that was
19 what we called our status quo scenario.

20 We then sort of, I would say somewhat in a
21 trial-and-error process, much like Mr. Book described,
22 looked at various levels of curtailment of pumping,
23 again focusing on, in part, looking at what we call
24 quick response areas, or areas near the stream system
25 that would respond relatively quickly to reductions in

1 groundwater irrigation and upland areas that respond
2 more slowly, looking at combinations of those to
3 determine how much reduction would be necessary in order
4 to achieve the level of groundwater consumptive use that
5 Mr. Book had determined.

6 Ultimately, what we determined was that if
7 we -- if we curtailed pumping within about 2 1/2 miles
8 of the stream system and if we also held the pumping
9 outside that -- that corridor along the stream system to
10 the amount of acreage that was in place in the year
11 2000, that the combination of those two things would
12 produce a reduction in groundwater beneficial
13 consumptive use that would, over the long haul, stay
14 below the level that Mr. Book had determined.

15 And so the remainder of the report provides
16 a series of graphics to illustrate the results of our
17 calculations, once that information was put into the
18 model. The model was simply run -- the accounting
19 program that accompanies the model was run to determine
20 the groundwater consumptive beneficial use and the
21 imported water supply credit in terms of how that would
22 change as a consequence of having the remedy that we
23 developed imposed.

24 Q. What are shown in the figures in the back
25 of the report?

1 A. Well, Figure 1 shows the model grid domain.
2 And it also shows the area along the stream system where
3 the pumping curtailment was imposed for the remedy
4 calculation. It shows the area basically within 2 1/2
5 miles of the stream cells.

6 Basically, what we did is we looked at
7 where stream cells were located in the model and then we
8 took basically two cells on either side of the stream
9 and curtailed pumping from those. That ultimately is
10 about a 2 1/2-mile zone around the stream system. So
11 the map shows what that ultimate area looks like.

12 In Figure 2 we have shown several things.

13 First of all, we've shown the result of our
14 status quo calculation where we looked at sort of
15 current conditions and adjusted pumping rates and so on
16 to reflect current conditions and then projected that
17 going out 51 years into the future; that is, three of
18 the cycles of the 17-year period that we used to look at
19 future conditions. And that's shown by the red curve
20 shown on Figure 2. And you can see that there is a
21 continually increasing trend of impact projected out to
22 the year 2057.

23 Also shown on Figure 2 is the effect of
24 imposing the remedy that we determined in terms of the
25 curtailment of pumping within 2 1/2 miles of the stream

1 and holding the pumping in other areas to the 2000
2 acreage levels. And that's shown by the blue line that
3 departs from the red line in about 2007.

4 And you can see that there is an initial
5 drought over a period of about 10 or 11 years or so
6 representing the effects of being able to remove, or
7 curtail the pumping within that corridor along the
8 stream system.

9 Then as we go forward in time, there is a
10 continuing slow increase in the effects due to the lag
11 effects, basically, of historical pumping, continuing to
12 impact the streams; but throughout that period we remain
13 at least at or below the 175,000 or, roughly, I should
14 say, below the 175,000-acre-feet-per-year value that
15 Mr. Book determined.

16 At the bottom of the figure we show the
17 impact of the status quo scenario and the remedy
18 scenario on the imported water supply credit. The
19 purple line reflects the imported water supply credit
20 that was calculated under the status quo scenario.
21 The -- I guess it's sort of a light-blue-type line shows
22 the effect of the remedy on the imported water supply
23 credit. And it shows that there is a higher imported
24 water supply credit associated with the lower level of
25 pumping associated with the remedy scenario.

1 Then Figure 3 shows basically the net
2 effect of the pumping and the imported water supply
3 credit over time for both the status quo scenario and
4 the remedy scenario.

5 So that's just basically netting out the
6 groundwater beneficial consumptive use and the imported
7 water supply credit to show what that pattern looks like
8 over the horizon from out to 2057.

9 And then the last figure, Figure 4, shows
10 the impacts on the overall groundwater contribution to
11 streamflow within the model area. It's basically
12 showing how -- the groundwater contribution to
13 streamflow, basically its contribution to grading base
14 flow in the streams, how it is decreasing over time,
15 first over the historical period from about 1960 on to
16 2007.

17 And then after that we show the difference
18 between how that base flow would differ as between the
19 status quo scenario, which is shown in red, which shows
20 a continually -- or continuing decrease in the
21 groundwater contribution to base low, versus the remedy
22 scenario, where it shows that there will be some
23 recovery. And then generally, stabilization before a
24 little bit of a continuing decline out toward the end of
25 that period.

1 Q. And what were your conclusions from this
2 analysis?

3 A. Well, the conclusions were that this is the
4 level of pumping reduction that we believe is necessary
5 in order to reduce the groundwater consumptive
6 beneficial consumptive use down to levels that stay at
7 or below the 175,000-acre-foot-per-year figure that
8 Mr. Book determined, at least looking out into the
9 future some 50 years.

10 One of the reasons we look out into the
11 future, say, for this length of time is that this is a
12 very large system, we're talking about 25,000 square
13 miles. The response of this system to groundwater
14 pumping can occur over extended periods, over decades,
15 and that you can't really change the course of those
16 effects quickly. It takes some time for those effects
17 to manifest themselves in terms of changes that you
18 make.

19 So we wanted to look out far enough into
20 the future to be sure that it would produce levels that
21 could be maintained, at least for this period, below the
22 water 175,000 acre-foot-per-year figure that Mr. Book
23 had determined.

24 Q. Mr. Dreher had a question of Mr. Book of a
25 possible discrepancy between the 175,000 acre-foot

1 figure and 164,000 acre-foot figure that is mentioned in
2 your report.

3 Did you hear that question and can you
4 respond to Mr. Dreher?

5 A. Yes, I did. The 1 -- the number that we
6 quoted in our report is the average amount over the
7 future period from 2007 to 2057.

8 As you can see in the graph of Figure 2,
9 over time that tends to creep back up, again due to the
10 lag effects of regional pumping. And so when you
11 average it out, it is somewhat less than 175,000
12 acre-feet per year, but out toward the end of that
13 period, we're up around or exceeding 175,000 acre-feet
14 per year.

15 Q. Now, there is an Appendix A here. Does
16 that just describe the revision that is noted in the
17 title of the report?

18 A. Yes.

19 MR. DRAPER: Well, I think that allows me
20 to then pass on to your next expert report.

21 ARBITRATOR DREHER: If I might, could we
22 divide -- well, let me ask Nebraska.

23 I would like to divide my questions between
24 this report and the next report, rather than to have
25 them all lumped together. So I'm wondering if the

1 States would be willing to divide direct and cross
2 similarly. In other words, rather than do all your
3 direct right now, if we could focus on this report and
4 then come back to you for direct on the second report.

5 MR. DRAPER: If that suits you better,
6 that's fine with us.

7 ARBITRATOR DREHER: Is that acceptable to
8 Nebraska?

9 MR. WOLMITH: Yeah. Obviously, we'll
10 adhere to whatever makes more sense to you,
11 Mr. Arbitrator. I do think the two reports have some
12 commonalities that might come out if they were addressed
13 together. I simply offer that as an observation. We'll
14 go any way you want to go.

15 ARBITRATOR DREHER: Well, let me ask my
16 questions first, and then we can go back to Mr. Draper,
17 and that way if you think there is some possible benefit
18 to having them combined, we don't destroy that. Is that
19 all right?

20 MR. DRAPER: That would also be fine.

21 ARBITRATOR DREHER: Okay. I assume that in
22 the development of the groundwater model, that the
23 consumptive use across the model domain due to
24 groundwater varied?

25 THE WITNESS: Yes.

1 ARBITRATOR DREHER: And for the -- you
2 know, the extent of the area that you're simulating
3 curtailment on, I mean, it crosses a pretty significant
4 area, and I would assume that the consumptive use
5 associated with groundwater use in those areas where you
6 simulate curtailment also varied?

7 THE WITNESS: Yes.

8 ARBITRATOR DREHER: But on an average
9 basis, what would -- across this area of simulated
10 curtailment, what would an average consumptive use be
11 for groundwater?

12 THE WITNESS: Well, the total pumping, as I
13 recall, through that area was something on the order of
14 600,000 acre-feet per year.

15 ARBITRATOR DREHER: Consumption?

16 THE WITNESS: That would be the pumping. I
17 think, generally speaking, 80 percent of it is
18 consumptive, but that's probably a question that would
19 be better addressed to Mr. Barfield.

20 ARBITRATOR DREHER: Well, I may come back
21 to it for him; but in your case, you're saying -- I
22 mean, I recognize you're giving an approximation. So
23 you're saying -- you're estimating that 600,000
24 acre-feet was withdrawn and about 80 percent of that was
25 consumptive?

1 THE WITNESS: Yes, that's generally
2 speaking. I didn't try to make a particular estimate of
3 that.

4 ARBITRATOR DREHER: I understand.

5 I intended to go back to the Special
6 Master's Report regarding the groundwater model, and I
7 didn't have a chance to do that, but the model domain is
8 bounded by generally, I guess, the Platte River on the
9 north, which is the constant head boundary?

10 THE WITNESS: That's correct.

11 ARBITRATOR DREHER: What are the other
12 boundary conditions and what -- and I know it's
13 described in here; I just didn't have a chance to go
14 back and look.

15 But since you're here, what are the other
16 boundary conditions and what was the criteria used to
17 define the extent of the model domain?

18 THE WITNESS: Well, in part, it was based
19 on the geographic boundary of the Republican River
20 watershed; but recognizing, at least on the north side,
21 that the Platte River was present and that was selected
22 as the boundary on the north side because that would --
23 from a hydrologic perspective, would represent that
24 boundary.

25 Along the southeastern margin of the model

1 domain there are a series of what we call drains, but
2 they're basically sort of simulating groundwater
3 discharge via springs or other types of seepage to the
4 surface. Those are the boundary conditions that are
5 applied, mainly along the southeastern margin of the
6 model domain.

7 The remainder of the model domain is
8 considered a low boundary. And apart from that, the
9 streams themselves are, of course, incised within the
10 model and, in that since, are a form of the boundary
11 condition, but they're internal.

12 ARBITRATOR DREHER: But the model domain
13 contains all of the hydraulically connected surface
14 water sources?

15 THE WITNESS: Yes.

16 ARBITRATOR DREHER: Here is, you know, kind
17 of what I'm struggling with, and I'll ask the question
18 of Mr. Larson, and I likely will repeat it to some
19 others.

20 But if I understand Mr. Book's analysis, at
21 least during this five-year period that he looked at,
22 2002 to 2006, the average simulated exceedance in
23 computed consumptive beneficial use was 31,000 acre-feet
24 per year. And, you know, maybe this is what has to be
25 done, but it just seems, on the surface, that curtailing

1 groundwater irrigation on 514,610 acres to address a
2 shortage of 31,000 acre-feet per year seems rather
3 draconian. I'm not saying it's not necessary.

4 I mean, from my beginning of this, you
5 know, a Compact is something that has to be complied
6 with. I mean, you can't -- you can't just ignore it,
7 but . . .

8 And then, you know, relating this to the
9 question that I asked you about the consumption across
10 the area curtailed, you know, if you're curtailing,
11 let's say, 500,000 acres -- well, if I understood how
12 you responded to my question, there was about 600,000
13 acre-feet of pumpage associated with those acres, of
14 which 480,000 would be consumptive.

15 THE WITNESS: Yeah. And I think maybe I
16 need to clarify that so that you don't misunderstand.

17 That's the consumptive use of the applied
18 groundwater as it's applied, not as it manifests itself
19 in terms of consumptive use via the stream system.

20 ARBITRATOR DREHER: Right. But I mean, if
21 the model -- if the model boundaries have been correctly
22 delineated -- and I have no reason to doubt that they
23 have -- then the effects of this groundwater depletion
24 should be confined to the model domain; it doesn't go
25 beyond the model domain?

1 THE WITNESS: That's correct. And most of
2 the effect is storage depletion, because most of the
3 effect that you see of groundwater use historically is
4 depletion of stored water. In fact, when you look up
5 the groundwater hydrographs, they've been on a continual
6 decline since the 1960s and that decline hasn't stopped.

7 ARBITRATOR DREHER: Understand. But I'm
8 looking at the proposed remedy here, and if you're
9 reducing -- I'm probably oversimplifying this.

10 But if you're reducing depletions through
11 this proposed action by, roughly, 480,000 acre-feet per
12 year and that is going to generate the additional reach
13 gains so that Nebraska is no longer overconsuming by
14 31,000 acre-feet per year, then presumably the
15 difference is going to credit replenishment of
16 groundwater storage.

17 THE WITNESS: There is some of that going
18 on.

19 First of all, the 480,000 is not a
20 depletive effect; that's a consumptive effect of the
21 groundwater applied.

22 The effect on the groundwater system is
23 subdivided into several components, one of them being
24 streamflow depletions, one of them being
25 evapotranspiration effects. As you, for example, are

1 curtail pumping, there is going to be an increase in
2 evapotranspiration losses the way the model is
3 structured, plus the storage effects.

4 But all this is superimposed on the
5 long-term legacy effects of pumping that has occurred,
6 basically since the 1960s, where there has been a
7 continual reduction in storage over that time, and that
8 continues to manifest itself on streamflows going into
9 the future.

10 ARBITRATOR DREHER: I understand. And
11 maybe I didn't ask my initial question so that I got the
12 answer that I -- I was looking for the amount of
13 groundwater depletion to the system, whether it's from
14 evapotranspiration, whether it's from evaporation,
15 whatever portion of the groundwater diverted does not
16 return to the system, either is groundwater or is
17 surface water runoff.

18 That's what I was looking for.

19 THE WITNESS: Well, I could give you those
20 numbers, but I would have to go into the model's
21 budgeting accounting to do that; but I can assure you
22 this: That the water will all be accounted for, because
23 basically the model is a big water budget. And one of
24 the things that we look for in making sure the model is
25 operating properly, is that it does balance -- that is,

1 the water balance is there.

2 So the effects will appear in various
3 places. Some of it will be storage depletions or
4 accretions, if there is recovery in the groundwater
5 levels. Some of it will be changes in
6 evapotranspiration. Some of it will be changes in flows
7 to the boundary conditions along the Platte River. All
8 those effects will add up to the total, but they will
9 add up.

10 ARBITRATOR DREHER: But I guess again, I
11 mean, if you can help me with the quandary that is stuck
12 in my mind, great. If you can't, we'll move on. But
13 I'm struggling with the fact that the depletion -- the
14 depletion that would be curtailed would amount to maybe
15 not 408,000 acre-feet, but certainly several hundred
16 thousand acre-feet. I mean, if we're talking about
17 500,000 acres, the depletive effect to the system has to
18 be on the order of several hundred thousand acre-feet,
19 and I'm -- it just seems like there ought to be another
20 way to generate 31,000 acre-feet of reach gains
21 annually, besides curtailing 500-some-odd-thousand
22 acres.

23 Now, I pose that as a question, and I want
24 to assure counsel that that does not reflect any kind of
25 a bias towards a solution here. I'm just posing the

1 question in a manner to try to solicit a response and
2 has nothing to do with what I think at this point or
3 what I don't think at this point.

4 THE WITNESS: Well, I guess my answer is
5 there may be other ways. I was asked to determine,
6 basically, what level of pumping reduction would be
7 required in order to achieve the level of computed
8 groundwater consumptive use that Mr. Book had
9 determined. There may be other ways.

10 ARBITRATOR DREHER: Well, but to the extent
11 that your simulated period -- and I didn't hear you -- I
12 may have missed it.

13 But to the extent your simulated period
14 that ends in 2057, if that has not achieved steady-state
15 conditions, I don't know that you said it did or didn't;
16 but if it hasn't, then presumably if a substantial
17 amount of the cessation of groundwater withdrawals is
18 causing a buildup in groundwater storage, that then
19 would continue, potentially, beyond your 2057 time
20 unless you're at steady-state.

21 THE WITNESS: That is true. And if you are
22 not at steady-state, as you can see by the trend on
23 Figure 2, if you look at the blue curve, which is the
24 remedy case, there is an initial drop getting down
25 somewhere in the neighborhood of 150- to 160,000

1 acre-feet, but then it starts to head back up again,
2 even though we've imposed the remedy.

3 ARBITRATOR DREHER: Right.

4 THE WITNESS: And that's the legacy effect
5 of historical pumping and the continuation of other
6 pumping that goes on.

7 ARBITRATOR DREHER: True. But at some
8 point, you know, regardless of whether -- I can't -- I
9 shouldn't comment about the status quo, because I don't
10 know that that would be the case here; but certainly
11 under the proposed remedy, at some point you would reach
12 steady-state conditions, would you not?

13 THE WITNESS: You will, but it may be a
14 very long, long time, because this is a very large
15 system that you're dealing with.

16 You know, I could -- I shouldn't guess, but
17 my sense is you could be out there hundreds of years
18 before that would occur. And you would actually have to
19 look at a balance between recharge and pumping to see if
20 you could ever achieve it.

21 ARBITRATOR DREHER: Well, at some point it
22 would seem that the storage in the aquifer system would
23 stabilize at some level, and that would be steady-state.

24 THE WITNESS: Well, steady-state is only
25 achievable if the amount of water that you're taking out

1 is equal to the amount of water that is coming back in.

2 So if I have enough recharge to sustain the
3 pumping, yes, I can reach a steady-state. If I don't, I
4 will never reach a steady-state. What will happen is I
5 will continue to deplete storage until probably, as a
6 practical matter, development will stop because the
7 pumping can't be sustained, but that's what will happen
8 if you exceed the amount of inflow to the system.

9 And that may be different in different
10 parts of this large area, in part, because of the
11 boundary condition along the Platte River and, in part,
12 because of the locations of streams.

13 ARBITRATOR DREHER: And that's why I didn't
14 make the comment about the status quo condition, but I'm
15 talking about the remedy condition.

16 I don't see how you would get the
17 improvement that you, at least that I think I'm seeing,
18 after the initial decline, which takes the annual volume
19 briefly down below 150,000.

20 THE WITNESS: Yes.

21 ARBITRATOR DREHER: And then it begins to
22 creep back up as the legacy effects work through.

23 THE WITNESS: Well, they've been ongoing,
24 you can see here at least since the '60s.

25 ARBITRATOR DREHER: Oh, sure.

1 THE WITNESS: It's just a continuation of
2 that effect.

3 ARBITRATOR DREHER: But at some point the
4 legacy effects are going to be expressed --

5 THE WITNESS: Fully.

6 ARBITRATOR DREHER: -- fully.

7 And unless it requires further withdrawals,
8 ongoing withdrawals out of storage for those legacy
9 effects, which I don't see happening, you ought to reach
10 steady-state, and that steady-state condition, in my
11 mind, might be different than what is shown here. I
12 don't know.

13 THE WITNESS: Well, the two things I would
14 say about that is, No. 1, it's not clear that you would
15 be able to do that everywhere within the model domain.
16 That may be achievable in certain parts of it, it may
17 not be in other parts, because the amount of groundwater
18 use is exceeding the amount of replenishment in those
19 areas, and there will be continuing decline there and it
20 will have to be manifested somewhere else outside that
21 area.

22 The second thing that I would say about
23 that is you are looking at a very, very long time
24 horizon. Even if there is a steady-state to be
25 achieved, it's going to be out there many, many, many

1 years.

2 ARBITRATOR DREHER: One last question
3 pertaining to Figure 2, and I presume the answer is
4 somewhat along the line that you gave regarding the
5 164,700 acre-feet of average reduced pumping, and that
6 has to do with the imported water supply credits.

7 You talk about an amount of 27,000 -- no --
8 yes. You talk about an imported water supply credit of
9 27,600 acre-foot feet per year and Mr. Book used 30,000
10 acre-feet per year in his analysis. And looking at
11 Figure 2, without getting into more discussion about
12 steady-state, it looks like the proposed remedy is
13 approaching steady-state at around 30,000 acre-feet. Is
14 that accurate?

15 THE WITNESS: Roughly, yes, that's
16 accurate.

17 You know, its growth is certainly less out
18 toward the end than at the beginning. The average is
19 27,000, but it's more close to 30,000 at the end.

20 ARBITRATOR DREHER: And one last question
21 just so that I understand how you did this analysis.

22 On page 2, under the status quo scenario in
23 the third paragraph, you talk about some process for
24 adjustments that I didn't completely understand. And it
25 may be as simple as that you took the 2006 groundwater

1 irrigated area in Colorado and simply used that for the
2 entire historic period?

3 THE WITNESS: Future period, that's
4 correct.

5 ARBITRATOR DREHER: Future period?

6 THE WITNESS: Yes.

7 ARBITRATOR DREHER: Is that the adjustment
8 you're talking about?

9 THE WITNESS: That's one of them.

10 We also made adjustments for Kansas to
11 reflect current conditions and also to reflect more
12 current information about metering.

13 And then, as we explain in the fourth
14 paragraph there, the adjustments we made to Nebraska by
15 prorating the 2006 acreage back to the historic pumping
16 to sort of bring that up to more current conditions, or
17 at least try to estimate current conditions better.

18 ARBITRATOR DREHER: And how did you handle
19 the commingled lands in the model? I mean, my
20 experience is that when lands have access to surface
21 water supply and groundwater supply, the amount that
22 they use, one or the other can vary significantly from
23 year to year. So I'm not sure how -- I don't know how
24 you handle that in the model.

25 THE WITNESS: Well, basically, we used the

1 2006 conditions, if I recall correctly, on the
2 commingled lands. And then they would be adjusted --
3 the historic pumping that goes along -- or historical
4 pumping that goes along with them would be adjusted to
5 reflect the 2006 acreage.

6 ARBITRATOR DREHER: Okay.

7 MR. WILMOTH: Mr. Arbitrator, would it be
8 all right with you if I do proceed with my cross at this
9 point, just to compartmentalize these pieces? I think
10 it would make more sense, given the questions you had.

11 ARBITRATOR DREHER: That's fine with me.
12 Is it all right with you, Mr. Draper?

13 MR. DRAPER: Yes, it is.

14 MR. WILMOTH: Mr. Larson, I'll wait for you
15 to get some water.

16 THE WITNESS: I have enough, that's fine,
17 thank you.

18 ARBITRATOR DREHER: Mr. Wilmoth, if you
19 wanted to, we could take a 15-minute break.

20 MR. WILMOTH: That's not necessary for me,
21 unless you would like to.

22 ARBITRATOR DREHER: No, I'm fine.

23 MR. WILMOTH: Mr. Arbitrator, Marc has
24 asked to take a break, so I would like to ask for a
25 break.

1 ARBITRATOR DREHER: All right, we'll take a
2 15-minute break.

3 (Break was taken from 3:00 to 3:17.)

4 ARBITRATOR DREHER: You may proceed,
5 Mr. Wilmoth.

6 CROSS-EXAMINATION

7 BY MR. WILMOTH:

8 Q. Good afternoon, Mr. Larson.

9 A. Good afternoon.

10 Q. Are you well hydrated?

11 A. Yes, I am. Thank you very much.

12 Q. Very good.

13 I'm trying to understand something that
14 Mr. Dreher asked you in your response about the status
15 quo scenario in your paper, Exhibit 3.

16 There is a sentence in the fourth paragraph
17 down that says -- and this is on page 2, excuse me --
18 "Groundwater pumping by Nebraska in future years was
19 represented by reported pumping in the corresponding
20 historical years to reflect hydrological conditions."

21 Is that period of time essentially the same
22 period used in your Addendum, Table 2, which is Exhibit
23 4 from Kansas? Take a moment to look. I'm just trying
24 to figure out what the numbers are.

25 A. The numbers for -- the period of time is

1 1990 to 2006.

2 Q. Okay.

3 MR. WILMOTH: And so if I may, and I guess
4 I'll -- should I offer this as an exhibit? I want to
5 get into the next report for just a second. I don't
6 want to ask any questions about that report, I would
7 just like to refer to it. How would you like me to do
8 that?

9 MR. DRAPER: If you just make clear you're
10 referring to it, then it will be identified shortly.

11 Q. (BY MR. WOLMITH) Could you take a moment
12 and look at Kansas Exhibit No. 4, your Addendum, Table 2
13 on page 3. If you need me to repeat that, I'll be happy
14 to.

15 A. I've got it.

16 Q. So in Table 2, if you will look at, for
17 example, the Middle Republican for 1990, I understand
18 that essentially the irrigation depth assumed was
19 1.5982?

20 A. Feet, yes, that's correct.

21 Q. Feet?

22 A. In this table, yes.

23 Q. And the same thing for 1991, for example,
24 and just on and on until 2006?

25 A. Correct.

1 Q. Do you know what the -- what that depth was
2 in the Middle Republican in the old IMPs; not the IMPs
3 that are currently in existence, but the old IMPs?

4 A. No, I don't.

5 Q. Now I am going to introduce Nebraska
6 Exhibit 15, which is slightly premature, because this is
7 just our compliance report, but it has some material in
8 here I would like to refer to. And we didn't
9 necessarily anticipate moving this quickly. We do have
10 a compliance binder set and we can compile that this
11 afternoon.

12 May I direct your attention, save us all a
13 little time?

14 A. Certainly.

15 Q. For the sake of everyone, I'm looking at an
16 appendix to the Nebraska Compact Compliance responsive
17 expert report, Appendix B, which is the middle
18 Republican IMP, the current IMP, but on page 2 of that
19 IMP, there is a discussion about the prior IMP, IMP
20 being the Integrated Management Plan.

21 Do you see there in that paragraph that the
22 allocation in the Middle Republican was actually 13
23 inches?

24 MR. DRAPER: Could you describe again, Tom,
25 where you're referring to in this exhibit.

1 MR. WOLMITH: This is Appendix B, and this
2 is the Middle Republican IMP.

3 Q (BY MR. WILMOTH) If everyone is on the same
4 page, what I am referring to is the third full paragraph
5 that explains that Integrated Management Plan
6 established an average groundwater allocation of
7 13 inches per certified acre, and I believe that
8 13 inches equates to something like 1.08 feet; is that
9 correct?

10 A. That sounds about right.

11 Q. So my question to you is, for 19 -- if you
12 were using the data reflected in Table 2 of Appendix --
13 I'm sorry, of Kansas Exhibit 4, did that result in an
14 overestimation of pumping under your status quo
15 scenario?

16 A. Overestimation relative to what?

17 Q. Of what you estimated.

18 A. I don't know the answer to that question.

19 Q. Let me put it this way.

20 If you relied on historical pumping from
21 1990 to 2006, but the status quo scenario -- and the
22 status quo scenario did not take into account the
23 13-inch limitation, would that have resulted in an
24 overestimation of your pumping in the status quo
25 scenario?

1 A. Again, I don't know if I can answer that
2 question, but maybe to help clarify a little bit, as
3 between the Addendum and Attachment 5, there are
4 differences in how we estimated the status quo for
5 Nebraska. One was based on historical pumping amounts
6 adjusted for differences in the acreage. The other in
7 the Addendum was based on Table 2 associated with the
8 2006 acreages.

9 Q. But just for sake of clarity, the bottom
10 line is your status quo pumping scenario in Kansas
11 Exhibit 3 did not account for the IMPs; is that
12 correct? -- that were then in existence in 2006?

13 A. It uses the values that are in Table 2.
14 That's the baseline that we used. Then to evaluate the
15 IMPs, we --

16 Q. I'm not asking that question yet.

17 A. -- we did those differently.

18 Q. Okay. I'm not asking that question yet.

19 I'm just trying to determine if your
20 Exhibit 3 accounted in any regard for the then-existing
21 IMPs at the time you prepared this document?

22 A. It did not try to determine the effects of
23 the IMPs. It tried to estimate if the historical
24 pumping from 1990 to 2006 were used as a surrogate for
25 future period adjusted for area differences, what would

1 that produce in terms of a result?

2 So that's what the baseline is. That's not
3 what the remedy scenario is; that's what the baseline
4 is.

5 Q. Right. But if the baseline scenario does
6 not account for then-existing limitations on pump, does
7 it not overestimate the baseline pumping?

8 A. I suspect if I went back and looked at it
9 that for Middle Republican -- if you're asking me would
10 the average depth of applied water for the Middle
11 Republican exceed 13 inches, I suspect it would. I
12 would have to go back and check.

13 Q. In your analysis?

14 A. In my calculations for the baseline -- for
15 the baseline.

16 Q. And so is another way of saying that that
17 the scale of the problem identified in your Appendix or
18 Exhibit 3 may actually be smaller than what you
19 calculated?

20 A. If we had used less pumping?

21 Q. Yes. That's my question.

22 A. The only effect would be that the trend for
23 the status quo wouldn't maybe rise quite as high as it
24 did.

25 Q. Thank you.

1 I have a couple more questions about
2 Exhibit 3 before I'm through on cross.

3 One of the things you mentioned was that, I
4 believe your phrase was there may be other ways to
5 reduce Nebraska's impact on the system.

6 A. I think the question from the Arbitrator
7 was: There is other ways to provide the 30,000
8 acre-feet of --

9 Q. Sure.

10 A. -- offset or whatever he was referring to.
11 I said there probably are or may be.

12 Q. Would one of those be, for example, the
13 purchase in transmission of surface water?

14 A. If it was available to be purchased and
15 especially if it was available during dry periods when
16 these problems are more acute, if it's there, you could
17 do it.

18 Q. But your report doesn't account for that
19 mechanism? In other words, your report assumes that
20 groundwater reduction is the sole way to reduce that
21 31,000?

22 A. My report tries to determine how much
23 pumping reduction is required to meet the 175,000
24 acre-foot target that Mr. Book had determined.

25 Q. Were you present for Mr. Book's testimony

1 earlier?

2 A. Today?

3 Q. Today.

4 A. Yes, I was.

5 Q. And Mr. Book explained that when he derived
6 the 175,000 acre-foot figure, which I understand he
7 provided to you -- is that correct?

8 A. More or less.

9 Q. -- the target -- that would be the target
10 CBCU, I guess. Is that an accurate characterization?

11 A. Well, that's the level that he determined
12 that you need to reduce the groundwater CBCU to in order
13 to be in compliance.

14 Q. And that figure was derived looking at 2002
15 to 2006 conditions; is that your understanding?

16 A. That's my understanding, yes.

17 Q. And those were pretty dry?

18 A. I would say they were dry; not the driest,
19 but they were dry.

20 Q. Do you know -- if I suggested that they
21 were in the 40th percentile, would that sound about
22 right?

23 A. It wouldn't surprise me, no.

24 Q. What years did you use when you determined
25 the baseline CBCU for groundwater again?

1 A. We used the hydrologic conditions from 1990
2 to 2006 and we repeated those three times for a cycle of
3 51 years.

4 Q. And so if I understand correctly, then, you
5 took Book's target CBCU and under those hydrologic
6 conditions you projected that out for 50 years, and you
7 used your baseline CBCU, using 1990 to 2006, and
8 predicted that over 50 years and compared them?

9 A. No.

10 Q. Okay. In constructing Mr. Book's target
11 CBCU per groundwater, we agree that that was done in
12 reliance on the fairly dry period?

13 A. He used 2002-2006.

14 Q. And for the baseline CBCU groundwater, you
15 used 1990 to 2006?

16 A. Well, in order to sort of forecast the
17 effect in the future, we used the hydrologic conditions
18 from 1990 to 2006 repeated through times, including some
19 wetter periods, some dryer periods.

20 Q. And that condition is relative to 2002 to
21 2006, a wetter condition, is it not?

22 A. On average, it would be.

23 Q. And when you compare the baseline CB -- let
24 me ask you this -- excuse me, strike that.

25 What happens to CBCU groundwater in a wet

1 period?

2 A. Well, if you look at the graph on Figure 2,
3 generally what happens when it gets wetter is
4 groundwater levels may decline more slowly or, in some
5 cases, even rise.

6 If you look at the patterns that you see in
7 Figure 2, you will see that during the wet periods there
8 tends to be an increase in the groundwater CBCU. It may
9 not always occur contemporaneously because sometimes it
10 stretches into a couple of years into the future beyond
11 those wet periods, and then dryer periods it tends to
12 subside again and it sort of repeats that cycle.

13 Q. So CBCU groundwater goes up with wet and
14 down with dry, I mean, generally speaking?

15 A. Somewhat. You can see that it is more
16 exaggerated on the status quo than it is on the remedy.
17 The remedy tends to be, say, less variable in that same
18 regard.

19 Q. But isn't the practical effect of using a
20 wet period to establish the baseline CBCU groundwater
21 and a dry period to establish the target CBCU, doesn't
22 that increase the delta and the gap that has to be
23 closed?

24 A. No, I don't think so. I think you're
25 confusing -- trying to determine what might happen

1 during dry periods with an attempt to forecast what
2 happens if you take a certain action.

3 All I'm trying to do is calculate what
4 might happen in the future, given general patterns of
5 hydrology that we might expect if we take a certain
6 action -- in this case, reducing pumping.

7 The question then is, okay, once I make
8 that determination, how does that compare with what he
9 calculated? That's just a comparison you can make
10 throughout that period in both dry periods and wet
11 periods.

12 Q. And so I understand, your -- the CBCU
13 target, the target CBCU, excuse me, is 175,000 and that
14 remains static, correct?

15 A. Well, I didn't determine the target,
16 Mr. Book determined the target.

17 Q. In your use of it?

18 A. My analysis, the purpose of it was to
19 determine how much pumping reduction you would have to
20 have so that as you go into the future, experiencing
21 both wet periods and dry periods, that you stay at or
22 below that level in both wet periods and dry periods.

23 Q. So in all periods you're staying below
24 175,000 acre-feet; is that correct?

25 A. I think that's correct, or thereabouts. I

1 mean, I think toward the end, some of the years we're
2 actually above 175,000.

3 Q. In substantial wet periods during that
4 cycle, what happens to that extra water?

5 A. I don't know. I don't determine that.
6 It's in the system. I'm not sure where.

7 Q. And if you're capping CBCU groundwater for
8 Nebraska at 175-, there is quite a lot of water left in
9 the system, isn't there?

10 A. I'm not sure I follow you. I'm dealing
11 with the baseline; I'm not dealing with the total of
12 water supply.

13 Q. But the purpose of this analysis is to see
14 what has to be done to reduce groundwater pumping to
15 stay within 175,000, correct?

16 A. So that the groundwater CBCU stays below
17 175,000.

18 Q. And if groundwater CBCU, every single year
19 for the next 50 years, stays below 175,000, there will
20 be wet periods, correct?

21 A. There will be runoff periods.

22 Q. And there will be some periods when there
23 is quite a lot of water in the system, won't there?

24 A. There may be in the stream system.

25 Q. And if Nebraska is not consuming that

1 through groundwater pumping and they're not consuming it
2 through surface water diversion, what happens to the
3 water?

4 A. It is either stored or goes downstream, I
5 suppose.

6 Q. Thank you.

7 I would like to talk to you about your
8 assumption on the hydrologic conditions with regard to
9 the target CBCU. Are you suggesting that that's not
10 something that you're prepared to deal with in any
11 detail?

12 A. I'm not sure I understand what the question
13 is.

14 Q. The question is, if I understand correctly,
15 you took the target CBCU and the 2002-2006 hydrologies,
16 carried that forward in some period of time, did you
17 not?

18 A. No.

19 Q. Not at all, okay. My mistake.

20 Does your analysis assume that Nebraska
21 needs to remain under her allocation every single year?

22 A. No.

23 Q. Does she, in fact, remain under her
24 allocation every single year, in your analysis?

25 A. I didn't try to go through the accounting

1 to determine compliance or noncompliance in any given
2 year. My analysis was to determine how much pumping
3 reduction would be necessary to get the groundwater CBCU
4 down to 175,000- acre-feet per year.

5 Q. The point of which, of course, is to ensure
6 Compact compliance, correct? I mean, it's not an
7 abstract exercise?

8 A. That's what Mr. Book determined that during
9 those kinds of periods you would need to be at in order
10 to be in compliance.

11 MR. WOLMITH: That's all I have.

12 Thank you very much, Mr. Larson.

13 ARBITRATOR DREHER: Let me ask one other
14 question now. I admit it's described in your report,
15 but I would like you to redescribe it.

16 I understand that you repeated the
17 hydrology for this 1990 to 2006 period. How did you
18 repeat the groundwater demands?

19 THE WITNESS: And we're talking about now
20 Attachment 5 --

21 ARBITRATOR DREHER: No. I'm --

22 THE WITNESS: -- or are we going to the
23 other one, as well?

24 ARBITRATOR DREHER: No. I'm looking at
25 Figure 2 and I'm looking at the status quo conditions.

1 What did you use to project future
2 groundwater demands? I think I heard you say that you
3 took 2006 acreage.

4 THE WITNESS: That's correct.

5 ARBITRATOR DREHER: But what demand did you
6 put on that acreage?

7 THE WITNESS: We used the historical
8 pumping, but then we -- for the actual historical
9 pumping for the 1990 to 2006 period, but we adjusted
10 that pumping by the differences in the acreage from the
11 2006 figure.

12 So, for example, if years had less acreage,
13 the pumping would be increased to reflect the 2006
14 acreage. If they had more, it would be reduced and so
15 on.

16 So it was scaled to bring it to the 2006
17 acreage level on a pro rata basis by NRD; in other
18 words, each of the NRDs were handled separately for the
19 run that is shown on Figure 2.

20 ARBITRATOR DREHER: And are those historic
21 unit withdrawals or unit pumping amounts, are those what
22 is reflected in Table 2 of your second report?

23 THE WITNESS: No. Table 2 in the second
24 report is a different baseline that we calculated. It
25 turns out it comes out about the same as the one in

1 Attachment 5, but it's not done exactly the same way.

2 ARBITRATOR DREHER: Is there an equivalent
3 of Table 2 in your baseline report?

4 THE WITNESS: No, there isn't.

5 ARBITRATOR DREHER: But what you're saying
6 is, you took the historic pumping rate per acre and you
7 applied that to essentially the 2006 acres into the
8 future?

9 THE WITNESS: Yes, essentially that, yes.

10 ARBITRATOR DREHER: Colorado?

11 MR. AMPE: No questions.

12 ARBITRATOR DREHER: Nothing?

13 Mr. Draper, I assume you want your five
14 minutes, more or less.

15 MR. DRAPER: Yes, please.

16 (Break was taken from 3:50 to 3:57.)

17 ARBITRATOR DREHER: Mr. Draper, you may
18 continue with redirect.

19 MR. DRAPER: Thank you. I have no further
20 questions on redirect of Mr. Larson with respect to
21 Kansas Exhibit 3.

22 ARBITRATOR DREHER: Then you may proceed
23 with direct on Kansas Exhibit 4.

24 MR. DRAPER: Thank you.

25 DIRECT EXAMINATION

1 BY MR. DRAPER:

2 Q. Do you have a copy of Kansas Exhibit 4,
3 which is entitled, Mr. Larson, "Addendum to Expert
4 Report of January 4, 2008 (Revised Attachment 5 to
5 December 19, 2007 Kansas Letter) Projected Reduction of
6 Nebraska Impact under the NRD IMPs," dated January 20,
7 2009?

8 A. Yes, I do.

9 Q. And this is by you and Mr. Perkins?

10 A. Yes.

11 Q. What was the purpose of the analysis that
12 is described in this report?

13 A. The purpose of this analysis was to make an
14 assessment of sort of the potential effects of the
15 Integrated Management Plans in terms of at least their
16 general goal on future conditions using the same kind of
17 future scenario analysis that we used in Attachment 5 of
18 Exhibit 3.

19 Q. Would you take us through that somewhat
20 carefully, but recognizing that people, including the
21 Arbitrator, have had an initial chance to review it?

22 A. What we did here was we got information
23 from Nebraska that indicated some concerns about the
24 distribution of pumping that we had used in our future
25 scenarios. And so, in part, we're examining that issue,

1 I guess you might say, but then it turned out that
2 examining that issue was also a convenient vehicle for
3 looking at the potential effects of the IMP.

4 So the adjustments that we made in the
5 scenario are described, beginning on the bottom of the
6 first page.

7 We used the distribution in 2006, but
8 rather than prorating the historical pumping by acreage,
9 like we had done in Attachment 5, we actually maintained
10 the 2006 distribution, but then used the irrigation
11 depth -- the historical irrigation depths applied to
12 that distribution as the estimate of future pumping for
13 each of the three 17-year cycles.

14 So if you look at Table 2 on page 3, the
15 irrigation depths outlined there for 1990-2006 were
16 applied to the 2006 distribution to come up with a
17 series of three 17-year cycles of estimated future
18 pumping. And that was our baseline.

19 It wasn't much different than the baseline
20 we had used previously. There were some slight
21 differences, but nothing significant; but it did provide
22 a convenient baseline to compare to the projected
23 effects of the general IMP procedure.

24 So what we next did then was to look at
25 what would happen if we reduced the pumping for the

1 three NRDs down to 80 percent of their historical 1998
2 to 2002 average depths, which was sort of a general goal
3 that we understood these IMPs to be focused on.

4 So on the middle of page 2 we have a table
5 that shows our calculations of what the 1990-2006 first
6 average depths was for each of the three NRDs. We also
7 show that 1998 to 2002 depth, we show our calculation of
8 80 percent of that, which is sort of the general target
9 that we were working with to evaluate here. And then we
10 compare those to the 1990 to 2006 average baseline in
11 terms of amount and the fractional change, as you can
12 see there, in Table 1a.

13 And then in terms of actual amounts that we
14 were talking about, those are outlined in Table 1b,
15 which are just translating those numbers based on
16 acreage in terms of the application depths into actual
17 amounts of acre-feet of pumping.

18 The other adjustment that we made was,
19 rather than to use a uniform value for the irrigation
20 depth over each of the 17-year cycles, we wanted to at
21 least have the variation in pumping from year to year
22 follow the historical variation in application over that
23 period, but having the average not exceed the 80 percent
24 figure that we calculated in Table 1a.

25 And so if you look over at Table 3, you

1 will see how we calculated, first of all, the ratios of
2 the individual year -- yearly depths to the average and
3 then how we translated, using those values, the
4 80 percent figure into an annual figure that would
5 average, over the 1990 to 2006 period would equal the
6 80 percent figure that we saw on Table 1a.

7 So if you look at the right-hand columns in
8 Table 3 where the average for the 1990 to '06 for the
9 Upper Republican, you will see the value is 1.0764 and
10 you will see on Table 1a that's the same as the
11 80 percent figure that we calculated, based on
12 80 percent of the 1998 to 2002, which we understood to
13 be the general target.

14 Similarly, Middle Republican, the value was
15 1.1708 and that compares to the 1.17083 on Table 1a as
16 80 percent figure.

17 So we made those adjustments, such that the
18 amount of pumping would equal, on average over each of
19 the cycles, 80 percent of the 1998 to 2002 depth for
20 each of those three NRDs.

21 So we then ran the model with that set of
22 pumping and looked at its computed groundwater
23 consumptive use, and then we made one other sensitivity
24 run to see what the effect might be if, in fact, the
25 return flows associated with pumping under a lesser

1 amount of applied water would be higher than they --
2 than they had been considered to be in the past.

3 And in the past those numbers -- the return
4 flows are generally estimated at about 20 percent. And
5 so we made a sensitivity run where we said, Well, what
6 if those return flows under the lower application rates
7 were only 15 percent, what would that effect be? So we
8 reduced the return flows from 20 percent to 15 percent
9 and also ran that.

10 And then the figures at the end of the
11 report then show the results that we got from making
12 those calculations.

13 Q. Would you please describe each figure and
14 what its significance is.

15 A. Figure 1 is the net sum of the groundwater
16 beneficial consumptive use calculated for each of the
17 scenarios offset by the imported water supply credit.

18 And you will see that the baseline
19 condition, which we described as using the historical
20 irrigation depths for each of the NRDs as applied to the
21 2006 acreage distribution, produces the solid blue line
22 that is at the very top.

23 If we look at the scenario where we reduced
24 the pumping to correspond to the 80 percent of the 1998
25 to 2002 depth and then adjusted the temporal variation

1 to follow the pattern of the variation over the 1990 to
2 2006 period, we generate the result that showed by the
3 dashed red line with the boxes and the crosses.

4 The solid red line then is the effect if
5 you assume 15 percent nominal return flow, rather than a
6 nominal return flow of 20 percent.

7 And then at the very bottom is the effect
8 if you take these distributions in the future and make
9 the adjustments that we made in our remedy calculation.

10 Q. Do you draw any conclusions from that
11 particular figure?

12 A. Well, you can see that reducing the
13 application to 98 percent of the 1998 to 2002 amount
14 continues to have an upward trend of groundwater
15 beneficial consumptive use, and it's only marginally
16 lower than the baseline condition associated with the
17 historic amounts. And it's shifted down, of course,
18 because it's less, but the shift isn't very far.

19 Q. Which set of lines is that represented by?

20 A. The blue line is the baseline and then the
21 dashed line with the boxes is the reduction down to the
22 80 percent of the 1998 to 2002 average figure that we
23 used.

24 And then Figure 2 just shows the
25 groundwater discharge to streams, basically cumulative

1 groundwater discharge effect over time beginning in 2007
2 and going forward to 2057 for those same three
3 scenarios. That's sort of the equivalent of the graph
4 that we had in our earlier report -- Figure 4 in our
5 earlier report. It's the equivalent of that graph going
6 forward for the three different scenarios, the baseline,
7 using the historical NRD depths versus the adjustments
8 to 80 percent of the 1998 to 2002 and the scenario with
9 15 percent return flow.

10 Then the last figure is just -- this is a
11 map of the quick response areas that we got from some
12 work that Nebraska was doing back early on showing their
13 estimates of quick response areas versus in terms of
14 where they were assuming, at least at that time, they
15 would need to have pumping reductions to get quick
16 response in a stream.

17 Q. So what were your overall conclusions from
18 this analysis of the Nebraska IMPs?

19 A. Well, as you can see, those reductions
20 would not bring you down anywhere near to the 175,000
21 acre-feet-per-year value that Mr. Book determined, and
22 basically would have a very limited reduction in the
23 increasing trend in consumptive -- beneficial
24 consumptive use or appeared beneficial consumptive use
25 going out into the future, and there would be continuing

1 increases at that level of development up into the range
2 250- to even 300,000 acre-feet per year.

3 MR. DRAPER: No further questions, at this
4 time.

5 ARBITRATOR DREHER: So your next witness
6 would be Mr. Pope and he won't be here until tomorrow
7 morning; is that correct?

8 MR. DRAPER: That's correct.

9 MR. WILMOTH: We certainly have some cross,
10 if you're getting ready to leave.

11 ARBITRATOR DREHER: No. This is too much
12 fun to think about that. I was just trying to measure
13 the time here.

14 MR. WILMOTH: I think we have about 20
15 minutes.

16 ARBITRATOR DREHER: Okay.

17 Sam, I assume that we have to be out of
18 here at 5 o'clock; is that right?

19 MR. SPEED: Correct.

20 ARBITRATOR DREHER: Okay.

21 Mr. Wilmoth, you may proceed.

22 CROSS-EXAMINATION

23 BY MR. WILMOTH:

24 Q. Just to refresh, Mr. Larson, the purpose of
25 this report is to determine the impacts of Nebraska's

1 new IMPs; is that it?

2 A. To evaluate what kind of potential effect
3 they could have looking at it in the future.

4 Q. And one of the kind of primary
5 considerations in that regard is figuring out how much
6 pumping is allowed under those IMPs; is that right?

7 A. Well, we used a figure that I think we got
8 from one of the Nebraska reports that indicated a target
9 of 80 percent of the 1998 to 2002 amounts as a surrogate
10 to estimate what would that be.

11 Q. So did you review the IMPs yourself?

12 A. I've looked at them. I can't say that I've
13 gone through them in detail, no.

14 Q. On page 2 there is a statement in the first
15 full paragraph about halfway through, "The primary
16 assumption" -- can you read that for me?

17 A. "The primary assumption for the NRD IMP
18 scenarios is the groundwater irrigation depths are to be
19 on the average 80 percent of the historical irrigation
20 depths for the years 1998-2002, as prescribed by the
21 IMPs."

22 Q. Is that what you're referring to earlier?

23 A. Yes.

24 Q. And so just to kind of carry this through,
25 you took that depth and you multiplied it by the number

1 of acres in 2006, is that correct? -- and that figure is
2 in line 6 of Table 1b, the groundwater irrigated acres?

3 A. That's correct.

4 Q. And the product of that multiplication is
5 in line 8; is that correct?

6 A. Yes, that's correct.

7 Q. I would like to hand you what will be, for
8 the sake of convenience so not everybody is flipping
9 through everything, this is the Upper Republican IMP,
10 this will be Nebraska Exhibit 16. I would ask that you
11 look at page 7, please.

12 A. Which page was it, Tom?

13 Q. Page 7.

14 A. Mine starts with No. 11.

15 Q. There is some goofiness with the number.

16 There is actually a page, a slash and then
17 a number. I should have mentioned that.

18 A. Okay, I've got it.

19 Q. Do you see section 3.A. there?

20 MR. DRAPER: I'm sorry, the page again?

21 MR. WILMOTH: Page 7. And I apologize.

22 The way it is numbered is odd. There is a slash and
23 then a page number, so it's page /7 right here.

24 Do you see that, Mr. Arbitrator?

25 ARBITRATOR DREHER: Yes.

1 Q (BY MR. WILMOTH) Could you read the first
2 sentence of No. 3.A. for me, please, on this page.

3 A. It says, "Provide for a 20 percent
4 reduction in pumping from the 1998-2002 baseline
5 groundwater pumping volume so that the average
6 groundwater pumping volume is no greater than 425,000
7 acre-feet over the long term."

8 Q. That's 425,000. And what pumping number do
9 you have in line 8 of Table 1b?

10 A. 4,949,996.

11 Q. So just rounding, that's about 495,000?

12 A. Yes.

13 Q. How do you account for that?

14 A. We used the 80 percent. We did not use the
15 limit of 425,000.

16 Q. So you did not use what's specified in the
17 IMP?

18 A. We did not use the 425,000. I'm sorry, we
19 used the 80 percent of the 1998 to 2002 figure. And the
20 reason why, that was our understanding of the general
21 target.

22 Q. So that does not represent, though, the
23 content of the IMP, does it?

24 A. Not this particular, figure.

25 Q. So your report really does not analyze the

1 impact of the IMP as written, does it?

2 A. Well, it doesn't include all the criteria
3 that might be in there. Now, how they're enforced or
4 how they're developed, I don't know. We used the
5 general target, as I said, of 80 percent of the 1998 to
6 2002.

7 Q. But your report doesn't account for a
8 70,000 acre-foot reduction in pumping in the Upper NRD,
9 does it?

10 A. Our average -- no, you're correct -- is
11 495,000.

12 MR. WILMOTH: Thank you. I have nothing
13 further.

14 One thing if I may.

15 Q (BY MR. WILMOTH) Would it surprise you if
16 the same result were to be true with regard to the
17 Middle Republican?

18 A. I think, if I remember, generally, the 1998
19 to 2002 figures were higher than some of the individual
20 numbers that I saw in some of the IMPs by maybe an inch
21 or two.

22 Q. Maybe we should look at that.

23 Could you turn to the Nebraska Compliance
24 report, Exhibit 15, please. Do you have that exhibit?

25 This is on page 8 of the Middle Republican

1 NRD IMP, which is Appendix B of the compliance report.

2 ARBITRATOR DREHER: Not the Upper, the
3 Middle?

4 MR. WILMOTH: This is Middle we're looking
5 at now. We just looked at Upper.

6 ARBITRATOR DREHER: Okay.

7 Q (BY MR. WILMOTH) Could you read for me that
8 first sentence of 3.a. in this passage, please?

9 A. 3.a. reads, "Provide for a twenty percent
10 reduction in pumping from the 1998 to 2002 pumping
11 volume using a combination of regulation and
12 supplemental programs so that the average ground water
13 pumping volume is no greater than 247,580 acre-feet" per
14 year -- "acre-feet over the long term."

15 Q. Roughly 247,5.

16 And what does your line 8 of 1b in your
17 report estimate groundwater pumping to be?

18 A. 325,229.

19 Q. And this reduction is not accounted for in
20 your report, is it?

21 A. No, it's not. That difference isn't, I
22 should say.

23 MR. WILMOTH: That's all I have. Thank
24 you.

25 ARBITRATOR DREHER: Colorado?

1 MR. AMPE: No questions.

2 ARBITRATOR DREHER: I assume you want your
3 requisite five minutes or so?

4 MR. DRAPER: Yes, please.

5 (Break was taken from 4:24 to 4:36.)

6 ARBITRATOR DREHER: All right, Mr. Draper,
7 redirect?

8 MR. DRAPER: Thank you, Your Honor. My
9 redirect is essentially a little bit of housekeeping. I
10 would like to ask Mr. Larson about Kansas Exhibit No. 8,
11 which is the curriculum vitae of his coauthor, Samuel P.
12 Perkins, P.E.

13 REDIRECT EXAMINATION

14 BY MR. DRAPER:

15 Q. Do you have a copy of that exhibit,
16 Mr. Larson?

17 A. Yes, I do.

18 Q. And does that apply to Mr. Perkins, your
19 coauthor, on this series of reports that you've
20 testified to?

21 A. Yes, it does.

22 MR. DRAPER: With that, I would move the
23 admission of both Mr. Perkins' CV No. 8 and Mr. Larson's
24 CV Exhibit No. 9, along with the two Kansas expert
25 reports to which Mr. Larson has testified, Kansas

1 Exhibits 3 and 4.

2 ARBITRATOR DREHER: Any objection?

3 MR. AMPE: No objection.

4 MR. WILMOTH: No.

5 I will also like to move the admission of
6 Nebraska Exhibits 15 and 16, 15 being the expert report
7 on compliance; 16 being the Upper Republican IMP. And
8 then I would also like to have two sheets on the white
9 board there marked as Exhibits 17 and 18 and move their
10 admission also, please.

11 ARBITRATOR DREHER: Any objection?

12 MR. DRAPER: It seems a little premature on
13 Exhibit 15. That's an expert report we haven't seen the
14 author on yet. I doubt that we'll eventually have any
15 objection to that, but it seems premature at this point.

16 ARBITRATOR DREHER: Would you have a
17 problem holding off until tomorrow?

18 MR. WOLMITH: I don't have a problem, as
19 long as there is no dispute in the record, on
20 reflection, about whether or not it was legitimately
21 considered. In other words, if John would prefer --
22 excuse me, Mr. Draper would prefer that I tore out the
23 relevant appendix, I'll do that and I'll move to admit
24 that.

25 ARBITRATOR DREHER: And that relative

1 appendix would be the Middle Republican River?

2 MR. WILMOTH: That is correct.

3 ARBITRATOR DREHER: NRD. Would that be
4 better, Mr. Draper?

5 MR. DRAPER: If they would like to do that,
6 it would be fine with me. I don't feel any great
7 necessity that they pull their exhibit apart; but I
8 think it would be more appropriate and consistent with
9 our procedure here that once the witness has testified
10 to it, then we move the admission. And the other
11 exhibit is a separate self-standing copy of their IMP,
12 it looks like.

13 MR. WILMOTH: We're happy to do that.

14 ARBITRATOR DREHER: I think to be
15 consistent to give the other side an opportunity to
16 cross-examine the witness prior to having their expert
17 report admitted, I think that would be the preferable
18 way to do it.

19 MR. WOLMITH: So I guess I would restate
20 our offer and move to admit Exhibit 15, which would be
21 solely the Middle Republican IMP, and we'll take care of
22 the logistics of that.

23 ARBITRATOR DREHER: Well, let me suggest
24 an -- because I'm concerned about getting the record
25 confusing.

1 You've already referred to the
2 compliance -- Compact compliance as Exhibit 15. So
3 rather than change that, I would rather have you take
4 out the Appendix and submit it as Exhibit 17.

5 MR. WOLMITH: Very good. Yes, that's what
6 we'll do.

7 MR. DRAPER: No objection.

8 MR. AMPE: Both Middle and Upper?

9 MR. WOLMITH: Yes. As separate exhibits,
10 yes.

11 ARBITRATOR DREHER: Any objection?

12 MR. WILMOTH: So to clarify for the record,
13 then, just so I understand, we're offering at this time
14 not 15, but we are offering 16, which is the Upper
15 Republican NRD IMP, and 17 which is the Middle
16 Republican NRD IMP. And we'll take care of the
17 logistics of that now. And I thought I had already done
18 that, I'm sorry. Move to admit 18 and 19.

19 MR. DRAPER: No objection.

20 MR. AMPE: No objection.

21 ARBITRATOR DREHER: All right, they're
22 admitted then.

23 (WHEREUPON, Kansas Exhibits 3, 4, 8, 9 and
24 Nebraska Exhibits 16, 17, 18 and 19 were admitted into
25 evidence.)

1 ARBITRATOR DREHER: Okay. Well, we didn't
2 finish quite as early as I thought we would. I
3 understand that there is some interest in not
4 reconvening until 9 o'clock tomorrow morning.

5 MR. DRAPER: Had that word gotten around?
6 That would be fine with Kansas. Why don't we try with 9
7 o'clock. It's a little less brutal and we seem to be
8 very consistent with our schedule.

9 ARBITRATOR DREHER: So we'll adjourn until
10 9 o'clock tomorrow morning, Thursday, the 12th.

11 MR. DRAPER: Yes.

12 (WHEREUPON, the hearing recessed at 4:42
13 p.m. to be continued Thursday, March 12, 2009, at 9:00
14 a.m.)

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CERTIFICATE

I, Dyann Labo, Registered Professional Reporter, do
hereby certify that the above-named proceedings were
reported by me in stenotype; that the within transcript
is true and correct, to the best of my knowledge and
belief.

Patterson Reporting & Video
Dyann Labo
Registered Professional Reporter