
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

Tuesday, March 17, 2009

VOLUME VII

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 17th day of March, 2009.

1 APPEARANCES:

2 For Kansas:

3 JOHN B. DRAPER, ESQ.
4 Montgomery & Andrews
5 325 Paseo de Peralta
6 Santa Fe, New Mexico 87501

7 SAMUEL SPEED, ESQ.
8 CHRISTOPHER M. GRUNEWALD, ESQ.
9 Assistant Attorney General
10 Civil Litigation Division
11 120 SW 10th Avenue, 3rd Floor
12 Topeka, Kansas 66612-1597

13 BURKE W. BRIGGS, ESQ.
14 Division of Water Resources
15 State of Kansas
16 109 SW 9th Street, 4th Floor
17 Topeka, Kansas 66612

18 For Nebraska:

19 DON BLANKENAU, ESQ.
20 TOM WILMOTH, ESQ.
21 Husch Blackwell Sanders LLP
22 206 South 13th Street, Suite 1400
23 Lincoln, Nebraska 68508

24 MARCUS A. POWERS, ESQ.
25 Assistant Attorney General
26 State of Nebraska
27 2115 State Capitol
28 Lincoln, Nebraska 68509-8920

29 JUSTIN D. LAVENE, ESQ.
30 Special Counsel to the Attorney General
31 State of Nebraska
32 2115 State Capitol
33 Lincoln, Nebraska 68509-8920

34 For Colorado:

35 PETER J. AMPE, ESQ.
36 First Assistant Attorney General
37 AUTUMN BERNHARDT, ESQ.
38 Assistant Attorney General
39 Office of Attorney General for Colorado
40 1525 Sherman Street, 7th Floor
41 Denver, Colorado 80203

1 I N D E X

2 WITNESSES: PAGE

3 Called by Nebraska:

4 DAVID AHLFELD:

5	Direct by Mr. Blankenau.....	1074
6	Cross by Mr. Draper.....	1105
7	Cross by Mr. Ampe.....	1165
8	Redirect by Mr. Blankenau.....	1167
9	Recross by Mr. Draper.....	1178
10	Recross by Mr. Ampe.....	1180
11	Redirect by Mr. Blankenau.....	1181

12

13 JAMES WILLIAMS:

14	Direct by Mr. Blankenau.....	1186
15	Cross by Mr. Ampe.....	1200
16	Cross by Mr. Draper.....	1214
17	Redirect by Mr. Blankenau.....	1219

18

19 Called by Kansas:

20

21 STEVE LARSON:

22	Direct by Mr. Draper.....	1233
----	---------------------------	------

23

24

25

1 EXHIBIT INDEX

2 KANSAS EXHIBITS: Admitted

3

4 36 Nebraska CBCU/IWS Proposal 1184
January 2008

5 37 Nebraska CBCU/IWS Proposal 1184
March 2008

6 38 Nebraska CBCU/IWS Proposal 1184
7 August 6, 2008

8 39 Review of RRCA Model for the Period 1187
9 2001 to 2004 by McDonald Morrissey
Associates, Inc., April 11, 2006

10 65 Graph: Comparison of Nebraska pumping 1071
11 impact under baseline conditions,
Kansas proposed remedy, and NRD
12 pumping alternatives

13 68 Third Report of the Special Master, 1073
14 Kansas v. Colorado, No. 105, Orig.,
U.S. Sup.Ct., pp. i-iv, 65-71 and
App. Ex. 8 at 76-85 (2000)

15 69 Resolution of the RRCA May 16, 2008 1184

16 -----

17 NEBRASKA EXHIBITS:

18 29 CV: David Ahlfeld 1183

19 30 Expert Report of David Ahlfeld 1183

20 31 Expert Report of James Schneider 1183
21 and James Williams, January 20, 2009

22 32 Drawing by David Ahlfeld of Proof for 1183
23 Proposed Accounting Changes and
Application of Coefficients

24 33 Ahlfeld Proof for Proposed Accounting 1183
Changes

25

1 34 Heap Map, 4 slides 1183
2 35 Head Map, 2 slides 1183
3
4 -----
5 COLORADO EXHIBITS:
6 (None were admitted this date.)
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
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25

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

2 ARBITRATOR DREHER: Good morning.

3 It's just a minute or two after 9:00
4 on -- what is today? -- March 17, I think.

5 MR. DRAPER: Saint Patrick's Day.

6 ARBITRATOR DREHER: Doesn't mean
7 anything to me.

8 This is the seventh day of hearing in
9 the Nonbinding Arbitration resulting from Kansas v.
10 Nebraska Colorado No. 126, Original in the United
11 States U.S. Supreme Court.

12 I understood, Mr. Draper, you have some
13 preliminary matters.

14 MR. DRAPER: Yes. With your permission,
15 I have provided the parties of the corrected version
16 of Kansas Exhibit 65. That was the one-page sheet
17 that had the graph on it that Mr. Larson testified to
18 yesterday.

19 And he testified that, on the version
20 that we were using yesterday, are the designations of
21 the Lower Republican NRD and the Upper Republican NRD
22 and the lower right-hand box was switched.

23 We have fixed that and this version
24 bears yesterday's date, which is when it was produced
25 and the previous one had the day before on it, in

1 case there is any question?

2 So this corrected version shows the date
3 of 3/16/2009. And I would ask that, based on
4 Mr. Larson's testimony with respect to and including
5 the correction that needs to be made, that it be
6 admitted.

7 ARBITRATOR DREHER: I assume there is no
8 objection.

9 MR. AMPE: No objection.

10 MR. WILMOTH: No objection.

11 ARBITRATOR DREHER: It's admitted.

12 (WHEREUPON, Kansas Exhibit 65 was
13 admitted into evidence.)

14 MR. DRAPER: The other one I wanted to
15 address, you had asked -- or we had discussed, I
16 guess, earlier the indirect benefit analysis from the
17 Arkansas River case. And in order that the parties
18 and the Arbitrator will have that easily accessible
19 and so it can be commented on, to the extent the
20 parties want to do it, I would like to offer for
21 admission Kansas Exhibit 68, which is the excerpts
22 from the Third Report of the Kansas and Colorado
23 Arkansas River, Case No. 105, Original.

24 And these are the excerpted, just the
25 Table of Contents and the particular parts of that

1 report that dealt with indirect impacts.

2 It's a two-volume report, so in the back
3 half of the exhibit, you will see that there is also
4 the cover and the Table of Contents for the exhibit
5 volume and in front of the Order that was entered
6 regarding the admissibility of that evidence.

7 So I would offer that be admitted as an
8 exhibit in this proceeding.

9 I might add it is on the Supreme Court
10 website, and that's where we actually downloaded this
11 from, but for ease of reference, I would offer it as
12 an exhibit.

13 MR. BLANKENAU: John, is the entirety of
14 this available on the Supreme Court website?

15 MR. DRAPER: The entirety of the Third
16 Report, both volumes, they are all there. The other
17 parts that we didn't print out relate to other
18 subjects, other than the indirect impacts.

19 MR. BLANKENAU: In the event we would
20 need to refer to any of those other areas, that are
21 relevant to this issue, do you have any objection to
22 us doing so, in briefing?

23 MR. DRAPER: No, not at all. In fact,
24 my feeling is that any of the parties could refer to
25 this as it sits on the Supreme Court website. It's

1 been approved by an Order of the Supreme Court and so
2 it's citable; but just as we did with the Nebraska
3 statutes, for instance, where something that is
4 literally citable is more convenient to have as an
5 exhibit, I would propose that we use that.

6 And it would not -- to answer Mr.
7 Blankenau directly, it would not limit anybody else's
8 ability to refer to any related items that had not
9 been included in the excerpt, for instance.

10 MR. BLANKENAU: With that understanding,
11 we would have no objection.

12 MR. AMPE: No objection.

13 ARBITRATOR DREHER: All right. It's
14 admitted.

15 MR. WILMOTH: Thank you.

16 (WHEREUPON, Kansas Exhibit 68 was
17 admitted into evidence.)

18 ARBITRATOR DREHER: With that, I think
19 we are ready to begin the third and last part of the
20 issues that were set to be heard. I'm not sure who
21 for Nebraska is going to do the direct.

22 Mr. Blankenau?

23 MR. BLANKENAU: Yes, I will be handling
24 this part.

25 ARBITRATOR DREHER: Please proceed.

1 MR. BLANKENAU: Just in the way of brief
2 orientation, these accounting issues will be broken
3 up into three distinct parts. The first one is what
4 we refer to as the CBCU accounting issue. The second
5 is accounting points with respect to groundwater
6 model and the third is the Haigler Canal accounting.

7 With that statement, we can begin with
8 the CBCU and call our first witness, Dr. David
9 Ahlfeld.

10 DAVID AHLFELD,
11 having been first duly sworn, was examined and
12 testified as follows:

13 DIRECT EXAMINATION

14 BY MR. BLANKENAU:

15 Q Dr. Ahlfeld, we have previously provided
16 to the Arbitrator a copy of your curriculum vitae,
17 which you have provided to us and we have had that
18 marked as Exhibit 29.

19 Briefly, could you describe the contents
20 of Exhibit 29.

21 A My CV is -- describes most of my
22 professional activity. I received a Ph.D. in 1987,
23 from Princeton University in civil engineering and
24 operations research. Went on to faculty position at
25 the University of Connecticut for about ten years,

1 and then on to faculty position at the University of
2 Massachusetts, Amherst, where I am today.

3 The CV continues to list publications,
4 conference proceedings, conference presentations and
5 so on, as well as students that I have had, classes
6 that I have taught and the like.

7 My work, as reflected in the CV, has
8 been in the area of groundwater modeling analysis.
9 The CV also lists a number of consulting projects I
10 have worked on where groundwater modeling was a key
11 element.

12 And the CV also lists my research
13 activities in groundwater modeling and management
14 optimization methods, which are particularly
15 concerned with, and I think, perhaps, relevant to
16 this -- to the analysis we did here because in the
17 context of optimization, we are interested in finding
18 a sensitivity of certain model outputs to certain
19 model inputs, which is not dissimilar to what is
20 desired in this case.

21 Q And you were approached by the State of
22 Nebraska to conduct some work with regard to
23 Nebraska's accounting procedures; is that not
24 correct?

25 A That's correct.

1 Q And you prepared an expert report in
2 this matter?

3 A Yes, along with several other coauthors.

4 Q And you have a copy of that report with
5 you?

6 A Yes, I do.

7 Q This will be referred to as Nebraska
8 Exhibit No. 30.

9 Dr. Ahlfeld, would you walk us through
10 your report, please.

11 A Well, I think the core of our report is
12 really the virgin water supply and examination of it.
13 The virgin water supply, of course, is defined in the
14 Compact. It is a key element of the computation of
15 the CBCU and the IWS, the imported water supply. It
16 is central to the accounting procedures.

17 There is a certain methodology by which
18 the virgin water supply is computed in the current
19 accounting procedures.

20 We have found that there is a second
21 method that can be used to compute the virgin water
22 supply, and we have done a series of tests which are
23 described in the report in which we compare these two
24 methods for computing the virgin water supply and
25 find that, in some cases, there is not agreement.

1 We conclude from that that, first of
2 all, the virgin water supply that is being used in
3 the current accounting procedure is not the correct
4 virgin water supply and, therefore, overall, there is
5 a flaw in the intention of the Compact to -- which,
6 as I understand it, is to arrive at the best estimate
7 of virgin water supply.

8 It also indicates that there is a flaw
9 in the individual values of CBCU and imported water
10 supply for the particular subbasins. I will get into
11 details in just a second.

12 So we find a disagreement between these
13 two alternate methods of computing the virgin water
14 supply.

15 We further propose a new method which we
16 believe resolves this -- this discontinuity.

17 Now, I want to -- I want to just step
18 back, if I may, and talk about the virgin water
19 supply.

20 It's, of course, defined in the Compact
21 as the water supply that would occur in the absence
22 of the streamflow; that is, in the absence of human
23 activity.

24 I should -- I should mention, in most of
25 my remarks here I will be referring to a given

1 subbasin, so we will be looking at the virgin water
2 supply and groundwater -- groundwater impacts in a
3 given subbasin. Of course, that is all added up over
4 the whole basin.

5 So the virgin water supply, as described
6 in the accounting procedures, involves adding the
7 gage flow that is measured at the accounting point,
8 adding the CBCU from surface water and the CBCU from
9 groundwater and subtracting the imported water
10 supply. That is what is done in each of the
11 subbasins.

12 Now, the gage flow and the surface water
13 flows are not at issue here.

14 What is at issue is the groundwater
15 portion of the virgin water supply. So, for
16 convenience, we have defined a quantity which we
17 called the groundwater portion of the virgin water
18 supply, which is basically the total impact of human
19 activity on streamflow in a given year in a given
20 subbasin at an accounting point.

21 So we defined that as being the
22 groundwater CBCU, minus the imported water supply;
23 that is, the virgin water supply associated with
24 groundwater.

25 Again, I think the easiest way to think

1 about it is that is the total groundwater impacts
2 that occur in the subbasin. And, of course, to get
3 the virgin water supply, we add that back in later in
4 the accounting procedures.

5 So I will be essentially talking about
6 that subset of the virgin water supply, which I have
7 defined as virgin water supply
8 groundwater-associated, and we used in our report a
9 notation for this, VWSg.

10 I want to be very clear here that there
11 are three types of -- or three values, I guess, of
12 VWSg that -- that was potential for confusion here,
13 so I want to just lay this out upfront.

14 First of all, there is a true, in
15 nature, value of VWSg. Of course, that's unknowable.
16 But it is -- but, of course it's out there.

17 There is the value of the VWSg that is
18 determined by the current method -- the current
19 accounting procedures.

20 There is a third value of VWSg that I
21 will be talking about which I call the direct method
22 of computing CBCU. Both the current method for
23 computing CBCU and this method that I'm referring to
24 are computed using the groundwater model and are
25 obviously estimates of the true value that would

1 occur in nature. But, I think there -- that it
2 follows from the Compact that they should be good
3 estimates. They shouldn't just be arbitrary numbers;
4 they should be our best estimates of the virgin water
5 supply associated with groundwater.

6 So how does the current method compute
7 the current virgin water supply associated with
8 groundwater the CBCU?

9 The current method says, All right,
10 let's compute first the impacts of each of the four
11 activities -- that is, Kansas pumping, Colorado
12 pumping; Nebraska pumping and now recharge. Let's
13 compute those.

14 Those are computed separately by using
15 the model in a differencing approach and then taking
16 those individual values -- that is, the CBCU for each
17 of the three States and imported water supply --
18 taking those three values, adding them together and
19 that's purported to be the virgin water supply
20 associated with ground. That is what the current
21 method does.

22 In effect, what that -- a little more
23 detail on that.

24 The current method says, Okay, we will
25 run the model with historical conditions: Everybody

1 on it. Then we will run the model again with, for
2 example, Colorado turned off -- Colorado pumping
3 turned off.

4 We will take the difference between
5 those two model runs -- the baseflows, that is -- the
6 difference in the baseflows computed at an accounting
7 point in any given year at a given subbasin, take the
8 difference and call that the CBCU for Colorado.
9 Repeat that process for Nebraska and Kansas and then
10 for the amount of recharge to get the imported water
11 supply.

12 So, in effect, the current -- the
13 current method starts with that historical condition
14 and sequentially subtracts each of the impacts and
15 computes this, the individual impact, and then
16 assumes that you can add those together to get total
17 impact.

18 Okay. So that's the current method and
19 the second type of CBCU. What I'm calling the direct
20 method -- in our report I think we call it
21 "independently computed virgin water supply
22 associated with groundwater," and I think Kansas, in
23 an earlier report, called this the -- described this
24 as the "virgin water supply metric."

25 What that does is say, Okay, let's do

1 two model runs; but let's first run the model with
2 everything on and then everything off at once and
3 take the difference in baseflows.

4 So I'm calling it a direct method
5 because we directly compute the impact of human
6 activities over the water, all impact simultaneously.

7 In the one case, the current method, we
8 compute these individual impacts and add them up in
9 what I'm calling the direct method; we compute the
10 impacts directly, or all at once, let's say.

11 Okay. So that -- that notion, I think,
12 is central to our report. We go ahead and use that
13 notion that we can directly compute the virgin water
14 supply associated with groundwater and conduct a
15 series of tests on various subbasins.

16 We compare the virgin water supply
17 associated with groundwater based on the current
18 method and the direct method. We find, in several
19 cases, that there is not agreement where there should
20 be.

21 And this would be a good point, I think,
22 to go to the Beaver Creek example, if I may, and we
23 have a couple of exhibits which are drawn from the
24 report.

25 So if you turn to --

1 Q Doctor, just so we are clear --

2 A Yes.

3 Q -- the information contained on these
4 exhibits is derived directly from your report; is
5 that correct?

6 A That's correct. I'm just looking to see
7 this -- the board here and on the left is derived
8 from Table 1 on page 18. We have just added a
9 graphic image, essentially. And we will also be
10 looking at Table 3 on page 19.

11 Q All right.

12 MR. BLANKENAU: My apologies to the
13 Colorado team over here.

14 A And I think we have paper copies of
15 these available. Okay. So this -- I think these
16 provide a nice illustration.

17 In the report we go into substantial
18 detail with Beaver Creek, primarily because it's a
19 relatively simple subbasin in that there are only two
20 activities -- human activities that have any
21 significant impact; namely, Kansas pumping and
22 Nebraska pumping.

23 So on the left panel here, we are
24 looking at 1965 conditions and we are looking at this
25 VWSg, the virgin water supply associated with

1 groundwater.

2 And in the upper left of the board, we
3 have the computation of that virgin water supply due
4 to groundwater and by this, what I'm calling the
5 direct method. Another way to say it is all-off
6 minus all-on.

7 So in that case, if we go to the all-off
8 case, we see that with Kansas and Nebraska off, the
9 baseflow was 12,226 acre-feet in 1965; with both
10 States pumping, we have 8822 acre-feet. And we take
11 the difference of that, and we arrive at, by this
12 direct method, a virgin water supply of 3404
13 acre-feet.

14 Okay, that is for 1965.

15 Now, if we look at the way the current
16 method would do the same calculation, first of all,
17 as I mentioned it's going to compute the individual
18 CBCU. So it's going to look at -- look at the case
19 with Nebraska on and Kansas off, which is 10,854; and
20 with both States pumping, 8822. We arrive at a value
21 CBCU value of 2032. And similarly, we can do the
22 same calculation for Nebraska and we arrived at a
23 CBCU of 1370.

24 With respect to the virgin water supply
25 due to groundwater, the current method would say, I

1 can take 2032 and 1370, add them together and that
2 should be the total virgin supply associated with
3 groundwater -- and, in fact, it is.

4 In other words, these two values compare
5 favorably. The sum of these is 3402, which is about
6 the same as 3404. Obviously, there is going to be
7 some slight round-off differences there.

8 Now, if we compare that with 2003, we
9 get a very different picture.

10 In 2003, same set of calculations. If
11 we do the direct method, all-off minus all-on, we
12 get, with everybody off, 6444 is the baseflow.

13 With everybody on, zero. And this, of
14 course, is highly significant; that is, when both
15 States are pumping in this particular year, there is
16 zero baseflow at the accounting point. Nevertheless,
17 take the difference of those and we get 6444.

18 So that is our best estimate of the
19 impact of human activity on this -- on Beaver Creek.

20 Now, how does the current accounting
21 method do this?

22 It says we will take the case with just
23 Nebraska pumping and Kansas off. That gives us 323.
24 Compare that to both States off -- or on, rather,
25 that is zero. The difference is 323. Similarly, for

1 Nebraska, we get 727.

2 So for the current accounting method in
3 2003, we get CBCU for Kansas of 323; Nebraska, 327;
4 and the current accounting procedure would say that
5 the value of virgin water supply should be the sum of
6 these two. And the sum of those two numbers is 1050,
7 which is obviously very far from 6445.

8 That, in a nutshell, is the problem:

9 That the current accounting method does not -- by
10 adding these two numbers together to get a reasonable
11 estimate of the virgin water supply due to the
12 groundwater, we do not achieve that desired outcome.

13 Now, we have studied this -- and I won't
14 go into any detail unless you have further questions
15 about it -- on the analysis of this.

16 But we have studied why is this
17 happening? What is going on here? And this kind of
18 observation made by Nebraska, I think, was the
19 impetus for pursuing this analysis.

20 And as we have studied this and reported
21 in our document, January document, we think we know
22 why this is happening.

23 It has to do with stream-drying. So as
24 I mentioned, it's quite significant that the baseflow
25 is zero when both States are operating; in other

1 words, the stream goes dry.

2 There is a nonlinear response to -- of
3 the streamflow to pumping in Beaver Creek in 2003.
4 And that nonlinearity translates to a failure of the
5 additivity assumption that is implied in the current
6 accounting procedures.

7 So we -- I think we -- we think we have
8 a good handle on why this is happening. The actual
9 mechanics of it has nothing to do with the actual
10 groundwater model, per se; it has do with how the
11 groundwater results are used.

12 We also have a document in the report
13 that this is happening, not just in Beaver Creek;
14 it's happening in a number of other watersheds, a
15 number of other subbasins and in other years. So
16 this is not an isolated event.

17 And finally, we document that it makes a
18 difference. This is not some trivial academic
19 exercise or something. This makes a substantial
20 difference in the final allocations.

21 In other words, the current method is
22 computing virgin water supplies that do not match the
23 intention of the Compact and, therefore, produce the
24 wrong allocations.

25 Okay. So that's -- that's a large part

1 of our report.

2 We also propose in our report a new
3 method which corrects this problem.

4 And the method is based on several --
5 based on three criteria. This is really the heart of
6 it.

7 We recognize that -- well, let me start
8 again.

9 The -- we -- we first would like to find
10 a new method -- this is -- I'm just going to tell you
11 the process we used for doing this.

12 We said, All right, any new method
13 should use the same sort of methodology as the
14 current method; that is, it should use a series of
15 model runs with human activities either fully on or
16 fully off.

17 Now, if you go through the various
18 combinations of a State on -- or an activity, rather,
19 on -- or the four activities, obviously either on or
20 off, there are 16 different combinations that I can
21 have. So that implies 16 runs of the proffered
22 model. That is criteria one. We are just going to
23 stick with those 16 runs, combinations of off and on,
24 so it's similar to the current method.

25 Secondly, for those subbasins and in

1 those years when there is no significant nonlinear
2 response -- let me rephrase that -- when the response
3 of streamflow upstream for the pumping is nearly
4 linear, as we define it in the report, then any new
5 method should produce the same results as the current
6 method.

7 That is No. 2. That is criteria 2 for
8 our new method.

9 The third criteria for our new method is
10 the CBCU and IWS that are computed by the new method
11 should pass this test, should add up to the same
12 value of virgin water supply associated with
13 groundwater that is arrived at by the direct
14 calculation.

15 Now, once you -- once you decide on
16 those three criteria, which we did, we decided those
17 were reasonable, then the rest of the methodology --
18 it falls out of that. It's just a derivation.

19 So the particular pairs of differences
20 that we use, the coefficients that arise out of that,
21 are simply derived from those three criterion. So
22 they are really the heart of the new method.

23 Now, in terms of the mechanics of it, we
24 are using, as I said, every combination of activity.
25 So all-on/all-off. Everybody on but Nebraska off.

1 Everybody off and Nebraska on. Everybody off and
2 Kansas on, et cetera. All of the different
3 combinations are being used.

4 And we take differences of those
5 combinations that are highlighted -- in particular,
6 highlight the impact of particular States. So this
7 is -- this is perhaps tedious to describe orally and
8 easier to look at in a report.

9 But basically, you have eight
10 differences that arise out of those 16 combinations
11 for a particular impact.

12 So, for example, if we look at
13 Colorado's impact, that could be computed by looking
14 at everybody off, then turn on Colorado. Take that
15 difference. Turn on Nebraska, but everybody else is
16 off. Then do another run with Nebraska on and
17 Colorado on. Take that difference. And so on.
18 Eight pairs of differences arise out of that for
19 Colorado's impact. And those are weighted, as it
20 turns out in our method -- in other words, when I say
21 "turns out," meaning it's derived from the criteria
22 that I mentioned.

23 So the mechanics of it is a little bit
24 more computation, obviously, but it does satisfy
25 those criterion. And we show on the report that it

1 meets those three criterion that I just mentioned.

2 I should emphasize that at a first read,
3 I can certainly imagine that someone might see that
4 long equation and think it's much more complicated.
5 But if the response is linear in a subbasin, every
6 one of those difference pairs will have the same
7 value. So it will revert, I should say, to the
8 computed impact that arises out of the current
9 method.

10 Q So if I could sort of summarize real
11 briefly for you.

12 A Yes, thank you.

13 Q Tell me if I have got this right.

14 Nebraska developed this method of
15 accounting to deal with nonlinearities associated
16 with streams that have little or no flow; is that
17 correct?

18 A Yes, that is correct. That is why the
19 nonlinearity arises when we have stream-drying. And
20 this new method corrects that problem.

21 Q And the differences between Nebraska's
22 new method and the existing method did not manifest
23 themselves in, generally, flowing streams; that is,
24 the results are essentially the same?

25 A That's correct. That's correct. We

1 have many tables in the back of the report that
2 highlight this, but if stream-drying is not present,
3 then the response is close to linear. There are
4 these minor nonlinearities we described in the
5 report. In the report the response is close to
6 linear, so we get the same result as the current
7 method.

8 Q And Nebraska's methodology essentially
9 hinges around the all-off minus all-on scenario; is
10 that correct?

11 A Yes, that is a very important point.
12 That is, we believe that the best estimate of the
13 groundwater-related virgin water supply, the VWSg, is
14 the direct computation, the all-off minus all-on.

15 Yes.

16 MR. BLANKENAU: That's all I have.

17 ARBITRATOR DREHER: Dr. Ahlfeld --

18 THE WITNESS: Yes.

19 ARBITRATOR DREHER: -- I understand what
20 you have done, to a point.

21 I don't understand how you came up with
22 the particular weighting factors that you used. I
23 mean -- yes.

24 How did you come up with those weighting
25 factors?

1 THE WITNESS: Okay. There is a lot of
2 algebra to get there, which I will try to describe.

3 Actually, we do -- there is a paragraph
4 in the report that is probably rather cryptic and
5 brief that attempts to describe the methodology that
6 we used.

7 Mathematically, what we are saying is if
8 you add together -- okay, let me back up.

9 We want to compute values of CBCU for
10 Nebraska, Kansas and Colorado and IWS, sufficient
11 that if you add those values together, they equal the
12 independently or directly computed value of VWSg.
13 Now, that independently computed value is all-off
14 minus all-on.

15 So the algebra of this becomes, if we
16 have -- if we -- if we add those four impacts
17 together -- and I'm using the word "add" -- let me
18 just parenthetically add here, I'm using the word
19 "add" and, of course, we subtract the imported water
20 supply. "Adding" here implies an arithmetic sense.

21 If we add those two together and start
22 off with the presumption that the coefficients on
23 each of the differences can be -- can take any value,
24 except they must add -- the sum of the coefficients
25 must add to one and coefficients must result in the

1 addition of the four method -- the four impact
2 calculations, adding to the all-on minus all-on
3 condition.

4 I'm finding this difficult to explain
5 without -- without some paper in front of me and a
6 large chalk board.

7 MR. BLANKENAU: We actually do have
8 something we can put up if that would be help. You
9 can write on there.

10 ARBITRATOR DREHER: It would help me, I
11 think.

12 MR. BLANKENAU: Okay, why don't we do
13 that.

14 THE WITNESS: I don't know if -- we
15 developed a notation to describe the various runs and
16 I will use that, if I may. Okay. Thank you.

17 Can everybody see that?

18 Okay. If I may, we developed a notation
19 -- am I writing large enough that you can see?

20 ARBITRATOR DREHER: Yes, that's fine.

21 THE WITNESS: -- in which a symbol like
22 this implies a run in which Colorado, Kansas, the
23 mound and Nebraska are all-on. And it's simple, like
24 that -- implies nothing is on and there are all sorts
25 of combinations in between.

1 So we can write the direct VWSg is equal
2 to all-off minus all-on.

3 ARBITRATOR DREHER: Before you continue,
4 are you doing okay with this?

5 THE REPORTER: So far. Thanks.

6 THE WITNESS: So, obviously, this is the
7 baseflow resulting from the all-off/baseflow
8 resulting from all-on.

9 Okay. We are going to -- we are going
10 to compute the VWSg in our proposed method using --
11 just the way it's done in the current accounting
12 method.

13 We are going to compute the VWSg equal
14 to CBCUn, plus CBCUk, plus CBCUc, minus IWS. Now, we
15 postulate, or suggest that we will compute each of
16 these impacts as a combination of differences.

17 And this is where I'm going to fill up
18 the rest of the sheet here with this. I wish I had a
19 much bigger board.

20 So, for example, CBCUn is equal to --
21 I'm going to put an arbitrary coefficient in front of
22 that just for the moment. Okay? And this is the
23 first difference: A run with everybody off and a run
24 with just Nebraska on. That's the first difference.

25 Then -- running out of space here.

1 Then we are going to have a second
2 difference and a second coefficient, which is, as yet
3 undetermined.

4 And let's see, suppose that one is the
5 difference -- Colorado is on and Colorado and
6 Nebraska are on and we take that difference, and so
7 on. Kansas is on.

8 Perhaps I can explain this without
9 writing out the rest of these.

10 I'm going to come up with alpha 4 with
11 another difference -- maybe I should write the rest.

12 Kansas. Then we have the mound minus
13 alpha 5, CK plus CSN. So I'm writing plus alpha 4
14 times N, minus MN, plus alpha 5, minus CK, minus CKN,
15 plus alpha 6, times CN, minus CMN, plus alpha 7,
16 times -- times CM, minus C -- I'm sorry -- ah, minus
17 KMN, that is KM minus KMN; one more, plus alpha 8
18 times CKM minus CKMN.

19 So those are eight coefficients on the
20 eight differences.

21 Now, here is how we proceed. And
22 without filling up another couple sheets here, I'm
23 going do the same thing for CBCUk. The same thing
24 for CBCUc; obviously, the differences will be
25 different. And the same thing for IWS, the

1 differences will be different.

2 What I'm going to require is that the
3 alphas be the same in each method. In other words,
4 for CBCU, you see I'm going to have alpha 1, times
5 theta minus C. But the alpha 1 in each equation must
6 be the same.

7 So that is a requirement algebraically.

8 Okay. Here it is in a nutshell.

9 Now, if I take this statement,
10 substituted here -- that is, if I take CBCUn written
11 out in terms of the eight individual components,
12 substitute it back into my equation on the top of the
13 sheet; do the same for CBCUk, the same for CBCUc, the
14 same for IWS, I will have 8 times 4, 32 terms, each
15 of the -- each with difference combinations and 8
16 coefficients, because alpha 1 through alpha 8 show up
17 in each of those cases.

18 Okay. So on the right side of this
19 equation, I have got 32 terms and 8 coefficients to
20 be determined. On the left side of the equation, I'm
21 going to substitute this. So for VWSg on the left
22 side of the equation, I will substitute theta minus
23 CKMN.

24 Now, it's a matter of how do I select
25 these coefficients so that the right side is equal to

1 the left side?

2 Let me -- let me show you one example of
3 that, if I may. Do we have a way to --

4 MR. POWERS: Just flip it.

5 THE WITNESS: Flip it. Okay.

6 So I will rewrite, I have $CBCU_n$ is equal
7 to α_1 , times θ , minus N , plus et cetera.

8 I have got $CBCU_k$ is equal to α_1 ,
9 times θ , minus K , plus dot, dot, dot.

10 I have $CBCU_c$ is equal to α_1 -- it's
11 the same α_1 in each case -- times θ , minus
12 C , plus dot, dot, dot. Of course, on each of these I
13 have eight terms total, just as I had on the previous
14 sheet.

15 And then finally, IWS -- this is always
16 a little confusing, because what we are really
17 talking about is minus IWS, and that allows us to --
18 it's just a sign switch to keep the -- to keep the
19 algebra cleaner. So that is a run where we have
20 everything off, minus the mound on.

21 Okay. Now, so on the right side of the
22 equation on the previous page -- I will label this as
23 page 1, if I may. That is page 1. And this is page
24 2.

25 So on the right side of this equation, I

1 have got these four terms. I'm going to substitute
2 the eight expansions. In each of those expansions an
3 alpha 1 times a theta shows up.

4 Now, on the left side of the equation I
5 have got a theta minus CKMN. If I want to have a
6 theta -- I have got a theta on the left side. If I
7 want to wind up with a theta on the right side, what
8 does alpha 1 have to be? It has to be quartered. So
9 each of these get quartered so that when you add
10 these together, the sum of these thetas adds up to
11 the left side.

12 That is what I was meaning when I said
13 earlier that, once we set the criteria -- and again,
14 the criteria is, that whatever values is CBC -- CBCU
15 and IWS we compute out of the new method, they must
16 add up to theta minus CKMN.

17 Once you set that requirement, the
18 coefficients just fall out from the algebra, so to
19 speak. It's a derivation, in effect.

20 I don't know if that is illuminating. I
21 can keep going and I don't know if we can provide
22 more information -- because it's easier to see that
23 written down.

24 ARBITRATOR DREHER: And the other
25 alphas, I mean, you derive them in a similar way?

1100

1 THE WITNESS: Yes, yes. You really have
2 to see all 32 terms to follow the logic of it; but if
3 this -- if this coefficient has to be a quarter, now
4 I have a quarter of an N here, but I don't want to
5 have an N on the right side. So in order to get rid
6 of that N, I have to assign the certain coefficients
7 to the other places where N shows up to cancel them
8 out. And that winds up being the one-twelfth. N
9 shows up three times elsewhere in the total set of 32
10 terms.

11 The alpha 8 -- because we want the CKMN
12 in here, the alpha 8 also has to be a quarter by the
13 same reasoning, as with the theta.

14 So -- yes.

15 ARBITRATOR DREHER: You know, in your
16 report you describe the numerical difference between
17 what you are calling the direct method and what is
18 currently provided in the accounting procedures as a
19 residual.

20 THE WITNESS: Yes.

21 ARBITRATOR DREHER: Isn't this just a
22 way of spreading the residual around so that you
23 don't have a residual?

24 THE WITNESS: The net effect of it is to
25 eliminate the residual.

1 We require -- mathematically, we require
2 that the residual be zero. It does -- it does spread
3 it around. And, as we show in various examples and
4 some of the other expert reports show, it does spread
5 it around.

6 Our reasoning is that by using this --
7 all of these differences, we are eliminating, we
8 think -- or at least reducing, the bias that might
9 exist based -- by using one or -- one particular base
10 condition.

11 While we have got this up here, the
12 current method, of course, just using the all-on as
13 the base condition -- and, in effect, we are using
14 multiple base conditions. And that not only
15 eliminates the virgin water supply computation
16 problem -- well, I should say, it eliminates the
17 virgin water supply computation problem. And to do
18 that, it has to spread the residual around somehow.
19 And it does it, we think, in the most reasonable
20 fashion, fairest fashion.

21 ARBITRATOR DREHER: Well, I suppose what
22 is fair is in the eyes of the evaluator.

23 THE WITNESS: Right, sure.

24 ARBITRATOR DREHER: I guess, you know,
25 the question that I have -- and I haven't resolved in

1 my own thinking about this -- is this residual is
2 created because the model response is nonlinear. And
3 spreading this residual around so that it's forced to
4 meet the very first equation up there --

5 THE WITNESS: Yes.

6 ARBITRATOR DREHER: -- I haven't able to
7 resolve it in my mind, is that really the most
8 accurate? That's the question.

9 Is this really the most accurate?

10 THE WITNESS: I think there are two
11 pieces to this. The first is -- two requirements of
12 the accounting procedure that have to be met here.

13 First, is computing a virgin water
14 supply associated with groundwater. And I think that
15 this is the most accurate; that is, the all-on minus
16 all-off is the most accurate way to do that.

17 Of course, you also need the individual
18 CBCU and the imported water supply, you need values
19 for those.

20 Further, those values should add up to
21 the total virgin water supply -- the correct value --
22 the directly computed value.

23 Now, could you come up with different
24 values of the impact that would add up to the direct
25 value? Yes, you could.

1 I think that the -- the -- the method we
2 have proposed deviates least from the current method
3 is targeted at correcting this one issue in the
4 accounting procedures -- this one problem.

5 So in my view, it is -- it is the best
6 estimate for the individual impacts and, of course,
7 has this benefit of adding up to the total correctly.

8 ARBITRATOR DREHER: Were you part of the
9 group that negotiated the accounting procedures at
10 all? Were you involved in this at that point in
11 time?

12 THE WITNESS: No.

13 ARBITRATOR DREHER: So then you are not
14 able, probably, to answer this, but I guess the
15 question that I have -- and maybe I will be asking it
16 of others -- was this nonlinear response of the
17 model, was that anticipated? And if it was
18 anticipated, why wasn't it addressed as part of the
19 procedure?

20 You know, any subsequent witness that
21 can answer that question, I would appreciate some
22 help.

23 THE WITNESS: Yes.

24 ARBITRATOR DREHER: That's all I have.

25 Let's see. Do we know who is going to

1 cross first here? Colorado or Kansas?

2 MR. AMPE: We need our usual five
3 minutes to confer.

4 ARBITRATOR DREHER: All right, that will
5 be fine. We will take a five-minute recess.

6 (Break was taken from 9:50 to 10:10.)

7 ARBITRATOR DREHER: Before we begin the
8 cross-examination, there is one minor thing I wanted
9 to clarify.

10 In the last paragraph on page 36 of your
11 report, in the first line, there is 17,363 acre-feet
12 referenced as computed by the current accounting
13 procedures. Is that the correct number, or should it
14 be 144?

15 THE WITNESS: I appreciate your pointing
16 that out and I meant to mention that, actually, in
17 the first segment, that is a typo we discovered. It
18 should be 144. That is page 36, third paragraph,
19 first line. Thank you.

20 ARBITRATOR DREHER: If I understand the
21 arrangements from Colorado and Kansas, Kansas is
22 going to go first; is that correct?

23 MR. DRAPER: Yes.

24 ARBITRATOR DREHER: Are you ready?

25 MR. DRAPER: Yes.

1 ARBITRATOR DREHER: Please proceed.

2 CROSS-EXAMINATION

3 BY MR. DRAPER:

4 Q Well, I would like to begin by asking
5 you to look at a document that we will provide you,
6 which is Kansas Exhibit 39.

7 This is a document entitled "Review of
8 RRCA Model For the Period 2001 to 2004 prepared for
9 Nebraska Department of Natural Resources by McDonald
10 Morrissey, Reston, Virginia and Concord, New
11 Hampshire," dated April 11, 2006.

12 Have you seen this document before?

13 A I don't think I have. I don't recognize
14 it.

15 Q When did you start working on this
16 project?

17 A Almost exactly a year ago, March '08.

18 Q And did you visit the Republican River
19 Basin as part of your work?

20 A I don't believe I have been there. I
21 have been to Lincoln, which I don't think is in the
22 Basin, if I recall correctly.

23 Q No.

24 Now, as I understand it, McDonald
25 Morrissey, is one of your coauthors for your expert

1 report in this instance?

2 A Correct.

3 MR. BLANKENAU: Excuse me, Mr. Draper.
4 Do you have a copy of that exhibit?

5 MR. DRAPER: This is one of the ones we
6 provided in January as Exhibit 39.

7 MR. BLANKENAU: If you could maybe give
8 us a moment to try to locate that, please.

9 MR. DRAPER: And I can take a look and
10 see if we have a copy.

11 MR. BLANKENAU: Yes.

12 MR. DRAPER: Looks like we do have one.

13 MR. BLANKENAU: Thank you. Sorry for
14 the interruption.

15 MR. DRAPER: Quite all right.

16 Q (BY MR. DRAPER) Now, this report is
17 about a subject which is very close to which you are
18 working on; wouldn't that be fair?

19 A Well -- at least judging by the title.
20 I would have to look at it, yeah. RRCA Model is the
21 same model that we have been working with.

22 Q Let me just, since you are not familiar
23 with this report -- and as you look through it, are
24 you still convinced that you have never seen this?

25 A I don't remember this, no.

1 Q Okay. If you could, look at page 3.

2 A Okay.

3 Q You can see, in paragraph 2, on page 3
4 that it states that the McDonald firm was
5 commissioned to determine, in conjunction with the
6 Department of Natural Resources of Nebraska, if the
7 RRCA Model calculated water levels and model
8 calculated baseflow for the period January 1, 2001,
9 through December 31, 2004 are consistent with
10 observed water levels at stream discharge for the
11 same period.

12 Do you see that?

13 A I do.

14 Q If you would, please, turn to page 7.
15 This is the second-to-last page of text.

16 If you would look at the bottom
17 paragraph of the first sentence, could you read that
18 first sentence for us, please.

19 A Okay. Page 7, last paragraph says, "The
20 model is imprecise because it does not represent all
21 features of the flow system but only those which are
22 deemed to be significant and because input
23 specifications are estimates."

24 Is that --

25 Q Yes. Thank you.

1 A Thank you.

2 Q And if that is true, according to your
3 coauthor about the RRCA model, does that indicate
4 that because it's imprecise and does not represent
5 all features, that it necessarily contains errors?

6 A Well, you know, I'm not sure what he is
7 referring to here. Obviously, there are many ways to
8 measure a precision of the model. No model is
9 perfectly precise when compared to -- well, I don't
10 think I have ever seen a model which is precise when
11 compared to observed data.

12 Q But you --

13 A I'm not sure -- I'm not sure I
14 understand your question.

15 Q You testified that you had reviewed the
16 RRCA model documentation; isn't that right?

17 A Yes, I -- yes.

18 Q Okay. And for instance, transmissivity
19 is held constant in that model; isn't that right?

20 A That's my understanding, yes.

21 Q That might be called a simplification,
22 mightn't it?

23 A Correct.

24 Q To the extent saturated thickness is not
25 allowed to change, there may be errors of some kind,

1 anyway, between the model transmissivity and the
2 actual field transmissivity; isn't that right?

3 A Yes, you would expect in this basin,
4 that the field transmissivities change as the water
5 table goes up and down. So by fixing them, as is
6 done in the current model, you are going to get
7 differences between the true transmissivity in nature
8 and that represented in the model.

9 Q And you were not -- you were not asked
10 by the State of Nebraska to investigate whether a
11 constant transmissivity was creating problems and
12 inaccuracies with respect to the results of the RRCA
13 model and accounting procedures; is that right?

14 A That's correct.

15 Q We --

16 A The model is not really at issue here.
17 The issue is the use of the results of the model in
18 the accounting procedure.

19 I tried to distinguish between the two,
20 because it's very important. The model computes
21 baseflows and the calibrations, up through the
22 Special Master Report -- and I guess that's around
23 2001, that data, calibrations are agreed -- it's
24 agreed that the calibrations are reasonable for that
25 period.

1 So the issue here is how the baseflows
2 computed by the model are used in the accounting
3 procedures to calculate CBCUs by IWS, virgin water
4 supply.

5 Q If you would, could you read out loud
6 for us the next sentence on page 7 after the one you
7 just read for us.

8 A "In one area of the RRCA model, the
9 'mound' area or an area in portions of Kearney,
10 Phelps, Harlan, and Franklin counties
11 model-calculated water levels appear to be
12 consistently too high."

13 Q Now, if water levels are too high in the
14 mound area, that would tend to overstate the mound
15 contribution to the Republican Basin, wouldn't it?

16 A Well, it could. It depends -- it
17 depends exactly where those high heads are with
18 respect to the groundwater divide and with respect to
19 Nebraska pumping. So it's -- I'm not prepared to say
20 that -- in any absolute way that -- I'm not prepared
21 to agree with your statement. There could be
22 exceptions, I think.

23 Q But it is possible --

24 A It's certain possible.

25 Q -- that this condition of having water

1 levels that appear to be consistently too high might
2 lead to an overestimation or overstatement of the
3 mound contribution?

4 A Well, if by that you mean, would it --
5 would the model be -- is it possible that the model
6 is producing baseflows in the Republican Basin that
7 are larger than they would be in nature as a result
8 of mound recharge? That's certainly possible.

9 Q But Nebraska did not ask you to
10 investigate that issue that was raised in this
11 report, did it?

12 A No. Again, that's a -- that's a model
13 issue, as I -- as I -- well, basically what I said
14 earlier, that the scope of this analysis does not
15 include changing the model itself.

16 Q If I understand, what you are proposing
17 is not a change in the model, but a change in the
18 accounting procedures to address the nonlinearity
19 aspect of the model?

20 A That's correct.

21 Q Would you look to the next page, page 8,
22 of the document we are looking at, Kansas Exhibit 39.

23 Could you read the last paragraph,
24 please.

25 A Okay, very last. "Hydrographs showing

1 model calculated water levels and observed water
2 levels indicates that the model continues to match
3 conditions since January 1, 2001. Hydrographs
4 showing baseflow calculated by the model and baseflow
5 calculated from observed streamflow support that
6 conclusion."

7 Q So this is a positive conclusion with
8 respect to the RRCA groundwater model and how it's
9 being used; isn't that right?

10 A Well, given that I have -- I'm seeing
11 this report for the first time, that -- that -- it
12 seems to be saying that since the model was
13 calibrated, some postcalibration analysis shows that
14 it continues to, according to this paragraph, produce
15 good matches to observed data and that's -- that's
16 what I'm inferring from that.

17 Q And this report did not note that there
18 was any such problem as the one that you are
19 asserting today; isn't that right?

20 A Well, I haven't read the report so I
21 don't know what else it might talk about, but you
22 have just pointed me to a few selected parts.

23 Q But based on what we have looked at so
24 far, that appears to be true?

25 A That's correct. It appears to be an

1 analysis of the model itself, exclusive of the
2 accounting procedures. I mean, I haven't seen
3 accounting procedures in anything I have read back to
4 you.

5 Q Now, the author of this report is
6 Mr. McDonald, or at least McDonald Morrissey &
7 Associates, his firm, correct?

8 A Apparently so.

9 Q And he is not testifying in this
10 proceeding, is he?

11 A I don't know.

12 Q But he is here today, isn't he?

13 A He is here today.

14 Q I would like to turn our attention to
15 what has been marked as Kansas Exhibit 36.

16 Kansas Exhibit 36, as we identified it
17 back in January, is a document entitled "Calculation
18 of Computed Beneficial Consumptive Use and Imported
19 Water Supply Credit Using the RRCA Groundwater Model"
20 from the Nebraska Department of Natural Resources,
21 dated January 2008.

22 Are you familiar with this document Dr.
23 Ahlfeld?

24 A I think I have seen this one.

25 Q The date shows that this was produced

1 prior to your coming on the project, correct?

2 A That is correct.

3 Q And this form of the proposal, this is
4 an earlier form of the proposal you are making today;
5 isn't that right?

6 A You know, I -- I would have to read this
7 again. I don't think I have looked at this since
8 about a year ago, so I'm not sure what this does.

9 Q This is a three-page document, Doctor,
10 that has a table on page 2 and some discussion of
11 various combinations of runs of the RRCA groundwater
12 model; isn't that right?

13 A It looks that way, yes.

14 Q If we look at Table A, "Option," A and B
15 relate to the two different ways of calculating the
16 mound credit, don't they?

17 A Yes, that appears to be the case.

18 Q And in looking at Table A, Option A is a
19 proposal to -- or it's a description of the current
20 way of calculating the mound credit; isn't that
21 right? In other words, everything on, except for
22 mound credit, versus everything off, correct?

23 A It looks that way. I'm hesitating there
24 because the terminology annotation is a little
25 different than we have since used. So . . . but,

1 yes, I think you are right.

2 Q And then Option B is the proposed method
3 of calculating the mound credit with a comparison to
4 all stresses, or all activities being used; isn't
5 that right?

6 A It looks like Option B compares mound
7 on, A/B off and A/B off, off; everything off. That
8 is -- now, is that proposed? I don't know. Is that
9 proposed in this document? I don't remember. It's
10 certainly not what we are proposing in the present --
11 in our January '09 report.

12 Q In that regard, I would ask you to
13 return to the next page, the last page of the
14 document there.

15 The second-to-the-last paragraph has a
16 final sentence that starts with the word "However" --

17 Would you read that sentence aloud for
18 us, please.

19 A Sure. "the use of option B to calculate
20 the imported virgin water credit and option C to
21 calculate the CBCU results in a combined impact for
22 the IWS credit and CBCU equal to the result from
23 method E and thus would seem to be the preferred
24 method."

25 Q So there is a preference being expressed

1 here for calculating the mound credit pursuant to
2 Option B; isn't that right?

3 A That seems to be what that sentence is
4 saying.

5 Q If we look at Table A, we can see the
6 differences in the mound credit over two different
7 periods. In the second column from the right, there
8 is a column that is entitled "Average Difference 1981
9 to 2000 Acre-Foot Per Year." You can see that for
10 the current method, 16,272 acre-feet per year is the
11 average. And in the proposed method, it would be
12 21.655, correct?

13 A That -- yes. And -- I'm -- I'm going to
14 just be clear, when you say the word "proposed
15 method," you are referring to -- I'm understanding
16 you to refer to the statement on page 3, that this is
17 -- that this would seem to be the preferred method.
18 That sounds a little bit weaker than a proposal to
19 me, but --

20 Q Yes, that is what I'm referring to.

21 A Okay.

22 Q You can see the result of going from
23 the -- if you look at period 2001 through 2006 in
24 Table A, that the difference is -- is much greater.
25 It more than doubles the imported water supply credit

1 using this version of the proposal; isn't that right?

2 A Right. Option B results in an average
3 over -- overage, about 28,000, over Option A, which
4 is about 13,000.

5 Q I would like to turn next to what has
6 been marked as Kansas Exhibit 37.

7 MR. BLANKENAU: Mr. Draper, I believe
8 the disclosure -- we will take a look -- ended with
9 Exhibit 39. So if we could have a copy.

10 MR. WILMOTH: Maybe it was in February
11 that was --

12 MR. DRAPER: Yes, it might have been in
13 February. That's right. In fact, it would have been
14 February because it would have been submitted in
15 response to the January submittals. So these were --
16 these were exhibits that were provided.

17 MR. BLANKENAU: Thank you.

18 MR. DRAPER: Just make sure everybody
19 has a copy handy, do you have a copy?

20 MR. BLANKENAU: Yes, I do have a copy.

21 Q (BY MR. DRAPER) Exhibit 37 is a
22 documented entitled, "Calibration of Computed
23 Beneficial Consumptive Use and Imported Water Supply
24 Credit Using the RRCA Groundwater Model, Nebraska
25 Department of Natural Resources, March 2008."

1 Have you seen this document before?

2 A Yes.

3 Q Did you participate in the creation of
4 this document?

5 A No.

6 Q This was just as you were coming on to
7 the team?

8 A That is correct. I came on -- it may
9 almost be exactly a year ago. I think it was late
10 March, mid-March, something like that. Anyway, no, I
11 was not involved in creating this document.

12 Q If you would turn to the Tables that are
13 the last two pages of the document, you see in Table
14 1 a number of different scenarios -- ten different
15 scenarios. And they are differentiated in the four
16 right-hand columns with respect to which of the
17 activities is on indicated by "YES," or off,
18 indicated by "NO," correct?

19 A That's correct.

20 Q And then on the next page, in Table 2,
21 we have choices of scenarios that might be used to
22 calculate impacts used in accounting procedures. And
23 here we see in Table 2 the four different activities
24 that we are seeking to quantify here in the first
25 column, the current choice of scenarios using the

1 scenario numbers from the previous table. And an
2 alternative set of scenarios in the right-hand
3 column, correct?

4 A Yes.

5 Q And what is being suggested here, if I'm
6 reading this correctly, is that it's being proposed
7 that the activities, or stresses be -- go from being
8 analyzed with all the other stresses on, to going --
9 to a comparison with the run where all other stresses
10 are off; isn't that right? Scenario 4 is the one
11 that has all of those.

12 A Yes, that's correct. It looks like that
13 is what they are doing here, yes.

14 Q And again, we can see the results in
15 Table 3 of this proposal, correct?

16 A Right. I guess Table 3 is the number
17 that results from the indicated scenario
18 differencing.

19 Q For the period 2001 through 2006?

20 A Apparently, that's correct.

21 Q As shown by the title of the table?

22 A Yes, right.

23 Q And again, we can see there are
24 differences with this version of the proposal:
25 Nebraska's pumping effect go down a little bit.

1 Kansas' go up, looks like more than 50 percent,
2 Colorado's go up something like 50 percent and mound
3 credit goes up more than a hundred percent, correct?

4 A Well, my recollection of this report --
5 and again, this is another one I haven't really
6 looked at since probably April of last year; but my
7 recollection is that this was not a proposal, as
8 such, as an observation of the changes that -- the
9 different values that you can get under the different
10 assumptions that are laid out here.

11 So I -- I would -- I wouldn't refer to
12 this as a proposal, if I'm recalling correctly.

13 Q It's a different version of the kind of
14 analysis that you are currently proposing?

15 A Well -- hum. We have conducted some
16 analysis, as reported in the January '09 report, and
17 we are proposing a method. The similarities are
18 related to different types of differencing one can
19 do.

20 That is the similarities between what
21 our current -- our January '09 report and this --
22 your Exhibit 37. I think -- am I answering your
23 question? I think so.

24 Q Yes. I think, as you can see on Table 2
25 and 3, that those far right columns are

1 labeled "Alternative choice of scenarios used to
2 calculate impacts on base-flows"?

3 A I see that.

4 Q Yes. So this was an alternative that
5 was being, at least, communicated to the other States
6 at this time, correct?

7 A Well, again, my recollection of this --
8 you know, these series of reports, I think, highlight
9 the approach Nebraska is taking here to, first of
10 all, noticing that this seems to be a report of a
11 problem.

12 And I think this report, in
13 particular -- that is your Exhibit 37 -- is
14 essentially saying, Hey, we have a problem here, we
15 have got some strange results. Why is this
16 happening? And reporting -- I believe this was
17 communicated to the -- is it called the Technical
18 Committee of the RRCA? My understanding is the
19 intention was that this would initiate some
20 discussion of -- in that committee to try to deal
21 with the problem.

22 So this was -- I don't think this was a
23 proposal, as such, as reporting on the observations
24 that Nebraska had made up to that time -- or at least
25 some of them -- some of the observations.

1 Q And I would note for the record that the
2 transcripts of the March 11 and March 12 meetings,
3 which are Kansas Exhibits 32 and 33 and the later
4 transcripts of last year's RRCA meetings, do reflect
5 consideration of these, but I won't take your time
6 now to go through that particular language.

7 I would now like you to take a look at a
8 document which has been identified as Kansas Exhibit
9 69.

10 While Donna is providing that to the
11 parties and to you, I will just mention what this is.

12 This is the -- this is a copy of the
13 May 16, 2008 Resolution of the RRCA. We have this as
14 a part of our pleadings in this case; but for ease of
15 reference, I have identified it with its attachments
16 to the -- the resolution as Exhibit 69.

17 Have you seen this document before, at
18 all?

19 A You know, I may have, but I'm not
20 recalling much about it.

21 Q Okay. Let me --

22 A Can I interrupt and just be clear?

23 Q Sure.

24 A The document is the whole packet of
25 stuff? Because there are a bunch of letters and

1 things here.

2 Q Right. There are three attachments and
3 what I would like to do is direct your attention to
4 the second-to-the-last attachment. So the last three
5 pages of Attachment 3 and then just before that,
6 there are four pages that contain the separator page
7 identified as Attachment 2 and then a letter dated
8 April 15, 2008 from Mr. Dunnigan, who testified
9 earlier in this proceeding, to his counterpart
10 Commissioners on the RRCA.

11 And if we turn to the first page of the
12 letter, we see here Mr. Dunnigan is identifying the
13 issues for consideration in this dispute resolution.

14 If you would be so kind, would you read
15 the first bullet under his introductory language
16 aloud for us.

17 A Sure, "Estimation of Beneficial
18 Consumptive Use of Nebraska's Virgin Water Supply.
19 Nebraska believes the current accounting procedures
20 are insufficient to correctly assess the Calculated
21 Beneficial Consumptive Use and the Imported Water
22 Supply Credit and therefore this issue needs to be
23 addressed and resolved."

24 Q I think that is the only discussion of
25 this subject in the letter. You might take a quick

1 look, as I do also, to confirm that that's true. As
2 far as defining that particular issue, does that seem
3 to be the major part of the letter?

4 A There are a lot of other bullets in this
5 letter that are used to described things that I'm not
6 familiar with. But -- other issues, that is.
7 Whether this is the only mention of the CBCU issue in
8 this letter, I'm not sure.

9 Q And I recognize you are not necessarily
10 familiar with this, but does that appear, on the
11 brief review you have been able to give it, to be the
12 only mention of that issue in this letter?

13 A Well -- hum. I guess I -- if you want
14 to give me some time to read this whole thing, I
15 guess I could answer that. But I don't recall seeing
16 this letter before today.

17 I guess my hesitation on answering your
18 question is that if I read one of these bullets and
19 there are some things that appear to me to be
20 unrelated to CBCU, they may, in fact, be related to
21 CBCU and I'm just not aware of it because it's tied
22 in some irrigated agriculture way.

23 I know there are a lot of issues that
24 are under discussion in this proceeding, but they are
25 not issues -- or ones I have been involved in.

1 So I would be happy to read this whole
2 thing, if that would -- if that would answer your
3 question.

4 Q There is probably no necessity for you
5 to study letter. I think we can do that at our
6 leisure.

7 For a more detailed description of the
8 first bullet, to the extent it's not considered
9 elsewhere in the letter of April 15, 2008, the
10 then-pending version of the proposal, or preference
11 or alternative with respect to calculation of
12 computed beneficial consumptive use and imported
13 water supply credit using the RRCA groundwater model
14 would be what we have looked at earlier as Kansas
15 Exhibit 37, the March 2008 document; wouldn't that be
16 right?

17 A You know, I'm sorry, I think I lost
18 track of your question.

19 The March -- the March -- the Exhibit 37
20 was -- was, obviously, distributed before April 15 --
21 I lost track of your question, I'm sorry.

22 Q And that was the pending version at the
23 time of the --

24 A Well, again, my understanding of the
25 whom -- this whole process has been that Nebraska's

1 interest has been in working with the other States to
2 arrive at a resolution of a problem which Nebraska
3 identified.

4 And, again, without -- I haven't seen --
5 I haven't read Exhibit 37 recently, but my
6 recollection of it is that it was basically a report
7 on the problem as it was understood at that time.
8 There was not a proposal as how to fix the problem at
9 that time or even a full discussion of the problem.

10 So . . .

11 Q Now, the first proposal in this sequence
12 that you participated in is the August 6, 2008 report
13 entitled "Analysis of Current Methods Used to
14 Calculate Groundwater Impacts for the Republican
15 River Compact" prepared by the Nebraska Department of
16 Natural Resources and McDonald Morrissey Associates
17 and Dr. David P. Ahlfeld; is that right?

18 A I was very much involved in that report,
19 yes.

20 Q And that has been marked as Kansas
21 Exhibit No. 38.

22 Now, in August when this report was
23 provided to the other States, were you making the
24 same proposal that you are making in your current
25 report?

1 A Right. That -- that -- the August
2 report was, again, a report to the Technical
3 Committee and the general spirit of it was, Here's
4 more detail on this problem and here's some ideas on
5 how we might fix it.

6 So we came up with a proposal which was
7 quite similar to the one we have in the January '09
8 report. And if you can refer -- I can point out that
9 difference by referring to the flip chart that I drew
10 on earlier this morning, page 1, where -- can you
11 bring that forward.

12 MR. POWERS: Yes.

13 A Page 1, where -- of that flip chart
14 where I write CBCUn in terms of eight pairs of
15 differences and eight coefficients, alpha 1, alpha 2,
16 et cetera.

17 As I discussed earlier in our current --
18 that is, in our January '09 report -- those
19 coefficients have different values, they are weighted
20 differently. So alpha 1 and alpha 8 have different
21 values than the other coefficients.

22 In our August report, the coefficients
23 were equal. They all had the same value:
24 One-eighth.

25 In other words, we took the average of

1 the eight differences. As we showed in that report,
2 the residual -- that is, the difference between the
3 directly computed virgin water associated with
4 groundwater, and the sum of the four impacts was very
5 small, using just weights of one-eighth --
6 coefficient of one-eighth, but it did remain -- there
7 was some remaining residual.

8 So subsequent to the August report, we
9 did some more analysis and determined that we could
10 fine-tune the procedure a little further and totally
11 eliminate the residual. I want to emphasize that in
12 the August report, we showed, even using equal
13 weight, the alphas having the same value, we get very
14 small residual. The residual is virtually eliminated
15 in most subbasins in most years.

16 So that was our proposal at that time,
17 based on our analysis up to that point in time.

18 I don't have a copy of that with me, but
19 I think, again, the spirit of that was, since it was
20 to the Technical Committee, Here's an idea that
21 Nebraska would like to discuss further with the
22 Technical Committee.

23 That was my understanding of the spirit
24 of that -- of that document and that proposal.

25 Q And when you say "the Technical

1 Committee," I think you mean the Engineering
2 Committee of the Republican River Compact
3 Administration?

4 A Yes, yes. That's the correct name for
5 it.

6 Q I think Mr. Dreher asked you whether you
7 had any involvement with the Modeling Committee that
8 developed the RRCA Groundwater Model and your
9 acquaintance with the RRCA Groundwater Model and
10 accounting procedures, again after they were adopted
11 about a year ago is when you started your work on
12 this project, correct?

13 A That's correct.

14 Q So you don't have any personal
15 experience to form your judgment as to what the
16 Modeling Committee's expectations were, do you?

17 A Well, I think the Modeling Committee's
18 task was to create a model that all parties could
19 agree on was a reasonable estimation of the -- was
20 able to reasonably estimate baseflows in the basin at
21 the various accounting points under these different
22 conditions of activities on or off.

23 So my understanding is that they went
24 through a process of comparing -- a calibration
25 process of comparing the model results of heads and

1 baseflows with observed data and appropriately
2 adjusting parameters and arriving at an agreed-upon
3 model.

4 Q Now, the stream-drying function or
5 occurrence in the RRCA model is a pretty clear
6 feature of that model; isn't it?

7 A I guess I'm not sure what you mean
8 by "clear." The model computes heads and baseflows,
9 so if you -- if the baseflow is zero, I guess you
10 would see it if you were looking for it. I'm not
11 sure what you mean by "clear."

12 Q That's a pretty well-known occurrence in
13 this basin and was represented in the RRCA
14 Groundwater Model; isn't that's right?

15 A Stream-drying occurs -- stream-drying
16 occurs -- both in nature and in the -- in the
17 groundwater model.

18 I think that's answering your question.

19 Q I think it is.

20 So it's a recognized phenomenon in the
21 basin and it's a phenomenon that is reflected in the
22 RRCA Groundwater Model, correct?

23 A Yeah.

24 Q And your review of the documentation for
25 the model has not revealed any intention -- any

1 express intention by the Modeling Committee that a
2 requirement was that the individual impacts had to
3 add up to the model-calculated total impact; isn't
4 that's right?

5 A Well, the -- the model report deals with
6 the model exclusively. And the model computes
7 baseflows. The problem is not the computation of the
8 baseflows; it's the use of those baseflows in the
9 accounting procedure.

10 So my understanding is that the Modeling
11 Committee was charged with producing a model that
12 reasonably estimate baseflows under the various
13 conditions. And they did that by a calibration with
14 existing data.

15 Q And the purpose was to quantify the
16 impacts on the Republican River surface flows of the
17 four activities that we have mentioned before:
18 pumping by each of the three States and the imported
19 water supply; isn't that right?

20 A Well, that's -- that's one of the uses
21 to which the model is put and, of course, the one I
22 have been focused on.

23 Are there other uses of it? I'm not
24 sure -- of the model, that is.

25 Q But there is no express statement in the

1 model documentation that the individual impacts, as
2 calculated by the model and compared through the
3 accounting procedures, had to add up to equal the
4 all-on versus all-off difference; isn't that right?

5 A I just want to be clear about the
6 beginning of your question, which I think said "there
7 is nothing in the model documentation."

8 Could you clarify -- you are asking, is
9 there something in a particular document? And I want
10 to make sure which document you are referring to.

11 Q The -- as I understood it, you reviewed
12 the RRCA Groundwater Model documentation, which would
13 have consisted of the bound volume -- originally, a
14 bound volume which was entitled "Final Report of the
15 Special Master with Certificate of Adoption of RRCA
16 Groundwater Model in Kansas v. Nebraska and Colorado,
17 No. 126, Original, dated September 17, 2003."

18 And this is the volume with the DVD in
19 the back of containing the RRCA Groundwater Model
20 code and representative input and output?

21 A Okay. I believe I have downloaded that
22 off the Internet and looked at it. And my
23 recollection is it doesn't mention accounting
24 procedures at all, but just talks about the model
25 itself, selection of domain, gridding issues,

1 calibration issues, et cetera. Typical
2 model-building issues.

3 So I think to answer your previous
4 question, there is no discussion of accounting
5 procedures in that report, as best as I can recall.

6 Q Thank you.

7 And in addition, did you review the
8 accounting procedures that are contained in another
9 volume which I'm holding here. It is in the same
10 case, it is entitled "Final Settlement Stipulation
11 Volume 1 of 5, dated December 15, 2002."

12 A Yes, I believe -- I have -- I have
13 looked at a document with a similar title. I assume
14 it's the same title.

15 Q In fact, you quote from this document in
16 your report, don't you?

17 A Well, we quote from it's, I believe,
18 Appendix C of that document, which details the
19 accounting procedures. So if that's the document you
20 have got your hand, then we are in agreement on -- on
21 the document, yes.

22 Q Just to reference the quotation I'm
23 referring to appears in Appendix A.1 of your report
24 on page 59.

25 A Okay. Yes, I see that.

1 Q And, in particular, you quote Section
2 III.D.1, which, in the printed version appears on
3 page C.20 of the document I just named?

4 A Okay. I don't have a copy of the FSS in
5 front of me --

6 Q Okay.

7 A -- to compare the page numbers. But,
8 yes, what you see in our Appendix A is intended to be
9 the verbatim text out of the accounting procedures.

10 Q Very good.

11 And in your review of the accounting
12 procedures, did you find any statement by the States
13 or their experts that indicated that it was their
14 assumption that the individual impacts of the pumping
15 stresses and the imported virgin water needed to add
16 up to the difference between the all-on and all-off
17 difference with respect to those stresses?

18 A Your sentence -- your question, rather,
19 has many parts to it.

20 The accounting procedures contain
21 statements that describe the addition of the
22 components, the individual impacts, as part of the
23 computation of the virgin water supply. And they
24 also include the definition of the virgin water
25 supply, which is to be the -- the streamflow

1 unimpacted by the activities of man.

2 So the additivity principle that we have
3 been using and, in fact, forms the basis of our
4 proposal method, as shown on the flip chart, page 1,
5 that additivity is stated in the accounting
6 procedures -- in the definition -- in the way the
7 virgin water supply is to be calculated, according to
8 the accounting procedures.

9 Q But the virgin water supply is not an
10 ultimate output of this -- of the procedures; rather,
11 it's the four -- the quantification of the impact of
12 the four stresses on streamflows; isn't that right?

13 A Well, my understanding of the virgin
14 water supply -- and again, I'll -- let -- if I may,
15 focus on -- just for simplicity sake, focus on the
16 groundwater portion of the virgin water supply, is
17 that it is to be the best estimate we can provide --
18 "we" being the States -- can provide of the true
19 impact of groundwater pumping and mound recharge on
20 streamflow. And once we get that number, it's added
21 back in to get the virgin water supply.

22 The key phrase is, "best estimate."
23 Given that we have a groundwater model, in my view,
24 the best estimate derives from the all-off minus
25 all-on pair of runs and that's -- that's our basis of

1 comparison, of course, as I described earlier this
2 morning, for the methodology that is used in the
3 current accounting procedures.

4 Q I think you agreed with me during your
5 deposition that this calculated virgin water supply
6 -- the difference between all-on and all-off, as you
7 put it -- is not something that can be measured?

8 A That's correct. As I mentioned, there
9 are really three virgin water supplies associated
10 with groundwater we are talking about. And one of
11 them is that true value in nature, which we will
12 never know; we can only estimate. And -- and -- and
13 we will never know it because, obviously, there has
14 been activity of man.

15 We can't reverse that, so . . .

16 Q So there is no way to compare the
17 results, either of the current accounting procedures
18 or your proposed procedure, against a measured value?

19 A Well, we do that indirectly, because we
20 have a groundwater model which we -- and again, when
21 I'm using "we" here, it is in the sense of all three
22 States -- have agreed that the groundwater model is a
23 reasonable representation of the basin; and that the
24 baseflows produced by the groundwater model are a
25 reasonable representation of baseflows that would

1 occur under various scenarios.

2 So it's not like we are just guessing
3 here. We do have -- we did that -- and further, that
4 model is, of course, calibrated based on observed
5 data. So there is some basis, I would say. I would
6 disagree with the premise in your question.

7 Q Now, the current method includes
8 comparison of a particular stress with the calibrated
9 run of the model; isn't that right?

10 A You're right. The current method goes
11 all-on and compares that with one stress-off method.

12 Q So one element of that comparison is the
13 actual calibrated version of the model?

14 A That's correct.

15 Q Now, if I understand your proposal, you
16 include that, but you -- that comparison, but you add
17 seven other comparisons?

18 A That is correct.

19 Q And come by those various differences
20 with various coefficients?

21 A That's correct.

22 Q So, in a sense, you have moved away from
23 a method that relies on each comparison of the
24 calibrated run of the model and you are comparing
25 a number of other noncalibrated runs; isn't that

1 right?

2 A Well, there's several pieces to this, if
3 I may elaborate a little bit here.

4 First of all, the all-off condition --
5 in fact, all of the other runs -- so we get -- just
6 to be clear, we have the one run with everything on.
7 And then we have 15 other runs.

8 All of those runs include the period
9 1918 to, say, 1965, during which there was very
10 little stress on the aquifer -- very little pumping
11 stress.

12 So inasmuch as there are comparisons
13 with data from before the mid-'60s or so, there's
14 some degree of calibration there.

15 So that's one piece.

16 The other piece is that the -- the --
17 the model that has been devised has been agreed --
18 has been agreed by the States to be reasonable for --
19 that is, to provide reasonable estimates of baseflow
20 -- for a range of conditions: All-on and the various
21 State activities off.

22 In each case, it has been deemed by the
23 State that the model produces reasonable results --
24 reasonable enough to be used to compute the impacts
25 under the current method. That set of runs defines

1 an envelope, if you will, of runs that are valid uses
2 of the model and our additional runs that we are
3 proposing fall within that envelope, generally.

4 MR. BLANKENAU: Excuse me, a moment.

5 Is this perhaps a convenient time to
6 take a break?

7 ARBITRATOR DREHER: I was having so much
8 fun, I just forgot about the time.

9 How much more do you have, Mr. Draper?

10 MR. DRAPER: I have got a little bit way
11 to go yet.

12 ARBITRATOR DREHER: Do you? Okay, so if
13 we did not take a break at this point, would you
14 finish by noon or not?

15 MR. DRAPER: I doubt it.

16 ARBITRATOR DREHER: Okay. With that in
17 mind, then we will take a few-minute break.

18 MR. BLANKENAU: Thank you.

19 (Break was taken from 11:20 to 11:45.)

20 ARBITRATOR DREHER: Mr. Draper, you may
21 continue.

22 MR. DRAPER: Thank you very much, Your
23 Honor.

24 Q (BY MR. DRAPER) I would like to follow
25 up on the line of our inquiry that we were involved

1 in when we took the break and ask Mr. Ampe if he
2 could give the witness a copy of the RRCA
3 Groundwater Model. It's a printed volume, I think
4 identified earlier, dated September 17, 2003.

5 You have seen this document before, I
6 believe; is that right, Dr. Ahlfeld?

7 A I have seen -- yes, I downloaded this
8 from the Internet. I think it's the same thing.

9 Q I would like you to turn, if you would
10 be so kind, to page 15. On that page there is a
11 table entitled "RRCA Model Global Water Budget."

12 Do you find that?

13 A Yes.

14 Q Looking at that Table, you can see that
15 for various decades, various types of inflow are
16 tabulated, correct?

17 A That's correct.

18 Q If we look at the far right column under
19 the "Inflow" category of columns, that column is
20 entitled "Canal Leakage."

21 Do you see that?

22 A I do.

23 Q That relates to one of the activities we
24 are talking about, doesn't it?

25 A I believe that relates to the mound, the

1 recharge from Platte River diversions.

2 Q Yes. As leakage from canals bringing
3 water in from the Platte, the effect of which we
4 called a mound in the basin.

5 Now, if we look at the decade beginning
6 in 1941, is there much activity at that time with
7 respect to canal leakage?

8 A The 1940s, we have 632,988.

9 Q 632,988 acre-feet?

10 A That's right.

11 Q And that's per year, isn't it?

12 A Let's see. This is the annual average
13 amount in acre-feet. So, yes, apparently that is per
14 year averaged over that decade.

15 Q If we compare that to the amount of that
16 stress or activity, it's at least as high as most of
17 the later decades; isn't that right?

18 A Right. It's -- it hangs around 600,000
19 throughout the -- the period.

20 Q So we are seeing a very significant
21 stress in this category, even in the 1940s, are we?

22 A Well, it's as significant as it has been
23 in later years.

24 Q I believe when you were commenting on
25 the calibration period, you indicated that the

1 calibration period went back to 1918; isn't that
2 right?

3 A Right. The -- well, the model run
4 begins in 1918.

5 Q Right. And I think you indicated that
6 most of the activities that we were analyzing began
7 in the 1960s, but that would not be true as to -- as
8 to imported virgin water, would it?

9 A Based on this table, it looks like the
10 imported virgin water started in the 1940s and
11 referred to as groundwater pumping, of which there
12 were some in this period, but really ramped up
13 through the '60s and early '70s. By that I mean, it
14 increased by something like an order of magnitude.

15 Q If we can turn to the next page, page
16 16, in this printed volume, where we have the --

17 A Oh, yes.

18 Q -- outflows tabulated for the RRCA
19 model, quote, Water Budget and we have a column there
20 labeled, "Well Pumping," don't we?

21 A Correct.

22 Q And we can see that starting in small
23 amounts in the 1920s and increasing to, by orders of
24 magnitude by the time you get to the 1950s, for
25 instance; isn't that right?

1 A Right, comparing 1920s to 1950s, yes,
2 and then it continues to increase, obviously, you
3 know.

4 Q Great.

5 I think you testified earlier that you
6 were not involved in the calibration of the RRCA
7 Groundwater Model?

8 A That's correct.

9 Q So you did not analyze the data in the
10 early period with respect to its utility for
11 calibration purposes, did you?

12 A No, I can't say that I have done that.

13 Q But you have looked at it enough to know
14 that the data becomes sketchier and sketchier as you
15 go back in time, isn't that right?

16 A My understanding is that the data -- as
17 we go earlier, there is a less data available. I
18 presume, by "sketchier," you mean of lower quality.
19 I don't have a sense of that. The number of data
20 points does decline. That's -- that's lower.

21 Q Significantly --

22 A Well --

23 Q -- if you know?

24 A I mean, essentially -- as I recall it,
25 it essentially starts at zero data in 1918 or very --

1 perhaps a handful, up to lots of data at -- in the
2 later decades of the 20th Century.

3 Q Thank you.

4 I would like to now ask that Mr. Ampe
5 provide you with a copy of the Final Settlement
6 Stipulation printed Volume 1 of 5.

7 MR. AMPE: For the record, this may have
8 some various annotations or marks in it that are
9 mine.

10 MR. DRAPER: Thank you.

11 Q (BY MR. DRAPER) In relation to your
12 earlier testimony concerning the role of the
13 Modeling Committee, I would like to turn our
14 attention to page 17, if you would, please.

15 A Okay.

16 Q This is the page that has the heading
17 Roman number IV, "Compact Accounting" towards the
18 top?

19 A Yes.

20 Q And paragraph C is found -- the
21 introductory language of paragraph C and four
22 subparagraphs is found at the bottom of that page.

23 Would you please read that language
24 aloud for us.

25 A So this is page 17, paragraph C,

1 "Determination of stream flow depletions caused by
2 Well pumping and determination of Imported Water
3 Supply Credit will be accomplished by the RRCA --
4 "RRCA Groundwater Model as used in the RRCA
5 accounting procedures."

6 Q Thank you.

7 So that is a broad purpose that is being
8 referred to in this section of the FSS, including
9 determination of the imported water supply credit and
10 the impacts of well-pumping; isn't that right?

11 A Right. This paragraph explains how,
12 generally -- you know, just broadly, how those
13 quantities are to be computed -- or "determined,"
14 actually, is the word used.

15 Q Yes.

16 A I mean, obviously, the computation
17 details are in the accounting procedures, as
18 referenced here, I should say, are in the Appendix.

19 Q If we turn the page to page 18, we see
20 in paragraph 3, it starts with language indicating
21 that the States have created a Modeling Committee,
22 and talks about the makeup of that committee?

23 A And the second -- well, third sentence
24 down about -- looks like it's about eight lines
25 starts "The Modeling Committee shall develop a ground

1 water model acceptable to the States to accomplish
2 the purposes set forth in this subsection IV."

3 Q In this "subsection IV.C.," correct?

4 A Did I skip a word? I'm sorry, "set
5 forth in this subsection IV.C."

6 Q And that is the section to which you
7 just read the introduction, correct?

8 A Yes.

9 Q So the Modeling Committee was charged
10 with developing the RRCA Groundwater Model and
11 accomplishing the purposes set forth in IV.C., which
12 includes the ultimate determination of imported water
13 supply credit and the pumping impacts of each State;
14 isn't that right?

15 A That appears to be what this says, yes.

16 Q Now, I would like to turn to your
17 report, if I may --

18 A Uh-huh.

19 Q -- to Nebraska Exhibit 30.

20 A By that, you mean the January 2009
21 report?

22 Q Yes, January, 2009.

23 Could we turn to page 53, please.

24 On this page you have Table 12; is that
25 right?

1 A Yes.

2 Q And here you show, for various
3 subbasins, the accounting for the year 2003; is that
4 right?

5 A That's correct.

6 Q And if we look to the second subbasin,
7 you have Beaver Creek as the second subbasin in this
8 Table?

9 A Right.

10 Q And this is what you have referred to, I
11 guess it was in the deposition, as the poster child
12 for the problem that you are seeking to address?

13 A Well, it's a very nice example, as I
14 mentioned, because it only involves two States, so
15 it's relatively easy to analyze what is going on
16 here.

17 I think I did call it poster child.
18 Now, we had a poster this morning, didn't we?

19 Q Yes, very descriptive.

20 Looking at that line in Table 12, you
21 see the CBCUs for the three States: Zero for
22 Colorado and 323 acre-feet for Kansas, 727 acre-feet
23 for Nebraska, correct?

24 A Correct.

25 Q Then we have a couple of columns to the

1 right, the sum of those two values, which is 1050,
2 correct?

3 A Uh-huh, yes.

4 Q Now, the column to the right of that,
5 the second column from the right-hand side of the
6 Table is labeled CWSg and has the figure 6445 in it;
7 isn't that right?

8 A Yes.

9 Q Now, the CWSg is the difference between
10 the all-on and all-off runs of the model; is that
11 right?

12 A That's correct.

13 Q And then in the final column to the
14 right, you have -- you have labeled that
15 "Difference," and that is the all-on/all-off
16 difference of 6445, less the sum of the two
17 calculated impacts of the States; is that right?

18 A That's correct.

19 Q Now, in your proposal, if I understand
20 it, you take that 5395 difference between the total
21 on/off impact, you take the difference between that
22 total and the sum of the two calculated individual
23 impacts -- in this case, is 5395 acre-feet -- you
24 split that 5395 and give half to each of the States;
25 is that right?

1 A That is -- in a case like this with only
2 two activities, that is the net effect of our method
3 -- of our proposed method; that it -- as you say, it
4 takes the residual and divides it evenly.

5 In the case of there being -- a case in
6 which there are three or more -- three or four active
7 impacts, it divides it in a more complicated way but
8 does divvy it up, if you will, to the various
9 activities as, obviously, would have to be done if
10 you wanted to get rid of the residual. It has got to
11 go somewhere.

12 But it is not simply a matter of
13 dividing it in half. In other words, that is a net
14 result of the method which, in turn, derives from the
15 criteria we -- that I mentioned this morning.

16 Q And we can see what that does to the
17 number if we turn back a couple of pages, to page 50
18 to your Table 11.

19 There you show how you would assign the
20 impacts of pumping to Kansas and Nebraska --

21 A Uh-huh.

22 Q -- on Beaver Creek for that year 2003;
23 is that right?

24 A That's correct.

25 Q So you have -- you have taken a relative

1 difference that was 323 acre-feet versus 727
2 acre-feet comparing Kansas to Nebraska, as we now do
3 it, and you converted that to 3000 for Kansas and a
4 little more than 3000 -- 3400, for Nebraska; correct?

5 A That's correct.

6 Q Let's look at Table 12 again, page 53,
7 if you would.

8 Let's look at the Frenchman Creek.

9 Frenchman Creek in 2003, we are showing
10 19 acre-feet of an impact assigned to Colorado, zero
11 to Kansas, and 85,624 acre-feet assigned to Nebraska,
12 right?

13 A That's correct.

14 Q And so to go through your method, you
15 add those up, the 85,624, you add 19 acre-feet to
16 that, and you get 85,643 for your total of the
17 impact?

18 A Yes.

19 Q Then you compare it to the difference
20 between the all-on and all-off runs of the model,
21 which you show in the next column as 90,671.

22 You then take the difference between
23 those -- the second and third columns from the
24 right-hand side, as you did before, and you have a
25 difference of 5028?

1 A Yes.

2 Q Here again, you essentially split the
3 5000 to get 2500 for each State, and you give each
4 State 2500 acre-feet additional impact. So you
5 increased Colorado consumptive beneficial use from 19
6 acre-feet to something over 2500 acre-feet. And you
7 increase Nebraska's from 85,600 some to 87- -- or
8 88,000, correct?

9 A Right. And that would be on Table 17, I
10 think, where we show what would happen if you used
11 our methods to do the same calculations.

12 So, again, this is a case, just as in
13 Beaver, where there are only two activities that are
14 significant. So the net effect of our method is to
15 split the residual amongst the two States.

16 Q Yes. Over on page 56, we see the
17 proposed results; is that right?

18 A Right. That would be the corollary -- I
19 believe that's the corollary to Table 12, except now
20 we are using our proposed method.

21 Q So you have increased the consumption
22 that is going to be assigned to Colorado from 19
23 acre-feet to 2500 acre-feet and if you did that in
24 terms of percentage increase, it would be a pretty
25 high percentage. I think we calculated during your

1 deposition it was going to be something like
2 13,000 percent, or something like that?

3 A I'm recalling you were quoting from
4 Mr. Schreuder -- or Dr. Schrueder's report some
5 numbers like that, yes.

6 Q And a pretty marginal increase in the
7 Nebraska effect, correct, in terms of percentage?

8 A As a percentage increase, it would be
9 smaller, right.

10 Q And this also shows that you are
11 assigning a negative 9 acre-feet to Colorado as part
12 -- or to Kansas as part of your proposal?

13 A Yes. Hum.

14 Q Now, do your results with respect to
15 Frenchman seem reasonable?

16 A Yes.

17 Q Why?

18 A Because the activities of both States
19 have contributed to the depletion of streamflow in
20 Frenchman Creek, and the current method essentially
21 computes the Colorado -- sorry, yes, the Colorado
22 impact with the Nebraska pumping on; that's the only
23 -- Nebraska pumping is on in both cases that are used
24 to calculate the Colorado impact. And when Nebraska
25 pumping is on, because it's the biggest pumper in

1 that subbasin, it's close to drying up the stream --
2 comes close to drying up the stream. So the impacts
3 that Colorado really had, in the absence of Nebraska,
4 are masked.

5 So it -- I believe it's reasonable to
6 devise a method which does not have that bias in it;
7 that is, that considers implicitly in the method that
8 both States contributed to the depletion of the
9 streamflow. And I believe that our method -- or
10 proposed method does that.

11 As you have noted, the net effect in the
12 simple case when there's only two activities is to
13 simply split the residual in half and assign it. In
14 the other cases, where we have three or more
15 activities, it's a bit more complicated; but the
16 logic of it follows in those three or four activity
17 cases.

18 Q In order to implement your proposal, you
19 have to assume a condition that has never occurred;
20 namely, one where Nebraska pumping is absent. There
21 has always been, during our study period, when there
22 is a Colorado pumping, there has been Nebraska
23 pumping there and you would take that away and create
24 a situation that has never, never happened in the
25 history of this basin.

1 A Well, the model as used in the current
2 accounting procedure performs four runs; namely, each
3 of the activities in sequence, which never occurred
4 in this basin.

5 And so I don't -- I don't see -- I don't
6 have a philosophic problem with considering cases
7 that have never occurred, but we already do that.
8 The States have already agreed to that much.

9 The model -- well, as I indicated, I
10 guess it was before the break, the model -- the range
11 of variation in model results that arise out of those
12 four cases, turning off sequentially each of the
13 activities, covers a large range of variation beyond
14 what has been calibrated.

15 So I take, as given, that the Modeling
16 Committee and the States have already agreed that the
17 model can be used over this range of variations;
18 turning off Nebraska, for example, which obviously
19 produce -- turn off Nebraska pumping, which obviously
20 produces a situation as modeled, which is far from
21 what really happened; but that has already been
22 agreed to.

23 So I take that as a given in -- in
24 considering our proposed method.

25 MR. DRAPER: Your Honor, I think we have

1 all been having too much fun lately. It has gotten
2 to be after noon. This may be an appropriate time to
3 break. I don't want to belabor the things over the
4 lunch hour. I do have a little bit to go, so I'm not
5 going to be able to finish it in the next five or so
6 minutes -- five or ten minutes. I'm not quite sure
7 how much I have left.

8 ARBITRATOR DREHER: Okay. We can take
9 our lunch break; but before we do, a question that I
10 would like Dr. Ahlfeld to contemplate and perhaps be
11 prepared to respond to, not necessarily as part of
12 the cross-examination, but it certainly, at least, is
13 part of the redirect, because I'm not trying to put
14 anybody behind, but it is a question that I have.

15 And that is, it appears to me that --
16 having reviewed the documentation for the groundwater
17 model and looked at what they attempted to do for
18 calibration, that the condition used to calculate the
19 direct virgin water -- in other words, no activities
20 of man -- is probably about as far removed from the
21 calibration conditions as you could get.

22 So my question is: Do you have an
23 opinion about how reliable the groundwater model is
24 for a condition that so significantly varies from
25 what the model was calibrated to?

1 I'm not asking for an answer right now,
2 but at some point, either during cross or redirect, I
3 would like to hear his opinion about that.

4 With that, we will break for lunch.

5 (Lunch break was taken from 12:15 to
6 1:32.)

7 ARBITRATOR DREHER: Mr. Draper, please
8 feel free to resume your cross.

9 MR. DRAPER: Thank you very much.

10 Q (BY MR. DRAPER) Professor, good
11 afternoon.

12 A Thank you. Good afternoon.

13 Q Before we fully leave the Final Report
14 of the Special Master with Certificate of Adoption of
15 RRCA Groundwater Model, the volume that we discussed
16 before which has the DVD in the back cover, I would
17 like to turn our attention to page 8. If you would
18 please turn to that page for me.

19 A Okay.

20 Q And do you see the section there, "A:
21 Purpose and Scope."

22 A I do.

23 Q Could you read aloud for us the first
24 sentence of that section, please.

25 A "The primary purpose of the RRCA Model

1 is to determine the amount, location, and timing of
2 the stream flow depletions to the Republican River
3 caused by well pumping and to determine streamflow
4 accretions from recharge of water imported from the
5 Platte River Basin into the Republican River Basin
6 above the streamflow gaging station near Hardy,
7 Nebraska."

8 Q So it's clear, isn't it, from this
9 opening statement with respect to the purpose and
10 scope of the RRCA model, that its purpose and scope
11 include determining the impacts of the four
12 activities that we are concerned with here, the
13 pumping of each State and the imported virgin water;
14 isn't that right?

15 A Well, I think the key phrase here, just
16 to make it, perhaps, a technical distinction, there
17 is streamflow, which is what the model actually
18 calculated, and streamflow depletions, which is what
19 the accounting procedure calculates; namely, changes
20 in streamflow.

21 So I'm understanding this sentence to
22 mean the purpose of the model is so that it may be
23 used to, (a), calculate baseflows and then
24 parenthetically calculate streamflow depletions.

25 Q In that regard, let me ask you now to

1 turn to page 49, if you would, in the same document.

2 A Okay.

3 Q Here, we have the section at the
4 beginning of Section E entitled "Model Output."

5 Do you see that?

6 A I do.

7 Q And if we look at the second paragraph
8 -- I'm not going to ask you to read particular
9 passages within it, but I think you can see that this
10 paragraph describing model output describes how that
11 model output is to be used; the switches, how they
12 are to be turned on and off with respect to each of
13 these activities.

14 Wouldn't you agree that it's a, perhaps,
15 overly technical distinction to say that the Modeling
16 Committee, including some of the witnesses of the
17 State, Mr. McDonald and others, were charged not only
18 to create the model itself, but also to recommend how
19 it should be used -- how the output should be used
20 from that model.

21 A Well, I have -- okay.

22 The second paragraph that you cite on
23 the bottom of the page 49 talks about the model
24 calculating differences by using base run and the
25 no-state pumping runs and so on. That appears to be,

1 just glancing at it, a description of the procedure
2 that is described in the accounting procedures,
3 Appendix C.

4 What is not clear to me -- and I'm not
5 sure that this illuminates my lack of clarity on this
6 -- is -- was the Modeling Committee responsible for
7 devising the accounting procedures, which I think is
8 what you just suggested, or were they responsible for
9 producing a model which they thought reasonably
10 produced baseflow estimates under the conditions of
11 all-on and then these off conditions, which is, to my
12 mind, different than devising the accounting
13 procedures themselves.

14 Obviously, I wasn't there. I have some
15 notion of this from various conversations I have had
16 with folks on the Nebraska DNR and so on. So I'm not
17 sure how useful my insight is on this.

18 But, in any case, that is what I'm
19 learning from this paragraph, if that answers your
20 question.

21 Q Let me ask if you would turn back to
22 your report now, Nebraska Exhibit 30.

23 A That's the January 2009?

24 Q Yes, January 20, 2009 report by
25 yourself, Mr. McDonald and Dr. Schneider.

1 A Yes.

2 Q Now, as we have said before, the Beaver
3 Creek analysis that you include in the report is the
4 poster child for the problem that you are trying to
5 illuminate.

6 But isn't it true that Nebraska doesn't
7 have an allocation on Beaver Creek. This is a part
8 of the model that involves Colorado and Kansas, but
9 not Nebraska that you have chosen to illustrate this
10 way?

11 A My understanding is that Nebraska has an
12 allocation on Beaver Creek. The term, "allocation"
13 -- I have to say the term "allocation" is a little
14 bit confusing because there are the allocations as
15 given in the Compact, which were volumes at that
16 time. And then derived from those, as I understand
17 it, are the percentages that are now used for
18 allocations.

19 MR. BLANKENAU: I would interject and
20 refer counsel to Article IV of the Compact itself.

21 Q (BY MR. DRAPER) What I meant to say,
22 there is no tributary test that Nebraska must meet
23 on Beaver Creek; isn't that right?

24 A I missed the first few words of that
25 question, I'm sorry. There is no --

1 Q -- tributary test under the FSS and the
2 accounting procedures that Nebraska is required to
3 meet on Beaver Creek?

4 MR. BLANKENAU: Sorry, John. Could you
5 define what you mean by "tributary test"?

6 Q (BY MR. DRAPER) A requirement that the
7 State of Nebraska must meet on Beaver Creek.

8 A I'm afraid I'm not familiar with the
9 term in this context, "tributary test," so I don't
10 know how to answer that question.

11 Q One of the things that -- in the early
12 parts of the series of proposals that Nebraska has
13 made on this subject, one of the features was the
14 effect on the mound credit of the version that was
15 being discussed. I don't see that as being given a
16 very prominent treatment in your report.

17 Is that a fair assessment? Do you have
18 a section, like "Beaver Creek," for instance, where
19 you analyze what this does on the imported virgin
20 water?

21 A Yes, we do.

22 Q Which section is that?

23 A The Swanson/Harlan analysis is
24 largely -- well, the Imported Water Supply is a big
25 part of that, in particular, situation.

1 Q Isn't it true that if your proposal were
2 accepted, the primary impact would be increasing the
3 imported water supply for Nebraska?

4 A Well, if our proposal were accepted, the
5 -- the primary element of it going -- in years
6 forward is that the virgin water supply computed by
7 -- I'm looking again at my poster -- Slide 1 -- or
8 Flip Chart 1, the summation of the impacts would
9 equal the all-off and all-on condition. That would
10 be required.

11 In the years that we looked at in our
12 report, I think it was '01 to '06, it does increase
13 the mound credit, the imported water supply credit, I
14 believe, in all years. Whether it would do that in
15 the future, I don't know. In other words, it's not
16 an inherent characteristic of the method. It's the
17 way it happens to work out for the particular years
18 that we analyzed.

19 Q In that regard, I ask that we turn to
20 page 63 of your report.

21 That is the beginning of Appendix C
22 where you have a series of Tables.

23 A 63, okay.

24 Q What do you show in this series of
25 Tables?

1 A Let's see. These are similar to the
2 Tables we were looking at before lunch in that we
3 have, let's see now, six pairs of Tables, 12 Tables
4 in all. And in each pair, we are looking at a
5 particular year. And in each year, we are looking at
6 the impacts that would be computed by the current
7 method that is in the top Table of the pair. And in
8 the bottom Table of the pair is the impacts as they
9 would be computed with the -- with our proposed
10 method.

11 You will notice, for example -- let's
12 see. Well, we have been talking about the '03, but
13 this spans '01, all the way up through '06. So you
14 will see, for example, in '03, Table C.5. and C.6.,
15 the numbers for Beaver Creek that we cited on our
16 posters earlier this morning which were just
17 examples, so this just lays out all of the subbasins
18 in all years and compares the existing method with
19 the proposed method.

20 Q Well, let's take a look at Table C.5.
21 and C.6. Those are on page 65, correct?

22 A Yes.

23 Q And we could see in the upper table
24 those familiar numbers for Beaver Creek as 323 Kansas
25 and 727 for Nebraska.

1 A That's correct.

2 Q Now, you have a column here in this
3 Table for the imported water supply credit, correct?

4 A That's right.

5 Q And if we -- you don't have totals for
6 these Tables, correct?

7 A That's right.

8 Q So let's just take the mainstem as one
9 example. That is the bottom one in each graph of
10 each Table?

11 A Right.

12 Q And we can see under the current
13 accounting procedures in 2003, the current accounting
14 procedures would show a 334 acre-feet IWS credit,
15 correct?

16 A That's correct.

17 Q And that is raised to a little over 9000
18 acre-feet by your proposed method?

19 A That's correct.

20 Q In fact, if we turn back to Table C.1.
21 and C.2. on page 63, we can see there that the
22 mainstem imported water supply credit goes from 9000
23 to a little over 13,000 in 2001, correct?

24 A That's correct.

25 Q You have a similar increase in 2002, if

1 we look on the next page, page 64. Something more
2 than doubling, or close to a doubling of what we are
3 currently calculating for imported water supply
4 credit; isn't that right?

5 A That is correct.

6 Q We already looked at C.5. and C.6.
7 C.7. and C.8. on page 66 show something
8 on the order of a tenfold increase on the mainstem of
9 IWS 826 to 9453; is that right.

10 A Yes.

11 Q And then on this page 67, the figure
12 currently 2288 is increased to something over 10,000,
13 correct?

14 A That's correct.

15 Q And a similar increase in the final two
16 Tables on page 68, correct?

17 A That is correct. I'm.

18 MR. DRAPER: Done. Thank you very much.

19 ARBITRATOR DREHER: All right.

20 Colorado, Mr. Ampe?

21 CROSS-EXAMINATION

22 BY MR. AMPE:

23 Q Good afternoon, Doctor.

24 A Hello.

25 Q To your knowledge, can Colorado restrict

1 pumping in Nebraska?

2 A Can Colorado restrict pumping in
3 Nebraska? I'm not aware of that being possible.

4 Q And you discussed -- in reviewing or
5 preparing for your report, you reviewed primarily the
6 accounting procedures, that exhibit -- excuse me --
7 Appendix C that we have been talking about?

8 A You know, my hearing is not that good,
9 and I'm not quite hearing your questions. I'm sorry.

10 Q Okay.

11 A Could you repeat that.

12 Q In preparing your report, you reviewed
13 the accounting principles, which is Appendix C?

14 A Isn't it not called the "Accounting
15 Procedures"?

16 Q Procedures?

17 A It may be Appendix C, yes, of the FSS.

18 Q Did you at any time review the First
19 Report of the Special Master in No. 126, Original?

20 A I'm not sure which document that refers
21 to. I may have. I just don't know -- don't know by
22 that name.

23 Q Do you recall a ruling by the Special
24 Master that Republican River Compact restricts that
25 the pumping States' consumption of groundwater, to

1 the extent consumption depletes the streamflow in
2 Republican River Basin?

3 A You are saying this is a statement by
4 the Special Master?

5 Q Yes.

6 A I don't think I have seen that.

7 MR. AMPE: Nothing further.

8 MR. BLANKENAU: In honor of tradition,
9 we would like to request what we have named in honor
10 of our learned colleague as "Draper 5."

11 ARBITRATOR DREHER: Why not?

12 (Break was taken from 1:52 to 2:06.)

13 ARBITRATOR DREHER: Mr. Blankenau,
14 please proceed.

15 MR. BLANKENAU: Thank you.

16 REDIRECT EXAMINATION

17 BY MR. BLANKENAU:

18 Q I want to clear up a couple of things
19 that I believe were miscommunication under
20 cross-examination by Mr. Draper.

21 I believe you indicated that Nebraska
22 proposal would change the allocations prescribed by
23 the Compact; is that correct?

24 A That is not correct about Nebraska's
25 proposal; that is, Nebraska's proposal does not

1 change the allocations.

2 Q Those allocations were prescribed by the
3 Compact?

4 A That is correct.

5 Q I also thought that you stated, under
6 cross again by Mr. Draper, that Nebraska's proposal
7 addresses the nonlinearities in the model; is that
8 correct?

9 A Nebraska's proposal addresses -- let me
10 back up.

11 The model itself contains some
12 significant nonlinear responses; that is, the
13 response streamflow to pumping. That simply is a
14 characteristic of the model. Nothing we are
15 proposing is intended to change the model. That is
16 simply the way the model behaves.

17 The change we are proposing is a change
18 to the accounting procedures so that that
19 nonlinearity, when combined with the additivity used
20 in accounting procedures, will still result in
21 matching the direct -- directly computed virgin water
22 supply.

23 Q I'm going to have Mr. Powers hand you
24 what will be Nebraska Exhibit No. 33.

25 Do you recognize that document?

1 A Yes, I do.

2 Q What is it, please?

3 A Well, this is sort of a set of notes --
4 obviously, it's typed up -- that we put together
5 several -- the authors' of the report -- elaborations
6 essentially understanding on the proposed method.

7 And on the third page -- they are not
8 numbered, but the third page discusses the selection
9 of weights. And it replaces -- in other words, this
10 page and the page that follows describes what I was
11 attempting to describe earlier this morning in
12 response to Mr. Dreher's question.

13 Q With respect to what you put on the
14 butcher paper?

15 A That's correct.

16 I note here that in the document we just
17 handed out you used X1, 2, 3, et cetera, instead of
18 alpha; but other than that, that is the same idea. I
19 mean that doesn't change things; it's just a
20 variable.

21 Q I'm not going to ask you any questions
22 about that. I wanted to make sure it tied into what
23 you explained earlier.

24 A Yes. As I mentioned earlier, it's
25 difficult to do that orally. So written down, it's

1 convenient.

2 Q With respect to your analysis of
3 Nebraska's proposal, can you tell me whether it
4 always benefits Nebraska?

5 A No. My answer is, it does not always
6 benefit Nebraska.

7 Q So there some locations or some years
8 when it would cut the other way, is that correct?

9 A Yes, I believe that is correct.

10 Q How do the outputs from Nebraska's
11 proposal compare with existing methodology with
12 regard to live streams?

13 A These would be -- as I mentioned
14 earlier, we sought a new method that -- one of the
15 criteria was, for the new method, that if, in a
16 particular subbasin in a given year, the streamflow
17 was a linear function or nearly linear function of
18 pumping -- that is, you didn't have stream-drying,
19 what you are calling a live stream -- that it
20 reproduced the values for impacts that are found with
21 the current method. In effect, that does happen.

22 Q So Nebraska's proposal was designed to
23 address only those problems associated with
24 accounting regarding no-flow or low-flow conditions;
25 is that correct?

1 A That's correct.

2 MR. BLANKENAU: I have nothing further.

3 ARBITRATOR DREHER: Well, I will reask
4 my question from this morning, then.

5 Dr. Ahlfeld, I would like to have your
6 opinion, if you have one, about the reliability of
7 the groundwater model when it's used to calculate no
8 pumping, no mound, which would appear to me to be the
9 most deviant from the conditions used to actually
10 calibrate the model. In other words, the model is
11 being used to simulate conditions that are quite
12 different from the conditions that were used during
13 calibration.

14 And how reliable is it for a condition
15 that is that far removed from that that was used for
16 calibration?

17 THE WITNESS: Yes. This was something
18 to which we have given quite a bit of thought. And,
19 in brief, I'm quite comfortable with what we are
20 doing.

21 We had, in fact, prepared some --
22 anticipating a question or discussion around this
23 issue --

24 MR. BLANKENAU: And I will interject
25 here. We had anticipated addressing this on

1 rebuttal, but we can certainly go into that now. We
2 have some documents prepared we can put in.

3 ARBITRATOR DREHER: Whatever you think
4 is going to be most helpful.

5 MR. BLANKENAU: Okay, we will do it now.

6 THE WITNESS: So what you are about to
7 see is a graphical depiction of changes in head that
8 result from various model runs. Obviously, the model
9 does two things. It computes head and it computes
10 baseflows under the various conditions.

11 And obviously, we are now using the
12 model that is -- the States are using the model to
13 conduct four runs. So the upper left panel --
14 obviously, what you are looking at here is the basin.

15 The upper left panel is the run with the
16 -- the difference between all-on and Colorado off;
17 Panel B is all-on, Kansas off. Panel C is all-on;
18 Nebraska pumping off. And Panel D is all-on versus
19 mound off.

20 What you are looking at with the colors
21 is the difference in heads between these two runs.
22 And the color scale, which you may not be able to
23 make out from where you are sitting, runs from zero
24 to greater than 60, with obviously the darker colors
25 being a greater head difference.

1 So, in other words, taking Panel A, for
2 example, what we see is that when we turn off -- when
3 we compare the all-on condition with Colorado off and
4 everything else on, this is the change in heads that
5 are predicted by the model -- the difference in
6 heads, rather, between those two cases.

7 What I think is striking here is that
8 there is very little propagation of head change
9 across statelines. Obviously, there is some right
10 along the stateline, but there is essentially no
11 change in the bulk of Nebraska or the bulk of Kansas.

12 Similarly, if we change -- if we turn
13 off Kansas, the effects are essentially limited to
14 Kansas and again in Nebraska and again in the mound.

15 I think there is a hydrologic
16 explanation for this, which is simply that this is
17 largely a subbasin-driven system -- that is, if the
18 pumping is within a subbasin, it's going to have most
19 of its effects within that subbasin and perhaps
20 neighboring -- immediately neighboring subbasin.

21 Okay. So that's what we currently use
22 the model for -- these extremes.

23 ARBITRATOR DREHER: Help me with the
24 colors.

25 THE WITNESS: Yes. So the color, a

1 light green here is ranging from, let's say, 10 --
2 less than 10 feet head difference. And as we get
3 into the dark blue, upwards of 60 feet of head
4 difference. In other words -- let back up and just
5 restate that we calibrate the model to historical
6 conditions and under current procedure, we run the
7 model in such a way to cause heads to go up by
8 60 feet or more.

9 ARBITRATOR DREHER: What is the
10 saturated thickness?

11 THE WITNESS: Well, that varies
12 throughout the basin. I think it's from quite thin
13 to hundreds of feet, is what I recall.

14 ARBITRATOR DREHER: But in the model, I
15 thought the saturated thickness was held constant?

16 THE WITNESS: It's constant with time
17 but not with space. So it's not uniform across.

18 MR. BLANKENAU: Mr. Powers has some
19 smaller copies of this.

20 THE WITNESS: Great.

21 MR. BLANKENAU: I will ask him to hand
22 those out. That will help people see what is up
23 there.

24 THE WITNESS: By my reasoning, I take
25 those as an indication of the perturbation of the

1 model that is considered acceptable within the
2 context of this procedure -- the accounting
3 procedures.

4 In other words, the Modeling Committee
5 deduced that the model was sufficiently -- was
6 sufficient to the task of reasonably predicting
7 baseflows, even when we changed heads this much. And
8 of course, streamflows depend on heads, so there is a
9 relationship.

10 If we go to the next slide -- the next
11 board.

12 What we are going to do on the next
13 board is simply add these four panels together, add
14 the impact of head change together. And so what you
15 see here on Panel E is simply the superposition of
16 these four panels.

17 And what you see in Panel F is the
18 all-off minus all-on. In other words, the all-off
19 minus all-on produces this changes in head. And I
20 forgot to mention the red color is a decline in head.

21 When we turn off the mound, the head
22 drops. So Panel F is all-off minus all-on. And
23 that's the changes in heads we get.

24 Panel E is the combination of Panels A
25 through D.

1 So in a nutshell, my reasoning is that
2 we are already accepting that stressing the modeled
3 aquifer this much is okay. As you can see, these are
4 very similar, Panels E and F. So, therefore,
5 stressing -- turning off everything at once is no
6 more of a stream stress than the individual --
7 turning off things individually. That's one aspect
8 of this.

9 You may recall in my comments this
10 morning, on Beaver Creek in 1965, we saw that the
11 all-off minus all-on was essentially identical to the
12 addition of the individual impacts.

13 Now, that suggests to me that the
14 all-on -- all-off minus all-on is, under those
15 conditions which are nonstream-drying conditions
16 where the response is linear, the all-off minus
17 all-on is giving reasonable results.

18 So I'm -- I'm -- I don't see what we are
19 proposing -- namely, using the all-off run -- as part
20 of our analysis as being out of the envelope of the
21 set of runs that are already being used.

22 ARBITRATOR DREHER: Well, in the context
23 of differencing.

24 THE WITNESS: Yes.

25 ARBITRATOR DREHER: But what kind of

1 head changes do you get when it is just all-off?

2 THE WITNESS: Well, this is -- this
3 image here shows us the difference between all-on and
4 all-off. So we are getting head differences of just
5 about the same magnitude in each State as we would
6 when we do it individually.

7 ARBITRATOR DREHER: So those would be
8 the maximum head differences, I guess, when you
9 difference them that way? Well, not necessarily.

10 THE WITNESS: Yes, yes. I'm sorry. I
11 should have said this is the head difference at the
12 end of a certain point in time, and I think it's
13 2003, and we were going to check on this. And I'm
14 sorry, I don't remember the year, but at a particular
15 point in time, a recent point in time. So it's a
16 head difference up to that point -- or at that point
17 in time.

18 I further point out that the other runs
19 that were -- that we are proposing, different
20 combinations of on and off, would essentially be, you
21 know, for example, A plus D, or B plus C plus D and
22 so on; different combinations of the four pieces.

23 To me, what is compelling from these
24 images is that there is very little interference
25 between -- pumping between the States.

1 Now, there is some, obviously, but this
2 is not an extraordinary stretching of the model
3 beyond what it's currently used for -- or beyond the
4 range it's currently used.

5 ARBITRATOR DREHER: Well, I will have to
6 think about it.

7 THE WITNESS: Very good. Thank you.

8 MR. BLANKENAU: I wonder if we could
9 address the exhibits.

10 ARBITRATOR DREHER: Yes.

11 MR. DRAPER: I have -- given the
12 extensive redirect, I have a bit of recross, if I
13 may.

14 ARBITRATOR DREHER: All right.

15 RECCROSS-EXAMINATION

16 BY MR. DRAPER:

17 Q Regarding this point, Doctor, with
18 respect to the changes that your methodology would
19 involve versus the methodology that was chosen by the
20 States, let me ask you to turn in that regard to page
21 53 of your report. This is Table 12 that we
22 discussed earlier.

23 A Yes.

24 Q But with regard to the point you are
25 making here, let's take another look at Beaver Creek.

1 That is the second line, the second subbasin that you
2 consider there.

3 A Uh-huh.

4 Q Under the existing methodology, where we
5 turn off just Kansas pumping and leave everything
6 else in the same condition that the model was
7 calibrated in, we see a difference of 323 acre-feet,
8 correct?

9 A Yes.

10 Q And when we just turn off Nebraska,
11 leaving everything in the calibrated condition, we
12 see 727, correct?

13 A Correct.

14 Q But if we look over to the column second
15 from the right, we see what happens when you turn
16 everything off, which is your approach, and suddenly,
17 those numbers go to 6445; isn't that right?

18 A That is correct.

19 Q That's a very different condition than
20 the one that is being used now, and it's much further
21 from the calibrated condition, isn't it?

22 A Yes -- well, it's -- with respect to
23 baseflow at the accounting point, yes.

24 MR. DRAPER: No further questions.

25 ARBITRATOR DREHER: All right.

1 MR. AMPE: I do have a couple of
2 questions based on his presentation --

3 ARBITRATOR DREHER: All right.

4 Mr. Ampe.

5 MR. AMPE: -- if that's okay.

6 ARBITRATOR DREHER: That's okay.

7 RECROSS-EXAMINATION

8 BY MR. AMPE:

9 Q Looking at the set of four photographs,
10 that shows head change?

11 A That's correct.

12 Q But the Compact doesn't address head
13 change, does it?

14 A Nope.

15 Q And looking at your scale, the white
16 could be anywhere from a 1-foot drop to a 1-foot rise
17 in head.

18 Do I read that correctly?

19 A That is correct.

20 Q So a 2-foot difference?

21 A Yes.

22 Q Do you have any idea what the effect on
23 baseflow of a 2-foot change in head would be?

24 A Well, it depends on many factors.

25 Depends on what the current head is with respect to

1 the stage and the conductance value that is used and
2 several other factors.

3 Q And none of these exhibits show that?

4 A This is just head.

5 MR. AMPE: Nothing further.

6 MR. BLANKENAU: Just a couple more.

7 ARBITRATOR DREHER: Well, I would like
8 to understand this, so please proceed.

9 REDIRECT EXAMINATION

10 BY MR. BLANKENAU:

11 Q Doctor, referring to your report at page
12 18 --

13 A Yes.

14 Q -- Table 2 is your computation of Beaver
15 Creek in 1965. Can you tell us what the calibrated
16 baseflow would have been in that year.

17 A Let's see. In 1965, it would be 82,
18 with both States pumping.

19 Q And then in 2003 --

20 ARBITRATOR DREHER: Excuse me. I think
21 he meant 8822. I thought he said 82?

22 THE WITNESS: I think I did misspeak,
23 thank you. 8822.

24 Q (BY MR. BLANKENAU) Thank you.

25 Then turn the page to page 19.

1 A Yes.

2 Q And in 2003, using the Nebraska
3 methodology, what would that be -- the all-off and
4 all-on method, it would just be baseflow?

5 A Yes. 6445.

6 MR. BLANKENAU: That's it.

7 ARBITRATOR DREHER: All right.

8 You can call your next witness or do you
9 need a Draper 5?

10 MR. BLANKENAU: How about a Draper 5?

11 ARBITRATOR DREHER: All right.

12 MR. DRAPER: Maybe one thing we ought to
13 take care of before we adjourn is the exhibits.

14 ARBITRATOR DREHER: I'm sorry, yes. I
15 forgot about that.

16 MR. BLANKENAU: Yes, thank you.

17 We have Exhibits No. 29, which is the CV
18 for Dr. Ahlfeld; No. 30, which is his expert report;
19 No. 32, which would be his equation that he wrote up
20 on the butcher paper, if you find that helpful. If
21 not, we can just eliminate that. It's two pages. We
22 will offer it, both pages. 33 was the proof that was
23 submitted; it was the mathematical equations related
24 to No. 32. 34 is the color graphic four-slide
25 document and 35 would be the color graphic with the

1 two slides.

2 MR. DRAPER: You are offering these that
3 say "For Illustrative Purposes Only"?

4 MR. BLANKENAU: Yes.

5 MR. DRAPER: You are offering those as
6 exhibits?

7 MR. BLANKENAU: And we offer those at
8 this point because the Arbitrator specifically asked
9 us to address those. Otherwise, we wouldn't put them
10 in on rebuttal.

11 MR. DRAPER: No objection.

12 ARBITRATOR DREHER: Colorado?

13 MR. AMPE: No objection.

14 ARBITRATOR DREHER: All right. They are
15 admitted then.

16 (WHEREUPON, Nebraska Exhibits 29, 30,
17 32, 33, 34 and 35 were admitted into evidence.)

18 ARBITRATOR DREHER: Now you can take
19 your five-minute break.

20 MR. DRAPER: We had some exhibits this
21 morning.

22 MR. WILMOTH: You are not done with us
23 yet.

24 MR. DRAPER: There were five Kansas
25 exhibits. Exhibit 36, the Nebraska CBCU/IWS proposal

1 from January, 2008. No. 37, similar proposal from
2 March 2008. 38, the proposal report dated August 6,
3 2008 by Dr. Ahlfeld and others. And 39 the review of
4 the RRCA Model dated April 11, '06. And finally, the
5 resolution of the RRCA dated May 16, 2008, with
6 attachments.

7 ARBITRATOR DREHER: That would be
8 Exhibit 69.

9 MR. DRAPER: 69.

10 MR. BLANKENAU: No objection.

11 MR. AMPE: No objection.

12 ARBITRATOR DREHER: All right. They,
13 too, are admitted.

14 MR. DRAPER: Thank you.

15 (WHEREUPON, Kansas Exhibits 36, 37, 38,
16 39 and 69 were admitted into evidence.)

17 ARBITRATOR DREHER: Let me make sure I
18 understand, because I don't have tabs -- I don't
19 think I have tabs for the Nebraska ones. Maybe I do.
20 I do.

21 Okay. So this supplementary
22 documentation that shows the algebra related to
23 deriving the various coefficient -- what number was
24 that?

25 MR. BLANKENAU: 33.

1 ARBITRATOR DREHER: And then the -- I
2 don't recall if you offered these or not. The Beaver
3 Creek example from 1965 and 2003.

4 MR. BLANKENAU: We did not offer that,
5 because it was -- that is contained in Dr. Ahlfeld's
6 report.

7 ARBITRATOR DREHER: All right. Then the
8 two-slide color exhibit is which number?

9 MR. BLANKENAU: 35.

10 ARBITRATOR DREHER: And the four-slide
11 color exhibit --

12 MR. DRAPER: 34.

13 ARBITRATOR DREHER: Thank you. We will
14 take a break.

15 (Lunch break was taken.)

16 ARBITRATOR DREHER: You can call your
17 next witness.

18 MR. BLANKENAU: We will call James
19 Williams. Originally, we had Dr. Schneider, but we
20 are not going to be calling him on the direct portion
21 of this case. Mr. Williams will discuss the next two
22 issues, both the accounting point and Haigler Canal
23 issues.

24 ARBITRATOR DREHER: Mr. Williams, you
25 are still under oath.

1 THE WITNESS: I understand.

2 JAMES WILLIAMS,

3 having previously been duly sworn, was examined and
4 testified as follows:

5 DIRECT EXAMINATION

6 BY MR. BLANKENAU:

7 Q Mr. Williams, handing you your report on
8 entitled "Expert Report on Accounting Issues: Haigler
9 Canal and Groundwater Model Accounting Points" dated
10 January 20, 2009, we would identify that as Exhibit
11 36.

12 Mr. Williams, would you lead us through
13 your discussion of those two accounting issues.

14 A Certainly.

15 Let me point out that we have provided a
16 graphical illustration, which is essentially the
17 features listed or shown on Figure 1 of this report,
18 which is found on page 2.

19 We modified the colors slightly so that
20 they would stand out a little better when they were
21 blown up. And so I will use that as I go along.

22 I would like to talk about the
23 accounting points first. The Republican River
24 Compact Administration Groundwater Model provides
25 baseflow at various locations throughout the model

1 domain, throughout the basin. And these are known as
2 accounting points. These are essentially the model
3 cells at which baseflow due to groundwater is
4 calculated and used as an output to accounting
5 procedures.

6 Last year, Nebraska submitted five
7 locations for our RRCA consideration. These would be
8 cells where the location did not match the intentions
9 of, perhaps, the Compact or the Settlement, in our
10 opinion. And we are not really sure why that was the
11 case, perhaps the modelers wanted to separate from
12 other settlement discussion; but in any case, we
13 believe that there is internal disagreement,
14 discrepancy between what actually happened with the
15 groundwater model and what we see in the settlement
16 documents.

17 Let me point out that one of these was,
18 in fact, approved by the Engineering Committee, and
19 that would be the accounting point at Guide Rock was
20 moved upstream a couple of miles so that model
21 accounting point matched the diversion dam for
22 Courtland Channel.

23 We realized that the purpose in the
24 settlement was to identify Nebraska's consumptive use
25 upstream from Guide Rock during water-short year

1 administration. So it's appropriate that that
2 groundwater model accounting point would match the
3 surface water accounting point so that groundwater
4 and surface water would be calculated at the same
5 location.

6 And, quite frankly, in Nebraska's
7 opinion, that was agreed to by Kansas and Colorado
8 because, to put it one way, they had no dog in that
9 fight. It didn't make a big difference in their own
10 accounting.

11 However, the four accounting points that
12 remain are the issue that we are discussing in this
13 report.

14 I would like to turn to the settlement
15 documents, Appendix C. And while I realize that the
16 accounting procedures have been updated since the
17 settlement, I believe that the points that I would
18 like to address here this afternoon are the same in
19 the currently approved accounting procedures. And
20 this just gets us back to the settlement.

21 Starting on page C11, we have the
22 definitions designated drainage basins. And you will
23 notice that at the bottom of C12 and the top of C13,
24 there are four drainage basins which are defined as
25 not only including a gage number, a gage location,

1 but also any consumptive use, any impacts below that
2 gage down to the confluence. So we are not arguing
3 about those.

4 Four of these, including the one in our
5 illustration here for the Arikaree River, are in a
6 mile or so of the confluence and we are not arguing
7 about those.

8 However, for four of them -- that would
9 be the North Fork, South Fork, Frenchman and
10 Driftwood -- do not match, in some cases, by several
11 miles. And those are the four that we are discussing
12 here.

13 Now, this is -- I fully understand, and
14 I admit, that in the accounting procedures, it states
15 that these accounting points should be at the
16 confluence.

17 We believe that that is not in agreement
18 with the Compact, explicitly for the North Fork gage
19 where the subbasin is defined, just like it is right
20 here, starting at the bottom of page C11, the North
21 Fork subbasin stops at the Nebraska stateline
22 Therefore, surface water accounting is done at that
23 USGS gage and, therefore, we believe that that
24 accounting point should be moved to that location.

25 My memory of our discussions last year

1 in the Engineering Committee was that Kansas actually
2 supports Nebraska for this change because that would
3 include some more consumptive use in the mainstem
4 that is currently being accounted for as if it were
5 North Fork consumptive use.

6 The remaining three accounting points,
7 along with the remaining subbasins, are not defined
8 in the Compact themselves.

9 Their first definition is here in the
10 settlement documents, but these are subbasins where
11 the stream gage is, in fact, some distance from the
12 accounting point.

13 And so it is our contention that the
14 purpose of the Compact is to allocate the surface
15 water and the wells are included, to the extent that
16 they impact that surface water.

17 We have a situation where we are
18 measuring streamflow at one location and we are
19 measuring impacts on that stream at a separate
20 location in all three cases, some distance downstream
21 from that stream gage. And we believe that this
22 should be consistent, so we measure this at the same
23 location in both cases.

24 I would like to move to our Haigler
25 Canal issue and quickly describe that.

1 This is the main purpose of our
2 illustration that we have here. And again, this is
3 Figure 1 on page 2 of this particular report.

4 The Pioneer Ditch diverts North Fork
5 water in Colorado, when in Nebraska it is known as
6 the Haigler Canal. The name comes, of course, from
7 the town of Haigler, near the southwest corner of
8 Nebraska.

9 The Haigler Canal crosses the stateline
10 about a half a mile south of the North Fork River.

11 And let's just follow the water.

12 Current accounting assumes that the
13 diversion for this canal is 100 percent of the water
14 seen at the stateline. Current accounting assumes
15 that all of the water goes on lands in -- it's
16 geographically the North Fork, but defined in the
17 Compact as being part of the mainstem. And,
18 therefore, 60 percent of this water that passes this
19 point is accounted back to consumptive use --
20 Nebraska consumptive use of North Fork water.
21 40 percent is considered to be return flows; that is
22 to say, for small diversions, non-Federal diversions,
23 the percentage used for water that crosses the field
24 or sinks in and makes its way to the stream is
25 considered to be 40 percent.

1 So that is, currently, all of the return
2 flows, or 40 percent of the diversion, is being
3 subtracted off of the mainstem accounting.

4 Our proposal is that we investigate the
5 footnote that is found at the bottom of page C38 in
6 the settlement documents, again the accounting
7 procedures at the time, which states that the RRCA
8 will investigate whether return flows from the
9 Haigler Canal diversion in Colorado may return to the
10 Arikaree River, not the North Fork River of the
11 Republican River -- North Fork of the Republican
12 River, sorry, as indicated in the formulas. If there
13 are return flows from the Haigler Canal to the
14 Arikaree River, these formulas will be changed to
15 recognize those returns.

16 We have investigated this. We have
17 proposed such returns and the Engineering Committee
18 was not able to come to an agreement on this issue.

19 So let's review what physically happens
20 here.

21 A portion of these waters crossing the
22 stateline in the Haigler Canal are placed on lands
23 that are in what is defined as the mainstem of the
24 Republican River. A portion actually crosses a ridge
25 line and are placed on lands that are in the Arikaree

1 subbasin and a portion spills into a natural
2 drainageway and rapidly makes its way downhill where
3 it's rechannelized and measured at a stream gage that
4 Nebraska is operating something on the order of 20
5 years now, using exactly the same stream gaging
6 equipment that is used on the Haigler Canal at
7 stateline.

8 So we have been operating a stream gage
9 here that takes a reading about every 15 minutes
10 during irrigation season. And what we know is there
11 is a certain portion of wet water that drops into
12 this drainage way and is measured at that gaging
13 point, makes its way to the Arikaree River and is
14 again measured here.

15 So there are -- we have divided it into
16 three issues that -- just to make it a little more
17 simple to discuss.

18 So the first question is: What is the
19 diversion?

20 So the diversion for the lands that are
21 being irrigated, we believe, instead of being
22 100 percent of what cross the stateline, should be
23 the difference between these two gages because some
24 of this water makes its way as wet water from the
25 North Fork to this location.

1 Secondly, of the water that is
2 considered to be the diversion, what portion is in
3 which basin?

4 And we have historically, in the Compact
5 Administration, divided this up based on simple
6 acreage. In other words, it would take too much
7 detail to worry about which farmer places how much on
8 which crop using which equipment.

9 A good example of this was that the
10 Engineering Committee was able to agree that waters
11 related to Riverside irrigation should be
12 apportioned, depending on how much was upstream of
13 the Frenchman gage versus how much was downstream of
14 the gage. So that was agreed to in Compact
15 Administration meeting last summer.

16 We have measured these out, based on
17 their surface water rights, using a little GIS
18 program. And we have determined it's almost half and
19 half. If we round to the nearest percentage, that
20 would be 51 percent of the lands that are in the
21 mainstem; 49 percent are in the Arikaree. So we
22 propose to make changes in the accounting procedures
23 that would reflect that difference.

24 And finally, as I observed earlier, some
25 of the wet water from the North Fork of the

1 Republican drops past this spill-back gage and makes
2 its way to the Arikaree River gage. In other words,
3 this water has already been logged into the
4 Republican River Compact accounting system as being
5 North Fork water, and now it is again logged in as
6 being Arikaree River water.

7 So we propose to change the virgin water
8 supply calculation of these basins to reflect that
9 there should not be double-accounting of this water.

10 MR. BLANKENAU: We have nothing further.

11 ARBITRATOR DREHER: Mr. Williams, at the
12 time that the Compact was entered into in 1943, what
13 do you think it meant by the term "drainage basin"?

14 THE WITNESS: I believe that they
15 probably meant everything extending down to the
16 confluence.

17 ARBITRATOR DREHER: And wouldn't, at
18 least, some of these proposed changes change that
19 definition if that's what the term meant?

20 THE WITNESS: Are you referring to the
21 accounting point changes?

22 ARBITRATOR DREHER: Yes.

23 THE WITNESS: I believe that would be
24 the case. I believe that at the time of the
25 settlement, it was decided that it would be easiest

1 to measure the surface water divided up, based on the
2 USGS stream gages that have been installed that were
3 being operated, in part, to assist Compact
4 Administration, despite the fact that several of
5 these gages were put in at some distance from the
6 confluence.

7 ARBITRATOR DREHER: But the fact
8 remains, does it not, that through the FSS, the
9 States could not agree to anything that changed the
10 Compact in any manner?

11 THE WITNESS: That is correct. And let
12 me modify my earlier answer to your question.

13 The subbasins would be defined as -- if
14 you would ask the framer of the Compact, as extending
15 in the confluence, except in the case of the North
16 Fork, which was defined in the Compact, yes, ending
17 at stateline.

18 ARBITRATOR DREHER: But it is possible,
19 is it not, that the definitions set forth for
20 accounting purposes in the FSS were intended to be
21 used for accounting purposes, but not intended to
22 change the definition of drainage basin, as used in
23 the Compact?

24 THE WITNESS: It has been some time
25 since I reviewed the Compact, so I don't recall a

1 definition of the drainage basin, except in the case
2 of the North Fork.

3 I would say that the settlement did not
4 change the definition of the North Fork Basin, if you
5 will.

6 Is that responsive to your question?

7 ARBITRATOR DREHER: In part.

8 I guess the term "drainage basin" is not
9 explicitly defined in the Compact?

10 THE WITNESS: Yes, I'm glad we agree on
11 that, because that was my memory, too. Yes.

12 ARBITRATOR DREHER: Of course, the
13 Compact didn't establish any accounting points. And
14 I was simply asking, you know, to the extent
15 "drainage basin" means from the confluence upstream,
16 with the exception of the North Fork, as you point
17 out, the FSS couldn't have changed that meaning if,
18 in fact, that's what the Compact meant?

19 THE WITNESS: My opinion would be that
20 when they wrote the FSS, they agreed that, for the
21 purpose of surface water, it would be easiest to use
22 the stream gages in place, with the exception of
23 where they had known consumptive use below that
24 stream gage and for those four locations that was
25 defined.

1 I believe I agree with you that the FSS
2 does not actually change that definition.

3 ARBITRATOR DREHER: Moving on to the
4 Arikaree, is the Arikaree River a gaining river, a
5 losing river or neither, downstream of the wasteway
6 gage?

7 THE WITNESS: I believe it's typically a
8 losing river.

9 ARBITRATOR DREHER: But I don't recall
10 reading in your report any proposal to address those
11 losses that would occur to the water being spilled
12 back in at the wasteway.

13 THE WITNESS: Well, I have a couple of
14 responses to that.

15 One is, we would be happy to discuss
16 that in the Engineering Committee, if we could start
17 a discussion on this issue.

18 A second response to that would be that
19 these types of situations occur elsewhere in Compact
20 accounting and it's typically not considered to be a
21 problem -- or at least nobody has done anything about
22 it or brought it up for attention.

23 I believe the example I'm most familiar
24 with is that during some years, Beaver Creek, which
25 drains into Sappa, has measurable flow. Sappa Creek

1 has little or no flow. And so those losses are
2 expressed between the gage on Beaver Creek and the
3 gage on Sappa, and then a subtraction is done, even
4 though there are losses in that location.

5 ARBITRATOR DREHER: Well, you have
6 answered my question, I think.

7 THE WITNESS: I don't think it would be
8 going too far out of bound to mention that in many
9 years, the flow coming into Nebraska on the Arikaree
10 River is, in fact, zero and basically any waters seen
11 at the Arikaree River gaging point during those years
12 could be assumed to be actually North Fork water.

13 ARBITRATOR DREHER: Either spilled or
14 returned flows?

15 THE WITNESS: Or return flows, yes.

16 ARBITRATOR DREHER: All right.

17 Mr. Ampe? Mr. Draper? Who is going
18 first?

19 MR. AMPE: It would be me. I would like
20 to state I would like the five minutes just because
21 originally Dr. Schneider had been up as the next
22 witness. So I just need a few minutes to get my
23 papers together for Mr. Williams.

24 ARBITRATOR DREHER: Certainly.

25 MR. AMPE: Anyway, it's 3:00, it's time

1200

1 for a break.

2 ARBITRATOR DREHER: Yes. Let's take our
3 15-minute break at this point.

4 (Break was taken from 3:05 to 3:25.)

5 ARBITRATOR DREHER: All right.

6 Mr. Ampe, please continue.

7 MR. AMPE: Or start, as the case may be.

8 ARBITRATOR DREHER: Or start. That's
9 more accurate.

10 CROSS-EXAMINATION

11 BY MR. AMPE:

12 Q Mr. Williams, look at your report, I
13 assume you have that in front of you.

14 A I do.

15 Q This expert report on accounting issues,
16 are you the primary author of that report?

17 A I'm the coauthor of this report. I
18 wrote a bunch of it, yes.

19 Q What bunches did you write?

20 A I'm the primary author of the Haigler
21 Canal portion and I am also the primary author of the
22 portion dealing with locations of the groundwater
23 model accounting point.

24 Q Looking at part 2 of your report, can
25 you explain to me what you would like to take place,

1 exactly.

2 A We believe that the cells used to
3 estimate baseflow in these four subbasins should be
4 relocated and the model cells that match the stream
5 gages should be used to calculate baseflows.

6 Q What problem do you believe this will
7 solve?

8 A We believe that it will provide an
9 apple-to-apple comparison, if you will, so that the
10 streamflow -- the surface streamflow would be
11 calculated at the same point as the baseflow as
12 measured or estimated by the groundwater model.

13 Q And how many groundwater accounting
14 points did you investigate to determine whether or
15 not the points needed to be changed?

16 A We looked at the subbasin groundwater
17 model accounting points and we also took a look at
18 the Guide Rock accounting point.

19 Q All the subbasin points?

20 A That's my memory.

21 Q And what exactly did you review to reach
22 your conclusion that these four need to be moved?

23 A Because they were not additionally
24 defined in the accounting procedures as extending to
25 the confluence, as was the case with four of them,

1 and these four were some distance away from the
2 confluence, located -- where the stream gage was
3 located, some distance away from the confluence.

4 Q If I understand you correctly, it was
5 based upon your review of accounting procedures?

6 A That is correct, yes.

7 Q Did you do any, I will call the actual
8 engineering or data collection in reaching your
9 conclusions?

10 A I would have to ask you to redefine what
11 you meant by that.

12 Q Did you collect any data in reaching
13 your conclusions?

14 A No. Only to the extent of groundwater
15 model runs to see what the effects would be.

16 Q What would those effects be?

17 A Those effects would be found in our
18 other report, the compliance report, which was
19 submitted February 17, 2009. On page 11, we have
20 Tables 1 and 2 and it shows if all of the accounting
21 cells are moved, we will see a net effect that
22 benefits Nebraska on the order of 1- to 200 acre-foot
23 per year. You will notice, with our proposed CBCU
24 calculation methods, the these two effects are not
25 additive, if you will.

1 So if we are going to take a look at
2 both of those together, the proposed CBCU changes to
3 what we believe a more correct accounting would be
4 using the accounting model, that it tends to have
5 something on the order of just a few hundred
6 acre-feet per year to the benefit of Nebraska.

7 Q So the short answer is it benefits
8 Nebraska?

9 A Overall, that's the case. It's not true
10 at each one of the accounting points we are proposing
11 changing. Some of them would, in fact, affect us
12 negatively but we thought if we were proposing
13 changing accounting points, that we should review all
14 of them and make changes, as necessary, to any one of
15 them.

16 Q These four subbasins, do you know why
17 the physical gage is located where it is?

18 A Discussing this with our field office
19 personnel, typically it is a location that is easy to
20 measure from in most types of weather. And of
21 special concern, would be flooding conditions. These
22 gages are typically located near bridges.

23 Q Is it always possible to place a
24 physical gage where you want it to be?

25 A No. It may be quite difficult in some

1 cases.

2 Q Did you take these physical limitations
3 on gage placement into account for your analysis?

4 A We did not. We simply went with the
5 lobbies of the gages.

6 Q Are there any physical limitations on
7 placement of groundwater accounting points in the
8 model?

9 A I'm not a modeler, but I understand from
10 discussions with them, no, one may choose any point
11 one wishes to.

12 Q Did you investigate whether it would be
13 possible to move the physical location of the gages
14 to the confluence with the mainstem?

15 A In these cases, no. We have spent some
16 effort working at the Guide Rock gage, but I
17 understand that is not point of your question.

18 Q It's not.

19 To conform with the Compact would it
20 make more sense to move the surface water accounting
21 to the confluence with the mainstem?

22 A That's possible.

23 Q I believe in your discussion of moving
24 the North Fork accounting point, you cited the
25 Compact itself?

1 A Yes.

2 Q And in reaching your conclusion on the
3 North Fork, did you review the first report of the
4 Special Master in No. 126, Original?

5 A I did not.

6 Q Are you aware that in that hearing, at
7 page 6 -- I should say in that Order at page 6, the
8 Special Master ruled that the Republican River is
9 formed at the junction of two rivers that rise in the
10 plains of northeastern Colorado -- Arikaree River and
11 the North Fork Republican River. The North Fork
12 Republican River flows northeasterly from Colorado
13 into Nebraska and the Arikaree flows northerly from
14 Colorado across the extreme northwest corner of
15 Kansas and then into Nebraska?

16 A I'm sorry. Was there a question?

17 Q Yes. Were you aware that the Special
18 Master made that finding?

19 A No, I was not aware.

20 Q So you did not take that into account in
21 reaching your conclusions on the North Platte?

22 A No, I did not.

23 Q Looking at part 1.A. of your report,
24 will you tell me what data collection you performed
25 as part of your study?

1 A Regarding the net diversion, we have the
2 gage records from these two gages.

3 Q That was the extent of your data
4 collection?

5 A Regarding the net diversion, yes.

6 Let me add to that, we also have
7 precipitation records from the rain gage at Haigler,
8 Nebraska and that has been reviewed, as well.

9 Q Do you -- let's see.

10 Precipitation could add to the flow of
11 the Haigler Canal, can it not?

12 A In this case, the spill-back gage could
13 be affected by precipitation; that is correct.

14 Q That is either because precipitation
15 falls directly on the canal itself or you could have
16 water flowing over the land and into the canal. Is
17 that a fair assessment?

18 A That is true. I would expand it to say
19 that I would not expect it to be in most of the
20 canal; but, as I stated in my earlier testimony, the
21 canal does drop into a natural drainage-way where
22 additional runoff could join the canal waters.

23 Q And as part of your study, do you back
24 precipitation out from the wasteway gage?

25 A Yes. Talking with field office

1 personnel, that has been the case in the past.

2 Q You are able to measure --

3 A Not on a consistent basis, I must add,
4 but they have done that.

5 Q They are able to measure overland flow
6 from precipitation and back that out from the gage?

7 A No. It would be simply a comparison of
8 flows prior to the precipitation seen at the gage at
9 Haigler and flows seen after that, and the comparison
10 would be to essentially cut the peaks off of flows
11 seen at the time of precipitation.

12 Q Explain to me a little bit here, this
13 spill-back gage. Is that located directly where the
14 waste flows from the Haigler flow into the channel of
15 Arikaree?

16 A Let's be careful with the terms here.

17 I do not believe that most of the return
18 flows, that would be flows that have gone across or
19 been applied to irrigate land and then make their way
20 somehow to a river, they do not pass this gage, if
21 that is -- if that is the question you are asking.

22 Q Let's --

23 A So -- okay.

24 Q I was asking where the location is of
25 that gage. Is that actually located at the channel

1 of the Arikaree?

2 A Oh, no. It is some distance above that
3 channel.

4 Q So as part of your study, did you make
5 that analysis of losses and gains between that gage
6 and the channel of Arikaree?

7 A No, we did not.

8 Q As part of your study, did you make that
9 analysis of losses and gains between where, I think
10 you called it a -- I don't know, wherever
11 theoretically, these flows would join Arikaree from
12 that point to the Arikaree gage?

13 A No, we did not.

14 Q So you really have no idea whether any
15 flows that passed this spill-back gage actually reach
16 the Arikaree gage?

17 A Only to the extent that we could compare
18 flows upstream on the Arikaree with flows downstream
19 from the spill-back channel.

20 Q I'm going to hand you what has not yet
21 been marked as an exhibit, but I assume will be.
22 It's Kansas' Responsive Expert Report Concerning
23 Haigler Canal and Groundwater Modeling Accounting
24 Points. I believe you have seen this before?

25 A Yes, I have.

1 Q Would you take a look at the last page.
2 I will represent to you that this is a table, last
3 column of which shows difference and the original had
4 some of the numbers in red, which are also shown in
5 the parentheses, which I have highlighted since I
6 only had a black and white printer at the time.

7 A I understand.

8 Q So you agree that applying the Nebraska
9 plan, we could have negative flows?

10 A The concept of negative flows is
11 somewhat abstract to me, but I understand the
12 calculation ends with a negative number at that
13 location.

14 Q What data collection or other
15 engineering analysis did you do in support of part
16 1.B. of your report?

17 A Part 1.B. refers to return flows
18 associated with Haigler Canal and data collection
19 consisted of estimating the location of the drainage
20 basins, the North Fork versus the Arikaree, from USGS
21 topo maps and then calculating the area watered in
22 each of those drainage basins from the canal.

23 Q Did you investigate the characteristics
24 of the flow of groundwater beneath your study area?

25 A No, we did not.

1 Q Do you happen to know which direction of
2 flow the groundwater in this area generally is?

3 A No, I do not.

4 Q Do you have any reason to doubt me if I
5 told you it was generally north?

6 A I would have no opinion on that.

7 Q I'm going to hand you Exhibit -- I will
8 call this one Colorado 11. This is a report from
9 Slattery Aqua Engineering. I assume you have seen
10 this before.

11 A I believe I have, yes.

12 Q Let's look at last page, Figure 1.

13 ARBITRATOR DREHER: Give me a minute,
14 Mr. Ampe.

15 MR. AMPE: In the binder on the far left
16 of your table.

17 ARBITRATOR DREHER: All right. I was
18 going to pull out my working copy.

19 MR. AMPE: Okay.

20 Q (BY MR. AMPE) As part of your study,
21 did you investigate the soil characteristics of
22 Haigler study area?

23 A No.

24 Q Are you personally familiar with the
25 area?

1 A I visited the area.

2 Q Did you get a look at the soils out
3 there?

4 A I wasn't there for the purpose of
5 investigating the soils.

6 Q Did you notice if they were sandy?

7 A I would agree that they tend to be
8 somewhat sandy.

9 Q This is something you would notice when
10 the window blows, isn't it?

11 A Yes.

12 Q Now, looking at Mr. Slattery's report in
13 Figure 1, first, do you have any reason to doubt
14 Mr. Slattery's data collection on the gage?

15 A At this time, I have no reason to doubt
16 his data collection.

17 Q Now, considering the general flow of
18 groundwater and the general soil characteristics of
19 this area, if water is not appearing at the Arikaree
20 gage, where is it going?

21 A I'm sorry, I would like to go back to
22 your previous question.

23 I don't understand why the area from
24 zero to 1 has been filled in on this Figure, knowing
25 that the gage is in operation for only half a year,

1 give or take, or a little more; but, I'm sorry, that
2 was an aside that made me pause.

3 Going to your next question.

4 Q Back to that question, if irrigation
5 water is applied in the study area and it's not
6 appearing at the Arikaree gage, where is it
7 appearing? What happens to it?

8 A I believe the water would either be lost
9 due to evapotranspiration or it could, perhaps, soak
10 into the ground.

11 Q If it soaked into the ground, what would
12 happen to it?

13 A I believe that groundwater consumptive
14 use would be captured in the groundwater model.

15 Q Physically, what would happen to that
16 water?

17 A I believe that, typically, it would make
18 its way either to a point on a stream downgradient,
19 if you will, or to a well and be pumped out.

20 Q And the point downstream, downgradient
21 from this study area is, in fact, the mainstem, is it
22 not?

23 A Potentially.

24 Q And if that groundwater were to appear
25 in the mainstem as baseflow, would it be recorded?

1 Would it show at the gage?

2 A Yes. I believe it has the potential to
3 show up at a gage, but not separate or identifiable.

4 Q Are you aware of any aquifer flow or
5 other barrier to groundwater flow under the study
6 area?

7 A No, I'm not aware of such.

8 Q Did you investigate to what extent
9 center pivots have been developed under Haigler Canal
10 as part of your study?

11 A No, I have not.

12 Q As part of your study, did you simply
13 assume that return flows from irrigated land on the
14 Arikaree side of the topographical divide would
15 appear at the Arikaree gage?

16 A Yes, that's what we assumed.

17 Q And you have no hydrologic basis for
18 this assumption; only topographical?

19 A That would be correct.

20 Q And assuming that we were correct in
21 that -- I take that back.

22 Now, how do the accounting procedures
23 account for water that is applied to the Haigler
24 area, the study area?

25 A How is it currently accounted for?

1 Q Yes.

2 A Currently, 60 percent of the water
3 passing the stateline gage in the canal is assumed to
4 be consumptive use; that is, all of the water is
5 placed on lands and assumed to be consumptively used
6 and feeds into the consumption calculation. And
7 40 percent is assumed to reappear; that is, all of
8 the Arikaree return flows are assumed to reappear in
9 the mainstem.

10 Q And as we talked about earlier, if these
11 return flows are not showing up at the Arikaree Creek
12 gage, they are probably showing up in the mainstem?

13 A Potentially.

14 MR. AMPE: Nothing further.

15 ARBITRATOR DREHER: All right.

16 Mr. Draper.

17 MR. DRAPER: Thank you.

18 CROSS-EXAMINATION

19 BY MR. DRAPER:

20 Q Good afternoon, Mr. Williams.

21 A Good afternoon.

22 Q My main question to you is: Have you
23 been to the Triple Point, the point where the three
24 States meet?

25 A I'm sorry, I wish that I had -- that I

1 would be able to claim that I have. But, no, I have
2 not been to the Triple Point.

3 MR. AMPE: I might suggest closing
4 arguments at this Triple Point.

5 THE WITNESS: I look forward with great
6 relish to a trip there, yes.

7 MR. DRAPER: It's a might lonely
8 wind-strewn spot, as I remember.

9 Q (BY MR. DRAPER) In your direct
10 testimony, you read from a footnote in the FSS;
11 isn't that right?

12 A In Appendix C of the FSS, that's
13 correct.

14 Q Pages C38, C39 in the printed version?

15 A That's correct.

16 Q And the language you read talks in terms
17 of the RRCA will investigate and if there are return
18 flows from the Haigler Canal to the Arikaree River,
19 these formulas will be changed to recognize those
20 returns?

21 A I believe that's what I read, yes.

22 Q And so these -- these changes that are
23 referred to here, would you agree, forward-looking if
24 these changes are determined to be necessary, they
25 would be prospective only; is that right? Isn't that

1 the suggestion of that language?

2 A I'm not sure exactly what you are
3 asking. It is clear from the language, "will be
4 changed," yes. They would be changed at some point
5 in the future.

6 I don't recall exactly your question,
7 but there may have been something related to what
8 years those changes would be applied to and I would
9 have no opinion on that.

10 Q Also referring to the bound volume of
11 the FSS, there are definitions in Appendix C,
12 correct?

13 A That is correct.

14 Q And, in fact, the term "subbasin" is
15 defined, isn't it --

16 A That is correct.

17 Q -- starting on page C11 and going for a
18 couple of pages after that.

19 A Yes.

20 Q And typically, these definitions define
21 a subbasin in terms of the area above a particular
22 gage; isn't that right?

23 A Yes, the drainage area above the
24 respective gage.

25 Q So to some degree, these definitions may

1 be inconsistent with a definition of subbasins that
2 keys to the confluence; isn't that right?

3 A I don't know of a definition of a
4 subbasin that is keyed to the confluence, if that's
5 what you are asking.

6 Q Well, if I heard the Arbitrator earlier,
7 I think he was suggesting that that may be the
8 Compact definition. And if we assume for a moment
9 that it is, to the extent that these subbasins are
10 defined as the area above a gage, which is not at the
11 confluence, at least for purposes of use of these
12 terms in the FSS, may engender some superficial
13 discrepancy with the Compact, correct?

14 A There were several thoughts there. I
15 will try to address them as best I can.

16 If I understood Mr. Dreher's question
17 earlier, it was with regards to what did the framers
18 of the Compact have in mind when they simply referred
19 to the subbasins and did not actually define them.
20 For the purposes of accounting for waters of the
21 basin, those that settled and created the FSS defined
22 the subbasins as shown here in the accounting
23 procedures.

24 Q Now, in terms of accounting under the
25 FSS, that was key to subbasin accounting at the

1 confluence by later provisions of the FSS, such as
2 III.A.1. on page C16; wouldn't that be right?

3 If you have that language, I would like
4 to show you exactly what I'm referring to.

5 If you look at bottom part of paragraph
6 III.A.1. on page C16, do you see that sentence at the
7 bottom of the paragraph, about six lines up, that
8 says, "Adjustment for flows diverted around Sub-basin
9 gages and for Computed Consumptive Beneficial Use in
10 a Sub-basin between the Sub-basin stream gage and the
11 confluence of the Sub-basin tributary and the Main
12 Stem shall be made as described" in further sections
13 named there.

14 Do you see that language?

15 A I do see that.

16 Q By that process, the accounting can be
17 made and appears to be made, at least to me -- and
18 I'm asking for your agreement, if you will -- that
19 this allows the accounting to be done strictly on a
20 subbasin basis where the subbasin accounting goes
21 fully to the confluence?

22 A I would say the problem is the internal
23 discrepancy in these accounting procedures where, for
24 example, the groundwater accounting point at North
25 Fork is at the confluence, but it is defined -- the

1 subbasin is defined differently in the Compact and
2 differently earlier on here.

3 And then a similar matter, several of
4 these stream gauges are some distance from the
5 confluence and yet, we do not make adjustments
6 described in this paragraph on page C16.

7 Some of them do, four of them I listed
8 earlier in my testimony.

9 MR. DRAPER: No further questions.

10 ARBITRATOR DREHER: Would you like a
11 break before redirect?

12 MR. BLANKENAU: I think we can
13 legitimately make this a five-minute break.

14 ARBITRATOR DREHER: All right. Very
15 good, thank you.

16 Must be something other than the Draper
17 5.

18 (Break was taken from 3:55 to 4:03.)

19 REDIRECT EXAMINATION

20 BY MR. BLANKENAU:

21 Q Mr. Williams, just to be clear, what
22 Nebraska is proposing with regard to the accounting
23 points is to remove the accounting within the
24 groundwater model cells to match up with the existing
25 stream gages, correct?

1 A That is correct, yes.

2 Q What is the practical effect of not
3 having those two match?

4 A The practical effect is that we are
5 trying to calculate surface water at one location and
6 groundwater consumptive use at another location. So
7 there is the potential for some of the surface water
8 passing that gage to then be consumed by the
9 groundwater and, in effect, a double-accounting.

10 And, of course -- in other words, we are
11 just trying to get a whole and complete and accurate
12 accounting of the water from that subbasin.

13 Q There was some discussion about the
14 definition of subbasins.

15 Is there any sort of internal conflict
16 within the FSS itself?

17 A Yes. That's -- that's exactly the point
18 of this whole thing, that the -- that there is an
19 internal conflict between the definitions of those
20 subbasins and the way that the accounting procedures
21 state that the groundwater accounting will be done.
22 So there is talk about the basin ending and the
23 surface water accounting being done on the stream
24 gage and yet, the potential for groundwater
25 accounting to be done at the confluence.

1 Q Let's switch, then, to --

2 A And I might add, it's not a conflict
3 with the original Compact itself. Our proposal is
4 completely in accord with that Compact, to the best
5 of my knowledge.

6 Q Let's go to the heading of the canal.
7 How would you deal with precipitation
8 falling into the canal?

9 A There are a couple of things that could
10 be done and perhaps we could work it out with the --
11 with the Engineering Committee.

12 But one thing to realize is that, to the
13 best of my knowledge, the upstream side of this canal
14 is bermed along its entire length. If that were not
15 so, then you would have heavy spill stations into the
16 canal and it would disrupt operations.

17 So it's typical for that to be bermed so
18 that surface water typically cannot get into the
19 canal until it drops into that drainage way.

20 So we could either choose to review and
21 work that record more rigorously, as has been from
22 time to time in the past, taking into account
23 precipitation measured just a couple of miles away so
24 it would assumed to be the same.

25 Another possibility would be that

1 another gage could be installed at the end of the
2 mostly horizontal portion of that canal before it
3 drops about a hundred foot down to that gage. In
4 other words, this gage that we currently have in
5 place and have owned for almost 20 years mechanically
6 and physically is the same as the gage crossing the
7 stateline.

8 Another one could be put in place and
9 comparisons could be made, so we could easily account
10 for any precipitation increases to flow.

11 Q Does the RRCA presently account for
12 precip flowing directly into any other canals?

13 A Not to best of my knowledge, no. Any
14 gains due to precipitation falling into the canal are
15 not accounted for in the canals.

16 Q And then lastly, what is in this for
17 Nebraska? What does Nebraska care?

18 A Nebraska is concerned, in large part,
19 because we currently have a situation where water
20 passing this gage in the canal, North Fork water is
21 being double-accounted. It is 100 percent accounted
22 for at that gage.

23 But also, I think as we have
24 established, through the various graphs and so on,
25 that we have seen much of the water, if not all, in

1 the past six or seven years showing up at the
2 Arikaree gage is, in fact, North Fork water and is
3 currently being double-accounted for.

4 What that means is in entire gage, plus
5 the North Fork gage, plus the volume seen here, those
6 are all subtracted off the mainstem accounting.

7 In other words, once it's logged into
8 the system, Nebraska has to provide that as wet water
9 at Hardy, essentially, or the accounting equivalent.
10 So this double-accounting, in our opinion, hurts
11 Nebraska.

12 And, I think, an extension to that is
13 why would the other states maybe not be too excited
14 about our proposal?

15 And the answer would be, if you decrease
16 the amount of wet water seen at Arikaree gage, there
17 is the potential for either Kansas and/or Colorado to
18 fill their subbasin account requirements as agreed
19 upon in the settlement.

20 MR. AMPE: I'm going to object to that
21 to the extent you are providing legal opinion as to a
22 subbasin requirement.

23 ARBITRATOR DREHER: Well, I will note
24 the objection; but as with this witness previously,
25 he is Nebraska Republican River Compact

1 Coordinator --

2 MR. AMPE: Sure.

3 ARBITRATOR DREHER: -- and he is
4 expected to make quasi-legal determinations.

5 Q (BY MR. BLANKENAU) I said "finally,"
6 but one more finally, Mr. Williams.

7 Is it your view, then, that Nebraska's
8 proposal makes the subbasin accounting more accurate?

9 A Oh, absolutely, it would make it more
10 accurate for both the North Fork subbasin and the
11 Arikaree subbasin and the mainstem calculation. Yes,
12 it would make it more accurate.

13 Q Because it better reflects reality?

14 A Yes.

15 MR. BLANKENAU: Nothing further.

16 ARBITRATOR DREHER: Let me ask some more
17 questions. Let me start with the Haigler Canal
18 issue.

19 Regarding a question Mr. Ampe asked you,
20 I'm not sure I understood your answer, and that was
21 the location of this gage.

22 Is it on the canal or is it at some
23 other location after the canal empties into this
24 drainage area?

25 THE WITNESS: Your Honor, I wish I had

1 brought pictures with me, but let me describe it as
2 best I can.

3 If you take a look -- it might be
4 beneficial to get you close and personal with our
5 graphic so we can see the topography, or I can bring
6 it to you.

7 ARBITRATOR DREHER: This is all right.

8 THE WITNESS: All right.

9 You will see that the canal stays close
10 to the 3400 elevation line until we get right to this
11 vicinity, right here, after it passes the nose of
12 that ridge.

13 At this point, the canal or the water
14 drops rapidly downhill to the bottom of this drainage
15 basin and then it follows this drainage basin
16 downstream. And at some point down in this vicinity,
17 this is rechannelized and looks like a canal, once
18 again, coming out of this drainage basin and it is --
19 in the middle of one such canal that there is a
20 Parshall flume with measuring equipment there.

21 It is a canal until we get to this
22 point, drops rapidly downhill, approximately
23 100 feet, I believe, the 3300 line close -- yes, this
24 would be it right here, somewhat downstream in that
25 measuring point.

1 So it's about a hundred-foot drop in
2 elevation.

3 ARBITRATOR DREHER: So it is possible
4 that there could be irrigation -- or not irrigation,
5 excuse my, precipitation in this drainage when the
6 canal drops into it? I don't mean runoff, but from
7 precipitation in that drainage.

8 THE WITNESS: That is absolutely
9 correct. And, in fact, we see in the record peaks
10 that are right on -- precipitation peaks seen at the
11 station.

12 We also see increased flow at this
13 location sometime after that and trying to do
14 baseflow separation is a little more difficult
15 because you don't know if it's remaining runoff
16 coming from here or simply that a person, if it
17 rained yesterday, are they going to divert today?

18 But, I think, in general, certainly,
19 with the larger storms, those peaks are clearly
20 evident in the record. They could indeed.

21 What I'm saying is, while it would take
22 some work, it is possible to back those out, yes.

23 ARBITRATOR DREHER: And then it's
24 another half mile from the gage to where the canal
25 actually enters the Arikaree River?

1 THE WITNESS: Approximately, yes.

2 ARBITRATOR DREHER: And there could be
3 additional losses in this canal?

4 THE WITNESS: That may be possible. I
5 don't recall the soils there. My memory is that it's
6 not lined at that location. That may be faulty.

7 ARBITRATOR DREHER: Okay.

8 Regarding the accounting point issues, I
9 want to make sure I understand what Nebraska's
10 concern is.

11 The accounting point for the groundwater
12 model is generally located in a cell that is at the
13 confluence of a tributary and the Republican River;
14 is that correct?

15 THE WITNESS: That's correct.

16 ARBITRATOR DREHER: And the gaging
17 station on most tributaries is located some distance
18 upstream, but in these three or four instances that
19 you are describing here, it's located, relatively
20 speaking, a greater distance upstream; is that right?

21 THE WITNESS: That's correct.

22 ARBITRATOR DREHER: Then help me
23 understand why the provision that Mr. Draper
24 referenced, why doesn't that work where it says,
25 specifically that adjustments for flows diverted

1 around stream gaging and for computed beneficial
2 consumptive use in the subbasin between the subbasin
3 stream gage and the confluence of the subbasin
4 tributary in the mainstem should be made as described
5 in subsections III.D.1 and 2. and IV.B.? Why doesn't
6 that operate to essentially put them at the same
7 location at the confluence?

8 THE WITNESS: Well, if I may, let me lay
9 out the cards as best I can, based on the potential
10 benefit or harm to Nebraska.

11 And I would like to turn you back to
12 page 11 in our compliance report, which is in that
13 section entitled "Closing the Gap." I referred to it
14 earlier.

15 ARBITRATOR DREHER: I have it.

16 THE WITNESS: Okay. This is important
17 to us, especially at the South Fork.

18 As I mentioned earlier, some of these
19 accounting point changes, in fact, would harm
20 Nebraska, Frenchman; for example, I believe it would
21 not be of benefit.

22 If you look at that column titled "All
23 Accounting Cells Moved," what we are essentially
24 talking about is on the South Fork and what we have,
25 over the past several years, is essentially no-flow

1 situation on the stream coming from Kansas.

2 And of that no flow, Nebraska has an
3 extremely small percentage, just a couple percent, of
4 the allocation of that zero flow. Because
5 historically, I believe, when the Compact was signed,
6 there was very little room, just a couple of miles,
7 between the stateline and the confluence, be very
8 little room for Nebraska to use that water.

9 What we find is that groundwater
10 irrigation now, as currently measured by the model,
11 increases the consumptive use in that vicinity. And
12 I think physically that water is probably mostly
13 water that has landed either locally or is coming
14 from the North Fork or the Arikaree. In other words,
15 it's not from some large subterranean flow to that
16 groundwater consumption in the area around Bickleman.

17 Now, using the accounting procedures
18 that Nebraska is proposing for CBCU, we find that the
19 net effect, the benefit, if you will -- in other
20 words, comparing those last two columns, the overall
21 benefit is just a few hundred acre-foot.

22 And I guess the sum proposal of what I'm
23 saying here today is that with our proposed CBCU
24 method, we think we will have a more accurate
25 accounting of the effects of groundwater depletion

1 measured at that accounting point at the confluence.
2 But without that proposed CBCU method, we see,
3 especially on the South Fork, a very large
4 consumption that we do not believe is, in fact, a
5 depletion of the waters of the South Fork.

6 Moving the accounting point so that it
7 matches up with the surface water accounting point,
8 we believe would correct that situation, to a great
9 extent, and fits with the continuity that we see
10 throughout the Compact; and that is, you should be
11 able to add in together surface water and groundwater
12 to get your consumptive use in a basin.

13 It should be at the same location, is
14 what we believe.

15 ARBITRATOR DREHER: But the computed
16 consumptive beneficial use downstream of the gaging
17 station, or between the gaging station and the
18 confluence, it is what it is.

19 It isn't this, just a matter of what
20 basin it's put into, whether it's in the mainstem or
21 on the tributary? I mean, it is what it is, isn't
22 it? And it's just a matter of where the use is
23 deemed to occur, either on the tributary or on the
24 mainstem?

25 THE WITNESS: I would agree with your

1 statement that we are not -- moving these accounting
2 points does not change overall use. It does not
3 change overall depletions to streamflow of the entire
4 system. It is simply a matter of assigning that in
5 the various subbasins.

6 ARBITRATOR DREHER: Okay.

7 Any further redirect?

8 MR. BLANKENAU: No, nothing further.

9 We would move for the admission of
10 Exhibit 35, the Haigler Canal accounting point
11 report.

12 ARBITRATOR DREHER: No objection.

13 MR. BLANKENAU: We had previously
14 identified that as Exhibit 31.

15 ARBITRATOR DREHER: So is it 31 or 35?

16 MR. BLANKENAU: It's 31, I'm sorry.

17 MR. DRAPER: This is the --

18 MR. BLANKENAU: The Haigler Canal
19 accounting points.

20 MR. DRAPER: The January 20 report
21 entitled "Expert Report on Accounting Issues Haigler
22 Canal and Groundwater Accounting Report."

23 MR. BLANKENAU: Correct.

24 MR. DRAPER: And that is Exhibit --

25 MR. BLANKENAU: 31.

1 MR. DRAPER: Thank you.

2 ARBITRATOR DREHER: And I don't believe
3 I have the record copy of that.

4 MR. POWERS: It should be in the book.

5 ARBITRATOR DREHER: Well, the book only
6 has a tab numbered 30 and there is nothing behind it.

7 MR. POWERS: The book over here.

8 ARBITRATOR DREHER: Oh, the new book,
9 okay. First I had trouble keeping track of paper and
10 now I have trouble keeping track of books.

11 All right, it's here.

12 Would there be any objection from any
13 counsel if I took that illustrative exhibit with me
14 that showed the layout of the Haigler Canal?

15 MR. DRAPER: No objection.

16 MR. AMPE: I believe it's right out of
17 his report.

18 ARBITRATOR DREHER: Should be, but the
19 colors are different, so one never knows.

20 So if I understand where we are at, that
21 concludes Nebraska's direct case --

22 MR. BLANKENAU: It does.

23 ARBITRATOR DREHER: -- on this issue?

24 All right.

25 The schedule I have got here shows

1 Kansas putting on its responsive case.

2 Are you ready to proceed with that?

3 MR. DRAPER: Yes, we are.

4 ARBITRATOR DREHER: All right, you may
5 call your first witness.

6 MR. DRAPER: Thank you, your Honor.

7 We would call to the stand, Mr. Steve
8 Larson.

9 ARBITRATOR DREHER: And Mr. Larson, you
10 are still under oath.

11 STEVE LARSON,
12 having previously been sworn, was examined and
13 testified as follows:

14 DIRECT EXAMINATION

15 BY MR. DRAPER:

16 Q Mr. Larson, there has been some
17 reference to the Modeling Committee -- joint modeling
18 committee of the States involved with the development
19 of the RRCA Groundwater Model and accounting
20 procedures.

21 Were you a member of that committee?

22 A Yes, I was.

23 Q Was it clear to you that the model, the
24 groundwater model, has nonlinear features related to
25 stream depletions?

1 A Yes, it was. There were several
2 nonlinear features in the model that were, in my
3 view, pretty obvious. And one of them -- that is,
4 the changes in saturated thickness with changes in
5 water levels -- there were some idealizations made,
6 primarily for computational stability reasons, to at
7 least linearize that feature; but there were other
8 nonlinear features that were pretty obvious.
9 Evapotranspiration, function is a method of piecewise
10 linear; but, overall, similiarly the rain is
11 nonlinear, similarly the stream-drying-sort-of
12 feature, if you will, is a piecewise linear feature
13 as well.

14 Q I would like to refer you now to what
15 has been marked at Kansas Exhibit 28
16 entitled "Kansas's Expert Response to Nebraska's
17 Expert Report, 'Estimating Computed Beneficial Use
18 for Groundwater and Imported Water Supply under the
19 Republican River Compact," prepared by David
20 Barfield, Steve Larson and Dale Book, dated
21 February 17, 2009.

22 Do you have a copy of Exhibit 28?

23 A Yes, I do.

24 Q First of all, I would like to provide to
25 the parties and to the Arbitrator two replacement

1235

1 figures, Figure 2 and Figure 5, of this report. I
2 believe Mr. Book will be the one to explain what the
3 corrections were on these two figures.

4 So with that, I would ask you,
5 Mr. Larson, to generally describe the report and
6 summarize the analysis and conclusions that you and
7 Mr. Book and Mr. Barfield have included in this
8 report.

9 A The first several sections cover some of
10 the background material, some of which have been
11 discussed already.

12 Section III gets into some of the
13 accounting procedures, as well as Section IV.
14 Mr. Barfield or Mr. Book are really the ones to
15 address those issues.

16 When we get into Section V, there is
17 discussions then about issues related to the proposed
18 changes to the accounting procedures by Nebraska.

19 MR. DRAPER: I think your mic may have
20 just gone off.

21 (Discussion off the record.)

22 A Section V discusses some of the concerns
23 about the proposed changes to the accounting
24 procedures and I might just highlight a few of them
25 with respect to our evaluation of that proposal.

1 I think, to begin with, we have to be
2 careful about what we call error. Error, in the way
3 I sort of look at it, is that if you have a, say,
4 known or measured value of something, and you compare
5 an estimate to that value, that difference, I would
6 say, could be construed to be an error. Or if there
7 was a specific mistake that was made, I would
8 consider that to be an error.

9 I think -- well, in this case, I don't
10 see that there is an error in that the values we are
11 trying to get at in terms of the use of the RRCA
12 Groundwater Model are the estimated depletions caused
13 by pumping and the estimated values of the impacts to
14 streamflows associated with imported water. And
15 those values are not known so there is not a
16 mechanism that we can compare to those and determine
17 that there is, in fact, an error.

18 So I think the first thing that we have
19 to be cautious about is what we call error or what is
20 simply a difference between estimates.

21 Secondly, I think we have touched on it
22 some already, but the RRCA Groundwater Model does
23 have nonlinear features. And those features, and
24 that fact, I think, it's very obvious that when you
25 look at computing the groundwater depletions and the

1 imported water supply credit, if you add them up,
2 that they may not add up to the effect that you might
3 get by looking at alternative run where you turn
4 everything off. They just may not add up.

5 And I think that was obvious to me,
6 anyway, as we went forward in this process.

7 We have prepared a figure to show --
8 this is Figure 6 at the back of our report -- to
9 illustrate the degree of those differences between
10 what you would get if you added up the impacts as
11 they are accounted by the procedure that is in the
12 FSS, as opposed to the total you would get by looking
13 at all-on versus all-off calculation with the model.

14 And this illustrates, over time, how
15 those differences vary as a percentage of the total
16 effect as calculated by the groundwater model.

17 And you can see that as a percentage of
18 the total, they vary from as much as plus 3 percent
19 to minus 4 percent, and they generally go up and down
20 over time.

21 That was the condition, or at least up
22 until the year 2000, was the condition associated
23 with the model as it was -- as it was approved as
24 part of the FSS process.

25 So that was a known condition of the

1 model, given the fact that it is nonlinear and, at
2 least in some areas, it will respond nonlinearly and,
3 therefore, that sum won't necessarily -- the sum of
4 the impact won't necessarily add up to the impact
5 that you might calculate by looking at the all-on
6 verse all-off condition.

7 ARBITRATOR DREHER: Which Figure are you
8 referring to, Mr. Larson?

9 THE WITNESS: I was referring to the
10 last figure, should be labeled "Figure 6."

11 ARBITRATOR DREHER: All right, thank
12 you.

13 Q (BY MR. DRAPER) And again, just before
14 we leave Figure 6, could you restate your conclusion
15 that can be drawn from this Figure.

16 A Well, the first thing is you can see
17 that there are differences in the period prior to
18 2000, which is the time at which the model
19 development occurred and the decisions were made in
20 the FSS and the modeling report were made. So those
21 effects were there in terms of the model that was --
22 and the procedures that were actually approved.

23 The second thing is you can see that
24 they do vary up and down over time. As a percentage
25 of the overall total impact, there are relatively

1 small amounts.

2 And I think, as we go in, then, to
3 Section VI of the report, we discuss the imported
4 water supply credit. Specifically, this is a -- in
5 our view, the proposed change does have a significant
6 impact on the calculation of the imported water
7 supply credit.

8 And to provide some context to that
9 calculation, we have prepared a map, which is the
10 first Figure in our report.

11 And the purpose of showing this map is
12 to illustrate where this amount of imported water,
13 infiltration of the groundwater occurs. It occurs
14 along the very northern perimeter of the model domain
15 up near the Platte River. It's a fairly significant
16 amount of water, when you look at the volume of it.

17 As we describe in the -- in our report
18 at the top of page 8, we are talking about water
19 amounts that are on the order of 500- to 600,000
20 acre-feet per year. Most, if not -- well, most of
21 this water, because of the proximity of where it is
22 in the model domain going back to the Platte River, a
23 relatively small amount influences flows within the
24 Republican River Basin and streamflows within the
25 Republican River Basin.

1 So, it was important, from my
2 perspective anyway, to be sure that when those
3 impacts were calculated, they were calculated using
4 actual, or as nearly representative of actual
5 groundwater conditions as we could use. And that
6 would be the historical condition associated with the
7 pumping conditions being on in the system, that they
8 would be the most representative condition in terms
9 of water levels.

10 So it was important for me, and I
11 believe for the State of Kansas, that those
12 determinations of that credit be made with the --
13 with the pumping on.

14 And that's -- and it's specified as that
15 within the FSS and in the modeling report.

16 Q What is the impact if the pumping is not
17 on?

18 A I'm sorry, would you repeat that?

19 Q What is the -- you said it was
20 important, from your point of view, to be sure that
21 this imported water supply credit was assessed with
22 the pumping on.

23 What is the -- what is the effect of
24 turning the pumping off, as proposed by Nebraska?

25 A Well, when you assess that effect with

1 the pumping off, you are assessing it with
2 groundwater levels that are higher than the
3 groundwater levels that actually occur. So you
4 estimate a greater effect of that imported water
5 supply on baseflow within the Republican River Basin.

6 Q Any further conclusions you would like
7 to note?

8 A I think those are the principal ones. I
9 think Mr. Barfield and Mr. Book will speak to some
10 other aspects of it. Our overall conclusions are
11 laid out at the end of the report.

12 Q Specifically, with respect to the
13 imported water supply credit, did you hear Professor
14 Ahlfeld testify that increases in the imported water
15 supply credit would not be any inherent
16 characteristic of Nebraska's proposed method to
17 change the accounting procedures?

18 Do you agree with that statement?

19 A No, I don't. I think our analyses,
20 especially of looking forward in the future, would
21 indicate that it's uniformly increasing the imported
22 water supply credit. And that occurred, both under
23 the proposed remedy condition -- the proposed Kansas
24 remedy analysis, as well as under the baseline
25 condition.

1 So my -- my conclusion is that that is
2 -- that the proposal will increase, not uniformly
3 from year to year but, as a general matter, increase
4 the imported water supply credit.

5 Q Do you have an opinion as to why that is
6 the case?

7 A Well, the reason is, when you -- when
8 you look at the alternative condition without the
9 pumping on, the groundwater levels are higher than
10 they would be under the historical condition, and,
11 therefore, you will estimate a greater impact
12 associated with that water than you would with the
13 pumping on.

14 Q And are those relatively significant
15 impacts, in your opinion?

16 A They are significant differences between
17 the estimates under the two different conditions.

18 MR. DRAPER: No further questions, Your
19 Honor.

20 ARBITRATOR DREHER: Let me inquire a
21 little bit about the imported water supply credit.
22 And maybe there is something I don't understand here.

23 But on page 7 of your report, in the
24 last paragraph, beginning with the second-to-last
25 sentence, this statement is made "The diversions

1 occur over a reach of 20 miles on the Platte River
2 amounting to more than 2 million acre-feet per year.
3 The lands irrigated with this supply total
4 120,000 acres near the topographic divide between the
5 Republican and Platte River Basins."

6 Is my understanding correct that this
7 means that, on average, more than 2 million acre-feet
8 per year are being diverted to irrigate 120,000-acre?

9 THE WITNESS: I believe there may be a
10 typo. It should be 141,000, and someone like
11 Mr. Barfield or Mr. Book could speak to the quantity
12 more specifically.

13 But my understanding is that looking at
14 the losses that we are dealing with at 400- to
15 500,000 per acre-feet per year, that that is
16 associated with the significant diversions.

17 ARBITRATOR DREHER: Because using
18 120,000 acres, which I think you said may be an
19 error, I calculate a diversion of 17 acre-feet per
20 acre, which seems rather excessive.

21 THE WITNESS: Yes. And I don't think I
22 -- I can't really speak to that quantity.

23 My understanding is that the numbers
24 that are provided in the RRCA Groundwater Model for
25 the losses are on the order of 600,000 -- 500-,

1 600,000 acre-feet per year, those are the amounts of
2 loss from the canal. So I would assume significant
3 amounts of diversions would be required to be
4 associated with those losses. But I can't really
5 speak to the application of that water in that area.

6 ARBITRATOR DREHER: But assuming that --
7 and I realize this isn't necessarily Kansas' problem.

8 But assuming there are losses of 500,000
9 to 600,000 acre-feet a year, and subtracting those
10 out, it still results in a diversion amount of 10 to
11 12 acre-feet per acre, which is pretty generous, it
12 seems like.

13 THE WITNESS: I would agree with you,
14 and I don't have an explanation for that.

15 ARBITRATOR DREHER: Okay.

16 Turning back to what the committee that
17 developed the model was or was not thinking, am I to
18 conclude from what you have stated that the Modeling
19 Committee did not assume that the superposition would
20 hold?

21 THE WITNESS: Well, I can speak from my
22 perspective. And I certainly didn't expect it to
23 hold entirely. I think, in large part, it does, but
24 not entirely because of the nonlinear features of the
25 model.

1 ARBITRATOR DREHER: But as you went
2 through the nonlinear features, most of them were
3 relatively minor compared with the nonlinear response
4 that Nebraska is highlighting here; is that correct?

5 THE WITNESS: In certain areas, it's
6 larger. I think when you look at it overall, as we
7 showed in Figure 6, in terms of the percentage
8 difference overall, it isn't that large. In some
9 areas, obviously, it can be larger.

10 ARBITRATOR DREHER: Let me make sure I
11 understood Figure 6.

12 What you did is you took the sum of the
13 individual impacts and for a given year, you
14 subtracted from the sum of the individual impacts the
15 simultaneous impacts. And then you divided that
16 difference by the sum of the individual impact and
17 multiplied by a hundred to calculate percentage?

18 THE WITNESS: That's correct.

19 ARBITRATOR DREHER: And then in the
20 purple line is a five-year average of those
21 calculations?

22 THE WITNESS: That's correct. So you
23 can sort of track how it goes over time.

24 ARBITRATOR DREHER: Is it my imagination
25 or does the five-year average seem to be trending

1 upwards?

2 THE WITNESS: It would look like there
3 is a slight upward trend over that period. I don't
4 know if it would continue as you go into the future;
5 but, yes, it does seem to be trending upward
6 slightly.

7 ARBITRATOR DREHER: Do you have an
8 explanation as to why that might be, or is it maybe
9 just because we are only looking at 30 -- 32 years,
10 more or less, of history, as opposed to something
11 longer?

12 THE WITNESS: That; and you will note
13 that sort of at the beginning, I have got some
14 significantly low periods or low values and toward
15 the end, I have got the higher values. And that
16 tends to tilt it some, at least over that period of
17 time.

18 ARBITRATOR DREHER: Do these differences
19 seem to be greater when water supplies are lower? Or
20 do you know?

21 THE WITNESS: I don't know offhand. No,
22 I don't know offhand.

23 ARBITRATOR DREHER: That's all I have.

24 I don't know how much cross Nebraska
25 has.

1 MR. BLANKENAU: A fair amount. I would
2 suggest that we begin fresh in the morning, but we
3 would ask that we could start, perhaps a half hour
4 early tomorrow, at 8:30.

5 ARBITRATOR DREHER: With the goal being
6 to try to complete tomorrow?

7 MR. BLANKENAU: Correct.

8 ARBITRATOR DREHER: Is that the idea?

9 Well, I'm certainly not opposed to
10 completing tomorrow, that's not my concern; but I am
11 concerned if we go into tomorrow with that as an
12 expectation, that we may rush through things.

13 MR. BLANKENAU: And I share that
14 concern. I think we have to be somewhat flexible, we
15 propose to go into Thursday, if need be. With any
16 luck, we will finish tomorrow. If not, we will go
17 into -- speaking for Nebraska -- Thursday.

18 ARBITRATOR DREHER: The reason I'm
19 wondering, I mean, I -- we had been starting at 9:00
20 pretty regularly, and so I tentatively have made
21 plans for an early morning meeting, but I can cancel
22 those. You have my attention.

23 MR. BLANKENAU: If it works better for
24 you to start at 9:00, that is fine as well. We can
25 have a shorter lunch, if need be as well.

1 MR. AMPE: And actually try and take
2 five-minute breaks.

3 MR. BLANKENAU: And adhere to the break
4 time would be helpful.

5 ARBITRATOR DREHER: All right.

6 Well, let's adjourn for day and we will
7 start again at promptly at 9:00 and see how far we
8 can get.

9 MR. BLANKENAU: Thank you.

10 (WHEREUPON, the hearing recessed at 4:40
11 p.m. to be continued Wednesday March 18, 2009, at
12 9:00 a.m.)

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CERTIFICATE

I, Carol Patterson, Registered Merit 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
Carol Patterson
Registered Merit Reporter