

NON-BINDING ARBITRATION BEFORE  
JEFFREY C. FEREDAY, ARBITRATOR

INITIATED PURSUANT TO FINAL SETTLEMENT STIPULATION  
Kansas v. Nebraska & Colorado  
NO. 126, ORIG., U.S. SUPREME COURT  
DECREE OF MAY 29, 2003, 538 U.S. 720

N-CORPE AUGMENTATION PLAN  
(Arbitration Initiated July 10, 2013)

DEPOSITION OF DR. WILLEM SCHREUDER

PURSUANT TO NOTICE, the above-entitled  
deposition was taken on behalf of the State of  
Kansas at 1313 Sherman Street, Denver, Colorado  
80203, on February 21, 2014, at 9:03 a.m., before  
Angela Smith, Professional Reporter and Notary  
Public.

<p style="text-align: right;">2</p> <p>1 APPEARANCES:</p> <p>2 Telephonically for the State of Nebraska:</p> <p>3 JUSTIN D. LAVENE, ESQ.</p> <p>4 Nebraska Attorney General's Office</p> <p>5 2115 State Capitol</p> <p>6 Lincoln, Nebraska 68509</p> <p>7 justin.lavene@nebraska.gov</p> <p>8</p> <p>9 - and -</p> <p>10 TOM WILMOTH, ESQ.</p> <p>11 Blankenau Wilmoth Jarecke, LLP</p> <p>12 206 South 13th Street, Suite 1425</p> <p>13 Lincoln, Nebraska 68508</p> <p>14 402-475-7080</p> <p>15</p> <p>16 For the State of Colorado:</p> <p>17 SCOTT STEINBRECHER, ESQ.</p> <p>18 State of Colorado, Department of Law</p> <p>19 1300 Broadway, 7th Floor</p> <p>20 Denver, Colorado 80203</p> <p>21 720-508-6287</p> <p>22 Scott.steinbrecher@state.co.us</p> <p>23</p> <p>24 Telephonically for the State of Kansas:</p> <p>25 CHRISTOPHER M. GRUNEWALD, ESQ.</p> <p>120 Southwest 10th Avenue, 3rd Floor</p> <p>Topeka, Kansas 66612-1597</p> <p>785-368-8424</p> <p>chris.grunewald@ksag.org</p> <p>EXAMINATION INDEX</p> <p>By Mr. Grunewald Page 4</p>	<p style="text-align: right;">4</p> <p>1 PROCEEDINGS</p> <p>2 WHEREUPON, the following proceedings</p> <p>3 were taken pursuant to the Federal Rules of Civil</p> <p>4 Procedure:</p> <p>5 * * * * *</p> <p>6 (Deposition Exhibits 1 and 2 were</p> <p>7 marked for identification.)</p> <p>8 DR. WILLEM SCHREUDER,</p> <p>9 having been first duly sworn to state the whole</p> <p>10 truth, testified as follows:</p> <p>11 EXAMINATION</p> <p>12 BY MR. GRUNEWALD:</p> <p>13 Q Good morning, Dr. Schreuder.</p> <p>14 A Good morning, Mr. Grunewald.</p> <p>15 Q Now, I'll do my best to speak up and</p> <p>16 also not talk over you, since we're doing this over</p> <p>17 the phone. And if you're having any problems</p> <p>18 hearing me or need to clarify something, please</p> <p>19 interrupt me and let me make sure we get your</p> <p>20 answers complete.</p> <p>21 Does that sound okay?</p> <p>22 A Yes.</p> <p>23 Q And you've been deposed before, right?</p> <p>24 A I have.</p> <p>25 Q So is there any reason that you can't</p>
<p style="text-align: right;">3</p> <p>1 EXHIBIT INDEX</p> <p>2 FOR IDENTIFICATION INITIAL REFERENCE</p> <p>3 Deposition Exhibit 1 7</p> <p>4 Notice of Deposition</p> <p>5 Deposition Exhibit 2 7</p> <p>6 Joint Expert Rebuttal Report</p> <p>7</p> <p>8</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">5</p> <p>1 give complete and truthful answers here this</p> <p>2 morning?</p> <p>3 A Other than lack of sleep, none that</p> <p>4 I'm aware of.</p> <p>5 Q Well, then we're both suffering from</p> <p>6 the same handicap.</p> <p>7 What -- we're here today in response</p> <p>8 to -- we had -- Kansas had a notice of deposition,</p> <p>9 and that notice requested that you provide any</p> <p>10 backup materials supporting your joint expert report</p> <p>11 that was filed on February 7th, 2014. And I believe</p> <p>12 that there is one transmittal that relates to that,</p> <p>13 and so I was hoping you could explain what it is</p> <p>14 that was provided.</p> <p>15 A The materials we provided is simply a</p> <p>16 graphical depiction of the information that was</p> <p>17 provided to us by Kansas.</p> <p>18 Q Thank you.</p> <p>19 Could you -- and I want to make</p> <p>20 sure -- this could be getting caught up in an</p> <p>21 unintended difference. I received this transmittal</p> <p>22 two times. And, Dr. Schreuder, you referred to it</p> <p>23 as backup. I received it from counsel,</p> <p>24 Mr. Steinbrecher, as well, and he referred to it as</p> <p>25 a disclosure. It could be an unintended difference.</p>

<p style="text-align: right;">6</p> <p>1 I tend to think of a disclosure as</p> <p>2 meaning a new opinion. And so I just wanted to get</p> <p>3 at exactly what this is.</p> <p>4 Is this backup material to some</p> <p>5 portion of your already disclosed opinions, in which</p> <p>6 case we could tie it to your report, or is it</p> <p>7 something else?</p> <p>8 So could you shed some light on that.</p> <p>9 A It's energy I referred to in my</p> <p>10 report. So I don't consider this a disclosure of a</p> <p>11 new opinion.</p> <p>12 Q Great. Maybe you can take me -- since</p> <p>13 we've got this material here, is it referred to in</p> <p>14 one spot in your report or several spots in your</p> <p>15 report?</p> <p>16 A I'd have to review the report to</p> <p>17 remember if I referred to it under multiple</p> <p>18 occasions. I think it's primarily referred to in</p> <p>19 the context of the transit losses. And I don't --</p> <p>20 so I think there are multiple references to it in</p> <p>21 the report.</p> <p>22 Q Okay.</p> <p>23 MR. GRUNEWALD: And for the record, I</p> <p>24 apologize for forgetting to point out that we should</p> <p>25 be using the deposition notice. It should be marked</p>	<p style="text-align: right;">8</p> <p>1 pertinent reference is in section IV.</p> <p>2 Q And that's the section titled Method</p> <p>3 of Calculating Transit Loss?</p> <p>4 A Correct.</p> <p>5 Q And the transmittal appears to have</p> <p>6 four graphs -- four line graphs -- and, Doctor,</p> <p>7 please correct my terminology as appropriate -- and</p> <p>8 a bar chart or a graph is the fifth page of the five</p> <p>9 pages.</p> <p>10 So can you tell me, then, if you have</p> <p>11 to distinguish between the particular pages you've</p> <p>12 got here, what are they referring to in this</p> <p>13 Section IV?</p> <p>14 A Well in Section IV, I simply provide</p> <p>15 sort of the summary result of this, which is the</p> <p>16 magnitude of the transit loss as calculated by</p> <p>17 Kansas, or at least, I should say, reported by</p> <p>18 Mr. Larson and Dr. Perkins. And so the bar graph at</p> <p>19 the end is -- and by the way, I'm fine with the</p> <p>20 terminology of a line graph and bar graph.</p> <p>21 The bar graph at the end sort of shows</p> <p>22 the bottom-line numbers that is reported in</p> <p>23 Section IV.</p> <p>24 Q Thank you.</p> <p>25 So the numbers that are used or are</p>
<p style="text-align: right;">7</p> <p>1 as Exhibit 1, if it hasn't been already, and your</p> <p>2 joint expert rebuttal report marked as Exhibit 2.</p> <p>3 Let me just pause here and see if the</p> <p>4 court reporter has already marked those.</p> <p>5 MR. STEINBRECHER: Yes. We have</p> <p>6 marked those, Chris.</p> <p>7 MR. GRUNEWALD: Thank you.</p> <p>8 Q (By Mr. Grunewald) Dr. Schreuder, I</p> <p>9 think what I'd like to do is to make sure I</p> <p>10 understand what you've sent here, since I've only</p> <p>11 had it for a very short time. If you can take</p> <p>12 Exhibit 2, which is your report, and at least point</p> <p>13 me to the large sections, if it's limited to one of</p> <p>14 those sections, and then we can start to make sure I</p> <p>15 understand what it's connected to.</p> <p>16 Just for reference, I know that there</p> <p>17 appear to be seven major sections of the joint</p> <p>18 report called out by Roman numerals. So I'd like to</p> <p>19 start with trying to get it tied to one of those</p> <p>20 Roman numerals or multiple ones, if that's</p> <p>21 appropriate.</p> <p>22 A Is that a question?</p> <p>23 Q I started up with, can you link it to</p> <p>24 any one of those sections or is it multiple?</p> <p>25 A Well, I would think that the most</p>	<p style="text-align: right;">9</p> <p>1 depicted on this material you've provided, where do</p> <p>2 those numbers come from?</p> <p>3 A Sorry, which materials are we talking</p> <p>4 about, the report or the figures?</p> <p>5 Q We're talking about your figures. And</p> <p>6 is it right to call five of these pages of the new</p> <p>7 material here, is it fair to call all of those</p> <p>8 figures?</p> <p>9 A Yeah. I think of them as figures.</p> <p>10 Q So for -- let's just focus on the</p> <p>11 figures then. The numbers -- and please feel free</p> <p>12 to clarify. I don't know if it's fair to say these</p> <p>13 are results or numbers. But what's being depicted</p> <p>14 on the figures, where did those numbers or</p> <p>15 calculations come from?</p> <p>16 A They are summaries of the analyses</p> <p>17 that were performed by Dr. Perkins and Mr. Larson.</p> <p>18 Q And so were they pulled from model</p> <p>19 output?</p> <p>20 A That's correct, yes.</p> <p>21 MR. GRUNEWALD: And when I refer to</p> <p>22 "model," just for the record, I'll note here there</p> <p>23 are a couple of terms and acronyms. I'll try and</p> <p>24 take care of them here and now for the record. The</p> <p>25 deposition here is for an arbitration for an</p>

<p style="text-align: right;">10</p> <p>1 augmentation plan for the Nebraska Cooperative 2 Republican Platte Enhancement project, which the 3 first part of that is N-CORPE project. 4 And this is in the Republican River 5 Basin. And there is the Republican River Compact 6 Administration, which I may refer to as RRCA. 7 Q (By Mr. Grunewald) And this is an RRCA 8 groundwater model; is that right, Dr. Schreuder? 9 A Yes. 10 Q And so that's the model we were just 11 talking about here, correct? 12 A Well, actually, we were talking about 13 a specific application of that model that was run by 14 Dr. Perkins and Mr. Larson. But otherwise, correct, 15 yes. 16 Q Fair enough. And I think where I was 17 is that you had said, I believe, that these were -- 18 your figures present summaries of analyses of 19 results from Mr. Larson and Dr. Perkins. And I 20 wanted to confirm that the analyses of Mr. Larson 21 and Dr. Perkins were results from the model. 22 And so does that all sound right? 23 A I think that's a fair 24 characterization, yes. 25 Q So did you do any independent runs of</p>	<p style="text-align: right;">12</p> <p>1 I submitted. I don't recall what the date was. 2 Q And as far as you know, it was 3 submitted on the date that it was due for Colorado? 4 A That's my recollection, yes. 5 Q Now, if we could just get back to when 6 these figures were created. Was this before or 7 after the report was submitted? 8 A It was before the report was 9 submitted. 10 Q And why wasn't this material provided 11 before? 12 A It's simply backup material that I 13 used to arrive at the numbers that I requested in my 14 report. I didn't think it was necessary to actually 15 attach this to the report, per se. 16 Q And so why is it being provided now? 17 A Because you asked for it. 18 Q So you think that you only had to 19 provide the material because a request was made for 20 the backup? 21 MR. STEINBRECHER: Chris, I'm going to 22 object. Calling for a legal conclusion. 23 Q (By Mr. Grunewald) Dr. Schreuder, did 24 you understand that when you prepared your report, 25 backup material was to be provided at that time?</p>
<p style="text-align: right;">11</p> <p>1 the model yourself for those figures? 2 A Not for those figures, no. 3 Q And that's true for all five of the 4 figures; is that right? 5 A That's correct, yes. 6 Q Now, in terms of you disclosing this 7 now, was this material that was ready to provide at 8 the time your report was filed on February 7th? 9 A I'm not understanding the question. 10 Q When were these figures created? 11 A I don't recall the exact date. 12 Q Do you know if it was before or after 13 February 7? 14 A Was February 7 when the report was 15 completed? 16 Q It's not often you get to ask 17 questions, but yes. 18 A I'm sorry. I don't see a date on the 19 report. Yes, I quoted the results of these figures 20 in my report. So, yes, it was before then. 21 Q Well, perhaps we should confirm for 22 the record, is the joint expert report marked as 23 Exhibit 2, was that the report submitted by yourself 24 and Colorado on February 7, 2014? 25 A This is the joint rebuttal report that</p>	<p style="text-align: right;">13</p> <p>1 A I don't recall what the specific 2 agreement in this case requires. 3 Q So you don't understand right now 4 whether or not it was required; is that right? 5 A I don't recall whether there was a 6 specific requirement that additional -- any other 7 backup material was required or not. 8 Q You don't understand -- sorry. 9 You don't recall whether or not it was 10 required before; is that what you're saying? 11 A I haven't read the agreement. So I 12 don't know exactly what the State's agreed to, as 13 far as making these materials available or not. 14 Q And that's as of right now, sitting 15 here, you don't understand what's required; is that 16 right? 17 A Well, I haven't read the agreement. 18 My knowledge of the agreement is based on, for 19 example, my participation in previous depositions 20 and noting, for example, that Kansas didn't provide 21 all of the information that they have testified in 22 their deposition. 23 So I didn't receive any specific 24 instructions as to the need to provide any 25 additional information, until I received the</p>

<p style="text-align: right;">14</p> <p>1 deposition notice.</p> <p>2 Q Okay. Thank you. Now, we talked</p> <p>3 about the figures relating to Section IV. Are there</p> <p>4 any other sections that they relate to?</p> <p>5 A Well, Section IV provides a</p> <p>6 quantification of the transit losses. There are</p> <p>7 discussion of transit losses in other places. So</p> <p>8 it's relevant to any of those places where those</p> <p>9 discussions would occur.</p> <p>10 But the specific quantification is</p> <p>11 summarized in Section IV.</p> <p>12 Q Okay. Thank you.</p> <p>13 All right. I'd like to go back</p> <p>14 earlier in your report. I'm going to try to ask you</p> <p>15 some questions marching through the report. And</p> <p>16 bear with me, we may have to go back a couple of</p> <p>17 times.</p> <p>18 If you'd turn to page 1, I'd</p> <p>19 appreciate it.</p> <p>20 A Okay.</p> <p>21 Q And, actually, I should ask a couple</p> <p>22 more general questions, just to understand how the</p> <p>23 report came together.</p> <p>24 Were you present for Mr. Wolfe's</p> <p>25 deposition that we did yesterday?</p>	<p style="text-align: right;">16</p> <p>1 A That's correct, yes.</p> <p>2 Q And no one else?</p> <p>3 A Not that I can think of offhand. But</p> <p>4 not that I recall.</p> <p>5 Q Now, did you conduct any model runs,</p> <p>6 any independent model runs of your own for any part</p> <p>7 of the report?</p> <p>8 A No. No.</p> <p>9 Q Did you conduct any model runs at all</p> <p>10 regarding the N-CORPE project, as you were preparing</p> <p>11 this report?</p> <p>12 A No.</p> <p>13 Q And is it possible to conduct model</p> <p>14 runs regarding analysis of putting augmentation</p> <p>15 water into Medicine Creek?</p> <p>16 A Is it possible, yes.</p> <p>17 Q Okay. If we can look on page 1 under</p> <p>18 the heading Transit Loss. Do you see that section?</p> <p>19 A Yes.</p> <p>20 Q There's a sentence that's ending the</p> <p>21 page. Do you see it there? It begins "The RRCA."</p> <p>22 A The RRCA Groundwater Model (Model) is</p> <p>23 not informed of any surface water diversions, tail</p> <p>24 water, reservoir releases, or any other surface</p> <p>25 water operations."</p>
<p style="text-align: right;">15</p> <p>1 A No.</p> <p>2 Q So I just thought there might be an</p> <p>3 easier way to move things along. So bear with me as</p> <p>4 I try to make sure I understand who put the report</p> <p>5 together and how many people were involved. I'd</p> <p>6 just like to focus on that for a moment.</p> <p>7 Who drafted the text of this report?</p> <p>8 A Mr. Wolfe and I.</p> <p>9 Q And did anyone else, besides you two,</p> <p>10 draft the text?</p> <p>11 A No. I mean, we had input from others,</p> <p>12 but we drafted it.</p> <p>13 Q And so you both would be the primary</p> <p>14 authors of this report?</p> <p>15 A Yes.</p> <p>16 Q In fact, the two of you would be the</p> <p>17 only authors of the report; is that right?</p> <p>18 A Correct.</p> <p>19 Q And aside from writing the text, who</p> <p>20 else assisted you and Mr. Wolfe in putting the</p> <p>21 report together?</p> <p>22 A Well, we had counsel review it. I</p> <p>23 think Mr. Sullivan might also have reviewed it. I'm</p> <p>24 not sure.</p> <p>25 Q Mr. Mike Sullivan?</p>	<p style="text-align: right;">17</p> <p>1 Is that what you're referring to?</p> <p>2 Q That's right. I take it, from your</p> <p>3 reading that, that you see it.</p> <p>4 A Sorry. Yes. Yes.</p> <p>5 Q Sorry. That's just the lack of sleep.</p> <p>6 I appreciate you reading it into the record. I did</p> <p>7 want to ask about it.</p> <p>8 Now, there was a phrase in the first</p> <p>9 part that says "model is not informed." Could you</p> <p>10 tell me what you mean there by "informed"?</p> <p>11 A In the RRCA groundwater model, when we</p> <p>12 run the model for either the calibration or for the</p> <p>13 annual updates, the surface water diversions, tail</p> <p>14 waters, reservoir releases and all of those kinds of</p> <p>15 information is not -- the groundwater -- those are</p> <p>16 not inputs to the groundwater model.</p> <p>17 Q When you say "other surface water</p> <p>18 operations," there that straddle pages 1 and 2, what</p> <p>19 would fall into that category?</p> <p>20 A I think that was just sort of a</p> <p>21 catchall to -- if I can think of another surface</p> <p>22 water operation, other than diversions, tail water</p> <p>23 releases, or reservoir releases that I haven't</p> <p>24 thought of yet. Things, perhaps, like reservoir</p> <p>25 evap or anything else that shows up in the</p>

<p style="text-align: right;">18</p> <p>1 accounting, the groundwater model isn't made aware 2 of that.</p> <p>3 Q So the phrase "any other surface water 4 operations" was intended to cover things you hadn't 5 thought about yet, and you were sure that they're 6 not in the model. Is that what you're saying?</p> <p>7 A No. Other than the things that I've 8 previously enumerated, specifically diversions, tail 9 water, reservoir releases.</p> <p>10 Q So the things you have thought about 11 for that phrase are reservoir evaporation and what 12 else?</p> <p>13 A Well, reservoir is just another term 14 that -- or surface water term that I didn't 15 specifically enumerate. I'd have to look at the 16 accounting again to see what other things we include 17 in those calculations that the groundwater model is 18 not informed of.</p> <p>19 Q Now, Colorado has an augmentation 20 proposal called the Colorado Compact Compliance 21 Pipeline; is that right?</p> <p>22 A Yes.</p> <p>23 Q And it has a pipeline which discharges 24 groundwater that's been pumped, and discharges it 25 into the north fork of the Republican River; is that</p>	<p style="text-align: right;">20</p> <p>1 A Give me a minute to read the previous 2 sentence. I haven't done that yet.</p> <p>3 So can you ask me the question again, 4 now that I've read the sentence.</p> <p>5 MR. GRUNEWALD: Sure. Can the 6 reporter read it back?</p> <p>7 (The question beginning on page 19, 8 line 10 was read.)</p> <p>9 A Yeah. I think that mischaracterizes 10 what these two sentences say. The sentences 11 specifically say that it has been Colorado's 12 consistent position that pipeline -- the outflow 13 from the pipeline is surface water and it should be 14 treated like any other surface water.</p> <p>15 And any other surface water, how we 16 treat things like surface water diversions, tail 17 water, reservoir releases add to that, perhaps, 18 evap, any of those things, the groundwater model is 19 not informed of. And that's the scientifically 20 correct way to represent these things.</p> <p>21 Q (By Mr. Grunewald) And is there a 22 temporary agreement regarding the compact compliant 23 pipeline and the RRCA for the year 2014?</p> <p>24 A Yes, there is.</p> <p>25 Q And in following the accounting</p>
<p style="text-align: right;">19</p> <p>1 right?</p> <p>2 A That's correct.</p> <p>3 Q Is that the sort of other surface 4 water operations you were intending to cover by that 5 phrase?</p> <p>6 A Well, I wasn't specifically thinking 7 of that, but I have consistently argued that that is 8 a surface water outflow that the model should not be 9 informed of.</p> <p>10 Q You know, I took the two sentences 11 here, the first sentence in this section and then 12 the sentence that we've been discussing here, I took 13 them together to mean Colorado has an augmentation 14 plan that delivers water from a pipeline, and that's 15 the sort of thing that the model is not informed of. 16 Is that what you meant?</p> <p>17 A Are you now referring to the previous 18 sentence there?</p> <p>19 Q I'm trying to make sense of why the 20 two sentences are next to each other.</p> <p>21 A Well, I'm just trying to figure out 22 which sentences we are talking about. Is this the 23 first two sentences under the section of Transit 24 Loss?</p> <p>25 Q That's correct.</p>	<p style="text-align: right;">21</p> <p>1 procedures in that agreement, will the model be 2 informed of the augmentation pipeline discharge?</p> <p>3 A Yes. In that particular instance, 4 Colorado compromised to actually add some of those 5 surface models to the water, even though we think 6 that scientifically that is not the appropriate 7 measure.</p> <p>8 Q If we could turn to page 3, I'd 9 appreciate it. Let me know when you're there.</p> <p>10 A Yes.</p> <p>11 Q There is a section in the middle of 12 the page titled Location of Delivery. Do you see 13 it?</p> <p>14 A Yes.</p> <p>15 Q In the first paragraph there, the last 16 sentence, it refers to a delivery point. Do you see 17 that sentence? The sentence begins "This is further 18 evidenced by." If you could read the sentence and 19 let me know when you're done.</p> <p>20 A Aloud or to myself?</p> <p>21 Q Either way.</p> <p>22 A "This is further evidenced by the fact 23 that the Kansas reports appear to disagree on the 24 delivery point and thus the amount of transit loss 25 as demonstrated below."</p>

<p style="text-align: right;">22</p> <p>1 Q Could you please describe what you</p> <p>2 meant by "delivery point"?</p> <p>3 A Well, if you calculate transit loss,</p> <p>4 in order to define what that transit loss is, you</p> <p>5 need to establish between which two points you will</p> <p>6 calculate that transit loss. The upstream end of</p> <p>7 that is consistent in all of these that it would be</p> <p>8 the location of the outflow from the N-CORPE</p> <p>9 pipeline.</p> <p>10 The disagreement seems to be to what</p> <p>11 point that transit loss should be charged.</p> <p>12 Q And are delivery points different from</p> <p>13 accounting points?</p> <p>14 A Well, the Kansas expert seemed to use</p> <p>15 different locations. I think they all -- all the</p> <p>16 different delivery points that were suggested by the</p> <p>17 Kansas experts corresponded to various accounting</p> <p>18 points that occurs elsewhere in the accounting.</p> <p>19 So, yes, they are different, but they</p> <p>20 also happen to be accounting points.</p> <p>21 Q Could transit losses be computed for</p> <p>22 stream uses above accounting points?</p> <p>23 A I'm not sure I follow the question.</p> <p>24 Could you clarify that.</p> <p>25 Q Would it be possible to compute</p>	<p style="text-align: right;">24</p> <p>1 talking about this case? That's where I'm</p> <p>2 struggling.</p> <p>3 Q Let's focus on this particular area,</p> <p>4 Medicine Creek. Can it be done?</p> <p>5 A Can you calculate the transit loss?</p> <p>6 Q Well, we can start generally there,</p> <p>7 sure. Is that possible?</p> <p>8 A Yes. Essentially, anything's</p> <p>9 possible.</p> <p>10 Q Sound like an optimist. I think we'll</p> <p>11 come back to this point. What I'd like to do here,</p> <p>12 let's go ahead and turn to page 5, if you could.</p> <p>13 And let me know when you're there.</p> <p>14 A I am there.</p> <p>15 Q Fourth paragraphs down on this page,</p> <p>16 if you could read that paragraph. And you can just</p> <p>17 read it to yourself. It begins, "The N-CORPE</p> <p>18 project pipeline." Do you see that?</p> <p>19 A I do.</p> <p>20 Q Just let me know when you're ready.</p> <p>21 A Okay.</p> <p>22 Q Now, in Medicine Creek, there are</p> <p>23 service water gauges; is that right?</p> <p>24 A Yes.</p> <p>25 Q Is there a service water gauge</p>
<p style="text-align: right;">23</p> <p>1 transit losses for portions of the stream reach</p> <p>2 above particular accounting points?</p> <p>3 A I'm really struggling with the</p> <p>4 question. Typically, transit losses, in the way</p> <p>5 that it's used generically in hydrology is used for</p> <p>6 -- associated with stream reaches. I'm struggling</p> <p>7 with how you're tying those to accounting points or</p> <p>8 not.</p> <p>9 Q And just so I follow what you're</p> <p>10 saying, generally associated with an entire stream</p> <p>11 reach, is that what you were trying to describe by</p> <p>12 the generic -- I think you said understanding, but</p> <p>13 please correct me if I misstated that.</p> <p>14 A Transit losses are generally</p> <p>15 associated with what's referred to as a reach, so</p> <p>16 between two different points. So what I'm</p> <p>17 struggling with is you're saying that there's a --</p> <p>18 can you do transit losses between points, and that's</p> <p>19 sort of a self-evident fact. So that's why I'm</p> <p>20 struggling with the question.</p> <p>21 Q And so you could pick points in</p> <p>22 between accounting points and determine transit</p> <p>23 losses; is that a fair characterization?</p> <p>24 A Are we talking in general? Are you</p> <p>25 talking about the Republican River Model? Are we</p>	<p style="text-align: right;">25</p> <p>1 downstream of the N-CORPE project discharge?</p> <p>2 A Yes.</p> <p>3 Q Is there more than one stream gauge</p> <p>4 downstream of the project discharge location?</p> <p>5 A Yes. I believe there are two gauges</p> <p>6 on Medicine Creek downstream of the discharge.</p> <p>7 Q And is one above or upstream from</p> <p>8 Harry Strunk Lake?</p> <p>9 A That's correct. Yes.</p> <p>10 Q And then there's another one</p> <p>11 downstream of the reservoir -- or lake?</p> <p>12 A That's my recollection, yes.</p> <p>13 Q How would you know how much of the</p> <p>14 discharge measured at the pipeline outfall actually</p> <p>15 reaches the downstream gauge?</p> <p>16 A How would you know?</p> <p>17 Q Yes.</p> <p>18 A Well, there are numerous experiments</p> <p>19 that you could conduct to try to estimate that.</p> <p>20 Q And what sort of experiments are you</p> <p>21 talking about?</p> <p>22 A Well, you could look at what the flow</p> <p>23 was prior to the pipeline operation. You can turn</p> <p>24 the pipeline on and see how much water shows up as a</p> <p>25 result of the operation of the pipeline.</p>

<p style="text-align: right;">26</p> <p>1           You can turn it back off again and see</p> <p>2   how it goes down. You can switch the pipeline on</p> <p>3   and off and look at the change in the gauge flow,</p> <p>4   and that could be a way that you can try to measure</p> <p>5   that.</p> <p>6       Q   Is the amount of change in gauge flow</p> <p>7   exactly the amount of water discharged from the</p> <p>8   pipeline outfall?</p> <p>9       A   We wouldn't know until we did the</p> <p>10   experiment.</p> <p>11       Q   So as of right now, when we look at</p> <p>12   changes in gauge flow, will we know how much of the</p> <p>13   augmentation flow is reaching the downstream gauge?</p> <p>14       A   I don't know if the pipeline's</p> <p>15   operating yet, so I can't answer that question.</p> <p>16       Q   Once the pipeline is operating, will</p> <p>17   we know how much of the augmentation flow is</p> <p>18   reaching the downstream gauge?</p> <p>19       A   And by "downstream gauge," which gauge</p> <p>20   are you referring to?</p> <p>21       Q   Let's start with the first one</p> <p>22   downstream.</p> <p>23       A   Well, the gauge gives you a</p> <p>24   measurement of what the flow is. The gauge doesn't</p> <p>25   tell you what the flow would have been absent the</p>	<p style="text-align: right;">28</p> <p>1   Republican River basins?</p> <p>2       A   Yes.</p> <p>3       Q   So it would be done for the Medicine</p> <p>4   Creek subbasin?</p> <p>5       A   That's correct, yes.</p> <p>6       Q   And is Nebraska proposing a change to</p> <p>7   the calculation of the virgin water supply for</p> <p>8   Medicine Creek?</p> <p>9       A   I don't have that in front of me, but</p> <p>10   I think that's correct, yes.</p> <p>11       Q   What's your recollection of what</p> <p>12   Nebraska is proposing?</p> <p>13       A   I believe what they do is to subtract</p> <p>14   the augmentation water supply from the virgin water</p> <p>15   supply.</p> <p>16       Q   If some of the augmentation water</p> <p>17   that's discharged from the pipeline outfall does not</p> <p>18   reach the downstream gauge used for the compact</p> <p>19   accounting, you disagree that that would have a</p> <p>20   negative impact on Kansas's allocation?</p> <p>21       A   Ask that again.</p> <p>22       MR. GRUNEWALD: Can the reporter read</p> <p>23   that back, please.</p> <p>24       (The pending question was read.)</p> <p>25       A   What do you mean by a "negative</p>
<p style="text-align: right;">27</p> <p>1   pipeline. So that's why I described the experiment</p> <p>2   the way I did.</p> <p>3       Q   And have you done any of those</p> <p>4   experiments with the N-CORPE project flow?</p> <p>5       A   No. I don't have any control over the</p> <p>6   N-CORPE flow to do those kinds of experiments.</p> <p>7       Q   Do you know if anyone's done those</p> <p>8   type of experiments?</p> <p>9       A   I do not know.</p> <p>10       Q   Did you ask anyone if anyone had done</p> <p>11   that sort of experiment?</p> <p>12       A   No.</p> <p>13       Q   I'd like to ask you a couple questions</p> <p>14   about compact accounting. Are you familiar with the</p> <p>15   RRCA accounting procedures?</p> <p>16       A   Generally, yes.</p> <p>17       Q   And I want to ask questions related to</p> <p>18   the N-CORPE proposal and the accounting procedures.</p> <p>19   And just let me know if we need to clarify some</p> <p>20   terms so that we're understanding each other.</p> <p>21       In the compact accounting, one of the</p> <p>22   things that's done is the determination of the</p> <p>23   virgin water supply; is that right?</p> <p>24       A   Yes.</p> <p>25       Q   And is that done for subbasins in the</p>	<p style="text-align: right;">29</p> <p>1   impact"?</p> <p>2       Q   (By Mr. Grunewald) Would Kansas'</p> <p>3   allocation be reduced in a situation where the</p> <p>4   augmentation water is being discharged compared with</p> <p>5   a situation where it's not, under Nebraska's</p> <p>6   proposed change in the accounting?</p> <p>7       A   Well, I'm struggling with the</p> <p>8   question, because there's just a whole bunch of</p> <p>9   unknowns in that particular hypothetical that you're</p> <p>10   posing here.</p> <p>11       MR. STEINBRECHER: Maybe you can break</p> <p>12   the question into pieces, Chris. I'm having trouble</p> <p>13   following all of your assumptions, too.</p> <p>14       MR. GRUNEWALD: Sure. You bet. I'll</p> <p>15   give it a shot.</p> <p>16       Q   (By Mr. Grunewald) So the calculation</p> <p>17   of the virgin water supply for Medicine Creek, under</p> <p>18   the existing accounting procedures, would not</p> <p>19   subtract the augmentation water supply if it were</p> <p>20   being added to Medicine Creek; is that right?</p> <p>21       A   Say what? You said existing</p> <p>22   procedures would not subtract the virgin water</p> <p>23   supply?</p> <p>24       Q   What I wanted to try and do, because I</p> <p>25   thought I might be contributing to the confusion by</p>



<p style="text-align: right;">30</p> <p>1 starting with Nebraska's proposed procedures, so I</p> <p>2 thought maybe let's just start with what happens now</p> <p>3 under the status quo.</p> <p>4 You know, I took from your explanation</p> <p>5 that you understood the change that was being</p> <p>6 proposed by Nebraska. So that was the change to the</p> <p>7 existing procedures. But I thought, let's just</p> <p>8 start with the existing procedures. I apologize for</p> <p>9 the confusion.</p> <p>10 A Okay.</p> <p>11 Q So under the existing procedures right</p> <p>12 now, do you know what the components of the virgin</p> <p>13 water supply calculation are for Medicine Creek?</p> <p>14 A I don't have that in front of me, so</p> <p>15 it's purely from memory. But there's a gauge flow.</p> <p>16 There's some surface water use. There's groundwater</p> <p>17 use. And when I say "use," I should say a CBCU. I</p> <p>18 don't have the accounting in front of me. I'd hate</p> <p>19 to guess at what it is.</p> <p>20 Q Sure. And so one of the things you</p> <p>21 mention there is the gauge flow. So the gauge there</p> <p>22 is that one compact accounting gauge that's used to</p> <p>23 collect the gauge flow for that calculation; is that</p> <p>24 right?</p> <p>25 A Yes.</p>	<p style="text-align: right;">32</p> <p>1 something less than the amount of water discharged</p> <p>2 from the pipeline reaches the downstream gauge,</p> <p>3 doesn't that mean that the virgin water supply is</p> <p>4 lower -- it's going to be lower under Nebraska's</p> <p>5 proposal?</p> <p>6 A Not necessarily.</p> <p>7 Q And why would it be higher?</p> <p>8 A There are a number of other terms in</p> <p>9 that calculation, all of whom can change.</p> <p>10 Q Now, do you understand -- or what is</p> <p>11 your understanding, I should say -- what is your</p> <p>12 understanding of Kansas' experts' opinion about the</p> <p>13 effect of transit losses on Kansas' allocations?</p> <p>14 A Well, as I've indicated in my rebuttal</p> <p>15 here, they generally seem to be suggesting that they</p> <p>16 were of the opinion that Kansas' allocation would be</p> <p>17 reduced.</p> <p>18 Q Do you disagree with that conclusion?</p> <p>19 A Yes.</p> <p>20 Q Why?</p> <p>21 A Because they're wrong.</p> <p>22 Q And what are the specific reasons that</p> <p>23 they're wrong?</p> <p>24 A Well, the calculations that are</p> <p>25 required for the compact are consummative</p>
<p style="text-align: right;">31</p> <p>1 Q So that's a gauge that's downstream of</p> <p>2 Harry Strunk Lake on Medicine Creek; is that right?</p> <p>3 A That's correct.</p> <p>4 Q So that's the collection of the</p> <p>5 surface water flow information for Medicine Creek</p> <p>6 for the virgin water supply; is that right?</p> <p>7 A It's one of the components that goes</p> <p>8 into the virgin water supply calculation.</p> <p>9 Q And Nebraska is proposing, under their</p> <p>10 changes for the N-CORPE plan, to subtract the amount</p> <p>11 of water that exits the pipeline from that</p> <p>12 calculation, right?</p> <p>13 A That's my recollection, yes. There's</p> <p>14 a subtraction in the virgin water supply calculation</p> <p>15 for the amount of water added by the pipeline.</p> <p>16 Q And if the amount of water that leaves</p> <p>17 the pipeline and is subtracted from the virgin water</p> <p>18 supply is a larger amount than actually reaches the</p> <p>19 downstream gauge, would that reduce the virgin water</p> <p>20 supply, compared to the situation under the</p> <p>21 status quo?</p> <p>22 A I was with you until you said, as</p> <p>23 compared to the status quo. That's where I -- I'm</p> <p>24 not quite sure what you mean.</p> <p>25 Q Sure. Under a situation where</p>	<p style="text-align: right;">33</p> <p>1 calculations, and their view of the augmentation</p> <p>2 water is that it needs to be delivered to a</p> <p>3 particular point, which would make this into a</p> <p>4 delivery compact, and that's an inappropriate way to</p> <p>5 approach this problem.</p> <p>6 Q If the augmentation discharged from</p> <p>7 the project suffers transit losses as it moved down</p> <p>8 Medicine Creek, would that result in less</p> <p>9 augmentation water reaching the downstream gauges?</p> <p>10 A Isn't that question sort of</p> <p>11 self-evident? If all of the water that is released</p> <p>12 does not reach the lower end, doesn't less water</p> <p>13 reach the lower end? Is that what you're asking?</p> <p>14 Q I believe so.</p> <p>15 A I don't think I can disagree with that</p> <p>16 statement.</p> <p>17 Q I'm glad we found some agreement.</p> <p>18 We talked a bit already about</p> <p>19 experiments that you might run to determine transit</p> <p>20 losses. Do you remember that discussion?</p> <p>21 A Generally, yes.</p> <p>22 Q Okay. Would additional stream gauges</p> <p>23 added to Medicine Creek assist in determining</p> <p>24 transit losses?</p> <p>25 A Well, from a purely scientific point</p>

<p style="text-align: right;">34</p> <p>1 of view, normally, if you want to look at gains and 2 losses, you use -- not necessarily stream gauges. 3 There are a number of ways that you can measure 4 gains and losses along a stream. But generally, it 5 involves measuring surface flows. 6 Q And stream gauges are one way you can 7 measure surface flows; is that right? 8 A Yes. 9 Q Do you have an opinion about the 10 amount of transit losses that could occur to 11 augmentation water as it travels down Medicine 12 Creek? 13 A Do you have a quantitative evaluation 14 of that? 15 Q We can start with that. 16 A No, I haven't tried to quantify to the 17 extent that there are changes in the surface flows 18 along Medicine Creek. 19 Q So now you haven't tried to quantify 20 it. Do you have any opinion on the amount? 21 A I'm not following the question. Are 22 you asking if I know what the amount is? 23 Q I'm asking whether or not you have an 24 opinion on an amount of transit losses that might 25 occur?</p>	<p style="text-align: right;">36</p> <p>1 flow? 2 A Yes. 3 Q And what would cause that to happen? 4 A Things like bank storage and other 5 delayed releases could give you results that 6 actually would seem to be negative or appear to be 7 negative. 8 Q And now here on page 5, this is a part 9 of your report addressing the Kansas report's 10 discussion of the imported supply credit. Is that a 11 fair characterization? 12 A Yes. 13 Q So I wanted to ask a few questions 14 about the imported water supply credit. Where is 15 the imported water supply computed? 16 A Where is it computed? Are you talking 17 about spacial locations? 18 Q Computed might be not the right term. 19 So let's make sure we're -- I'm asking questions 20 that are understandable. 21 How is -- the imported supply credit, 22 how is that amount determined? 23 A The imported water supply credit 24 calculation is done by using the RRCA groundwater 25 model.</p>
<p style="text-align: right;">35</p> <p>1 A I have not tried to quantify that, no. 2 Q And I understand that. What I just 3 want to make sure is I'm not missing something. You 4 have not tried to quantify it. 5 So is it fair to say that because you 6 have not tried to quantify it, you have no opinion 7 on the amount of transit losses that could occur? 8 A What I'm struggling with is you say, 9 do you have an opinion about that, and that's why 10 I'm sort of struggling with what constitutes an 11 opinion. But I think the best answer I can give you 12 is I haven't quantified that. 13 Q So if I ask you the question then, 14 what amount of transit losses could occur, what's 15 your answer? 16 A If you asked it that way, the answer 17 is a number somewhere between zero and infinite, 18 because that's the range of possibilities. 19 Q Do you have an opinion of which 20 possibilities are most likely? 21 A I haven't attempted to quantify that. 22 Actually, I gave you the wrong answer. It actually 23 covers negative numbers as well. 24 Q And by "negative numbers" here in a 25 stream system, that would be an accretion to stream</p>	<p style="text-align: right;">37</p> <p>1 Q And the numbers that represent the 2 credit, how are those numbers assembled? 3 A They are calculated by the groundwater 4 model, and then we have a program that calculates 5 the differences between those -- between the two 6 relevant simulations and accumulates them by the -- 7 actually, we have two programs that calculates them 8 by the reaches required for the compact accounting. 9 Q You mentioned -- I believe you used 10 the word "accumulated." So are there subtotals that 11 are then totaled for a credit? Is that what you're 12 describing? 13 A In the generic sense, yes. 14 Q So where are those subtotals in a 15 generic sense computed? Where do they come from? 16 A When you say "where," are you asking 17 for physical locations or are you asking what 18 mechanically you do? I'm struggling with the 19 question. 20 Q Fair enough. I am trying to get at a 21 connection between the imported water supply credit 22 and the physical system being simulated by the 23 model. 24 So are there geographical locations 25 where the subtotals are assembled or accumulated, I</p>

<p style="text-align: right;">38</p> <p>1 think was the word you used?</p> <p>2 A Yes.</p> <p>3 Q And are those locations different from</p> <p>4 accounting points that are used? Are they -- go</p> <p>5 ahead.</p> <p>6 A The term "accounting point" is sort of</p> <p>7 a very loosely defined term. I think the more, you</p> <p>8 know, appropriate term to use is that the results</p> <p>9 are summarized by individual subbasins and actually</p> <p>10 on the main stem at a smaller scale -- it's not at a</p> <p>11 smaller scale, it's at a smaller time discretization</p> <p>12 that it is reported.</p> <p>13 Q So, Doctor, if you want to try and</p> <p>14 clarify that, I'm happy to let you jump in.</p> <p>15 A When we calculate that imported water</p> <p>16 supply credit, we do it on an annual basis for a</p> <p>17 number of -- I guess, reaches is the proper term to</p> <p>18 use. That then gets accumulated in the accounting.</p> <p>19 And then we have to do a separate calculation for</p> <p>20 the -- I'm trying to remember now -- I think it's</p> <p>21 Harlan to Guide Rock, we actually have to do it on a</p> <p>22 monthly basis.</p> <p>23 Q Thank you. Is the imported water</p> <p>24 supply responsible for accretions to stream flow?</p> <p>25 A Yeah, you asked the question kind of</p>	<p style="text-align: right;">40</p> <p>1 or reaches or -- the imported water supply is kind</p> <p>2 of odd, in that we have that lower section that we</p> <p>3 have to deal with differently. But we generally</p> <p>4 just report annual values for most of the</p> <p>5 facilities, except for those monthly values down at</p> <p>6 the bottom end.</p> <p>7 Q So they're reported for annual values</p> <p>8 for the bottom end of the subbasins? Is that what</p> <p>9 you're describing?</p> <p>10 A No. When I said the "bottom end," I'm</p> <p>11 referring to the lower reach of the main stem.</p> <p>12 Q Oh, I see. And so the accretions are</p> <p>13 tracked throughout each subbasin for everything but</p> <p>14 this bottom end main stem you're talking about?</p> <p>15 A I don't think that's quite the right</p> <p>16 way to say it. There are accretions and depletions</p> <p>17 everywhere, and they're tracked throughout the model</p> <p>18 by the RRCA groundwater model.</p> <p>19 Q Are any of the accretions to stream</p> <p>20 flow associated with the imported water supply lost</p> <p>21 in the stream reaches before all of those results</p> <p>22 are accumulated?</p> <p>23 A When you say "lost," are you referring</p> <p>24 to there are accretions that lead to depletions in</p> <p>25 other places?</p>
<p style="text-align: right;">39</p> <p>1 in an odd way. But the imported water supply credit</p> <p>2 is generally accretions to stream flow from imported</p> <p>3 water.</p> <p>4 Q And these accretions are determined at</p> <p>5 the locations you were describing just before; is</p> <p>6 that correct?</p> <p>7 A Yeah. When you say "at locations,"</p> <p>8 they're actually -- respond to reaches. They're a</p> <p>9 spacial -- they're generally calculated by subbasins</p> <p>10 or reaches of the main stem.</p> <p>11 Q And is it the accretions -- are the</p> <p>12 accretions computed at every point along those</p> <p>13 reaches in the subbasin or -- I'm sorry, the</p> <p>14 subbasin?</p> <p>15 A When you say "at every point," what</p> <p>16 are you referring to?</p> <p>17 Q Oh, you know, I think of the model as</p> <p>18 having these mile-by-mile grid cells. So it is</p> <p>19 cell-by-cell sort of accumulation of accretions or</p> <p>20 something different?</p> <p>21 A Yes. The model does do the</p> <p>22 calculations on a much finer scale than what we</p> <p>23 report.</p> <p>24 Q And what we report is what?</p> <p>25 A Generally, annual values by subbasins</p>	<p style="text-align: right;">41</p> <p>1 Q Are they no longer counted as part of</p> <p>2 that accumulation that results in a credit?</p> <p>3 A I'm really struggling with the</p> <p>4 question. As part of the calculations, there are</p> <p>5 positives and negatives within the reaches that we</p> <p>6 report. And there's also positives and negatives</p> <p>7 between the reaches that we report.</p> <p>8 Q Okay. Do you consider the groundwater</p> <p>9 model necessary to determine the amount of the</p> <p>10 imported water supply credit?</p> <p>11 A Yes.</p> <p>12 Q And does determination of the credit</p> <p>13 include the base-flow gains and base-flow losses</p> <p>14 that occur above these generic accounting points?</p> <p>15 MR. STEINBRECHER: I have to object to</p> <p>16 the form of the question. I think it assumes</p> <p>17 something that Dr. Schreuder already disagreed with</p> <p>18 in his previous answers.</p> <p>19 Q (By Mr. Grunewald) Doctor, you can</p> <p>20 answer to the extent you can.</p> <p>21 A I'm really struggling with the</p> <p>22 question. There are both positives and negatives</p> <p>23 that occur within a lot of these calculations. And</p> <p>24 so I'm not sure what it is that you're asking me.</p> <p>25 Q Okay.</p>

<p style="text-align: right;">42</p> <p>1 MR. GRUNEWALD: What I'd like to do is</p> <p>2 let's go ahead and take a break for about five</p> <p>3 minutes, if that would be okay.</p> <p>4 MR. STEINBRECHER: That's fine.</p> <p>5 MR. GRUNEWALD: Well, I show 11:08.</p> <p>6 So how about we start again at 11:15. Does that</p> <p>7 sound okay?</p> <p>8 MR. STEINBRECHER: Sounds good.</p> <p>9 (Recess was taken at 10:09 a.m. until</p> <p>10 10:15 a.m.)</p> <p>11 Q (By Mr. Grunewald) Dr. Schreuder, how</p> <p>12 far is it along Medicine Creek from the point of the</p> <p>13 project discharge to Harry Strunk Lake?</p> <p>14 A It's in one of the reports. I don't</p> <p>15 recall the exact number offhand.</p> <p>16 Q Do you agree with the numbers in the</p> <p>17 Kansas report?</p> <p>18 A I don't remember the numbers in the</p> <p>19 Kansas report.</p> <p>20 Q I only went to the report because I</p> <p>21 assumed that's what you were referring to. So do</p> <p>22 you not know how far it is?</p> <p>23 A I'd have to review the reports again</p> <p>24 to recall the exact distance.</p> <p>25 Q Just so we're clear, you would rely on</p>	<p style="text-align: right;">44</p> <p>1 Q Do you have an opinion on the quantity</p> <p>2 of losses that might occur?</p> <p>3 A I haven't attempted to quantify it.</p> <p>4 Q Is it possible for you to do a</p> <p>5 quantitative analysis to that?</p> <p>6 A If it was deemed relevant, we probably</p> <p>7 could.</p> <p>8 Q And could you do model runs simulating</p> <p>9 the flow of augmentation water downstream of Harry</p> <p>10 Strunk?</p> <p>11 A Could you do model runs? I presume</p> <p>12 you could do model runs, yes.</p> <p>13 Q Is it possible for you to analyze</p> <p>14 potential losses to augmentation water using</p> <p>15 something other than the model, looking at the flow</p> <p>16 downstream of Harry Strunk?</p> <p>17 A Yes.</p> <p>18 Q I should ask. Did you do that?</p> <p>19 A No.</p> <p>20 Q And why not?</p> <p>21 A I don't think transit losses are</p> <p>22 relevant to the Republican River Compact.</p> <p>23 Q I'd like to ask a couple more</p> <p>24 questions about the model.</p> <p>25 Have you examined the model of</p>
<p style="text-align: right;">43</p> <p>1 the Kansas reports for the number or you would</p> <p>2 dispute the number in the Kansas report?</p> <p>3 A I would rely on the Nebraska report</p> <p>4 for the number.</p> <p>5 Q Oh, fair enough. So the number in the</p> <p>6 Nebraska report is the number you would use, but you</p> <p>7 don't know what it is?</p> <p>8 A I just don't recall the exact number.</p> <p>9 Q Do you know how far it is downstream</p> <p>10 from Harry Strunk Lake to Harlan County Lake?</p> <p>11 A I don't recall exactly, no.</p> <p>12 Q And do you know how far it is from</p> <p>13 Harlan County Lake to Guide Rock?</p> <p>14 A I don't recall the exact distance, no.</p> <p>15 Q And from Guide Rock to Hardy?</p> <p>16 A I don't recall the exact distance, no.</p> <p>17 Q In a general sense, is it your opinion</p> <p>18 that any potential losses to augmentation water are</p> <p>19 irrelevant for an augmentation plan?</p> <p>20 A In the general sense, yes. At least</p> <p>21 in the context of the Republican River Compact.</p> <p>22 Q Now, is it possible that there could</p> <p>23 be transit losses to augmentation water as it flows</p> <p>24 downstream to Harry Strunk Lake?</p> <p>25 A Is it possible? Yes.</p>	<p style="text-align: right;">45</p> <p>1 calibration results for Medicine Creek with regard</p> <p>2 to your work in this proceeding, in the arbitration?</p> <p>3 A I think, yes, I have seen some of the</p> <p>4 calibration results in Medicine Creek as part of</p> <p>5 this proceeding.</p> <p>6 Q And what specifically did you look at?</p> <p>7 A As I recall, it was the calibration to</p> <p>8 base flow at the gauge on -- well, one of the gauges</p> <p>9 on Medicine Creek.</p> <p>10 Q And which gauge do you think that was?</p> <p>11 A That's what I don't remember.</p> <p>12 Q Was it either the one upstream of</p> <p>13 Harry Strunk or the one downstream that's used for</p> <p>14 the accounting? Was it one of those two?</p> <p>15 A Most likely, yes.</p> <p>16 Q And was there anything in the model</p> <p>17 calibration results that you looked at?</p> <p>18 A Well, that's the one that I remember</p> <p>19 came up during this proceeding.</p> <p>20 Q With the groundwater model, do you</p> <p>21 believe it's capable of reasonably estimating losses</p> <p>22 to base flow in the stream network?</p> <p>23 A In what context are we talking?</p> <p>24 Q Well, in any context.</p> <p>25 A Could you ask it again.</p>

<p style="text-align: right;">46</p> <p>1 MR. GRUNEWALD: Could the reporter 2 read the question two questions ago back. 3 **Question was read back. 4 (The question on page 45, line 20 was 5 read.) 6 A I think that the groundwater model is 7 an appropriate tool for estimating changes to base 8 flow as it relates to calculating the impacts to 9 base flow from groundwater pumping and for purposes 10 of calculating the imported water supply credit. 11 Q (By Mr. Grunewald) And do you think 12 it's reasonable for any purposes, besides what you 13 just described? 14 A I guess I'd have to have -- that's the 15 purpose -- the stated purpose for the Republican 16 River groundwater model. I'd have to know what the 17 other purposes are that you had in mind, in order to 18 know whether it would be appropriate for that 19 purpose. 20 Q Have you evaluated the ability of the 21 model to compute losses to base flow beyond the 22 calibration that was conducted before 2003? 23 A Yes, I have reviewed some of that 24 information. 25 Q You have reviewed it. Have you</p>	<p style="text-align: right;">48</p> <p>1 So it was done about a year ago? 2 A That's my recollection. 3 Q Switching topics here. And I'm almost 4 done. 5 Is it possible that a gaining stream 6 can lose water along some portions of the stream and 7 gain in other portions? 8 A Yes. It's possible for a stream to 9 both gain and lose. 10 Q And is it possible for a stream to 11 both gain and lose and be considered a gaining 12 stream? 13 A Theoretically, yes. 14 Q What would you consider to be a 15 gaining stream? How would you define that? 16 A Generally, it's used in the sense that 17 the stream -- one or the other feature predominates. 18 Q And what are the circumstances that 19 would cause a stream that you'd consider a gaining 20 stream to be gaining and losing water at different 21 portions? 22 A It's purely a function of the gradient 23 between the aquifer and the stream, when the 24 stream -- the stage in the stream is higher than the 25 water level in the aquifer in the immediate vicinity</p>
<p style="text-align: right;">47</p> <p>1 conducted an analysis? 2 A You can probably say that, yes. 3 Q And what did that analysis consist of? 4 A Basically, comparing observed water 5 levels with model predicted water levels. 6 Q And what were the results of your 7 analysis? 8 A I felt that the model was doing a 9 reasonable job of predicting those observations. 10 Q At what period of years is that 11 covering? 12 A It would be the years after the 13 initial model calibration. 14 Q And so does that include up to the 15 present period? 16 A It would have been up to the present 17 time at the time I did the review. 18 Q And what time was that? 19 A I don't recall exactly. 20 Q Well, yesterday, a month ago, a year 21 ago, something like that? 22 A Something like that. 23 Q Which one, if you could -- 24 A I'm sorry. A year ago. 25 Q Thank you.</p>	<p style="text-align: right;">49</p> <p>1 of the stream, it would lose, and vice versa, it 2 could gain. 3 Q And what are the conditions that 4 affect that gradient general? 5 A There's lots and lots of things that 6 affect that. 7 Q Do you consider some of these things 8 that affect that to be major and some to be minor? 9 A You would have to know about the 10 specifics of the specific condition to know which 11 are the ones that are the major and minor 12 contributors. 13 Q Do you have any opinion for Medicine 14 Creek of which ones might be the larger contributors 15 to the change that gradient? 16 A Well, you're presuming there is a 17 change in gradient. I don't recall that I made any 18 specific analysis as to what all of those factors 19 are. 20 MR. GRUNEWALD: Okay. I don't have 21 any further questions. 22 MR. STEINBRECHER: Nebraska, do you 23 have any questions today? 24 MR. LAVENE: No questions from 25 Nebraska.</p>

50	<p>1 MR. STEINBRECHER: None from Colorado.</p> <p>2 (WHEREUPON, the deposition was</p> <p>3 concluded at 10:30 a.m.)</p> <p>4</p> <p>5</p> <p>6</p> <p>7</p> <p>8</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>
51	<p>1 I have read the foregoing transcript of my</p> <p>2 testimony and have indicated same by my signature.</p> <p>3</p> <p>4</p> <p>5 DR. WILLEM A. SCHREUDER</p> <p>6 STATE OF COLORADO</p> <p>7 CITY AND COUNTY OF DENVER</p> <p>8</p> <p>9 Subscribed and sworn to before me by the</p> <p>10 said DR. WILLEM A. SCHREUDER, this _____ day of</p> <p>11 _____, 2014.</p> <p>12 My commission expires: _____.</p> <p>13</p> <p>14</p> <p>15</p> <p>16 Notary Public</p> <p>17</p> <p>18 Address</p> <p>19 Reporter: AS</p> <p>20 Trial Date: 3/5/14</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>
52	<p>1 CERTIFICATE</p> <p>2 STATE OF COLORADO )</p> <p>3 )ss.</p> <p>4 CITY AND COUNTY OF DENVER )</p> <p>5</p> <p>6 I, Angela Smith, Professional Reporter</p> <p>7 and Notary Public for the State of Colorado, do</p> <p>8 hereby certify that previous to the commencement of</p> <p>9 the examination, the said deponent, DR. WILLEM A.</p> <p>10 SCHREUDER, was duly sworn by me to testify to the</p> <p>11 truth in relation to the matters in controversy</p> <p>12 between the said parties.</p> <p>13 I further certify that said deposition</p> <p>14 was taken in shorthand by me and was reduced to</p> <p>15 typewritten form by computer-aided transcription,</p> <p>16 that the foregoing is a true transcript of the</p> <p>17 questions asked, testimony given, and proceedings</p> <p>18 had.</p> <p>19 I further certify that I am not an</p> <p>20 attorney nor counsel nor in any way connected with</p> <p>21 any attorney or counsel for any of the parties to</p> <p>22 said action or otherwise interested in its event.</p> <p>23 IN WITNESS WHEREOF, I hereunto affix my</p> <p>24 hand and notarial seal this 24th day of February</p> <p>25 2014.</p> <p>My commission expires January 22,</p> <p>2015.</p> <p>Angela Smith</p> <p>Professional Reporter/Notary Public</p> <p>Calderwood-Mackelprang, Inc.</p>
53	<p>1 CALDERWOOD-MACKELPRANG, INC.</p> <p>2 7150 East Hampden Avenue, Suite 303</p> <p>3 Denver, Colorado 80224</p> <p>4 (303) 477-3500</p> <p>5 February 24, 2014</p> <p>6</p> <p>7 SCOTT STEINBRECHER, ESQ.</p> <p>8 State of Colorado, Department of Law</p> <p>9 1300 Broadway, 7th Floor</p> <p>10 Denver, Colorado 80203</p> <p>11 Re: Kansas v. Nebraska &amp; Colorado</p> <p>12 Deposition of: DR. WILLEM A. SCHREUDER</p> <p>13 The deposition in the above-entitled matter is ready</p> <p>14 for reading and signing. Please attend to this</p> <p>15 matter by complying with ALL blanks checked below:</p> <p>16 _____ arranging with us at the number listed below</p> <p>17 to read and sign the deposition in our</p> <p>18 office.</p> <p>19 xxxxxx having deponent read your copy and sign</p> <p>20 amendment sheets, if any (original signature</p> <p>21 page enclosed.)</p> <p>22 _____ reading enclosed deposition, signing</p> <p>23 signature page and correction sheets, if</p> <p>24 any</p> <p>25 _____ within 35 days of the date of this</p> <p>letter</p> <p>xxxxx by 2/28/14 due to trial/hearing date of</p> <p>3/5/14.</p> <p>Please be sure that the signature page and amendment</p> <p>sheets, if any, are signed before a Notary Public</p> <p>and returned to our office. If this matter has not</p> <p>been taken care of within said period of time, the</p> <p>deposition will be filed unsigned pursuant to the</p> <p>Rules of Civil Procedure.</p> <p>Angela Smith, Professional Reporter</p> <p>cc: Counsel of Record</p>

1 CALDERWOOD-MACKELPRANG, INC.  
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5  
6 CHRISTOPHER M. GRUNEWALD, ESQ.  
7 120 Southwest 10th Avenue, 3rd Floor  
8 Topeka, Kansas 66612-1597  
9 Re: Kansas v. Nebraska & Colorado  
10 Dear Mr. Grunewald:  
11 Enclosed, deposition of: DR. WILLEM A. SCHREUDER  
12 \_\_\_\_\_ Previously filed. Forwarding signature page  
13 and amendment sheets.  
14  
15 \_\_\_\_\_ Signed, no changes.  
16  
17 \_\_\_\_\_ Signed, with changes, copy enclosed.  
18  
19 \_\_\_\_\_ Unsigned, notice duly given \_\_\_\_\_,  
20 pursuant to the Rules of Civil Procedure.  
21 \_\_\_\_\_ Not signed, notice duly given \_\_\_\_\_,  
22 since trial is set for \_\_\_\_\_.  
23  
24 \_\_\_\_\_ No signature required.  
25  
\_\_\_\_\_ Signature waived.  
\_\_\_\_\_ To be signed in court.  
\_\_\_\_\_ Signature pages/amendment sheets to be  
returned to court on date of trial.  
\_\_\_\_\_ Mailed by Certified Mail No. \_\_\_\_\_.  
\_\_\_\_\_ Hand-delivered on approximately \_\_\_\_\_.  
Angela Smith, Professional Reporter  
cc: Counsel of Record