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Non-binding Arbitrations Before
Martha O. Pagel, Arbitrator

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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

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Colorado's Compact Compliance Pipeline Proposal
(Arbitration Initiated May 2, 2013)

and

Colorado's Bonny Reservoir Accounting Proposal
(Arbitration Initiated May 2, 2013)

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CORRECTED PRE-FILED TESTIMONY OF KANSAS EXPERT DAVID W. BARFIELD, P.E., KANSAS CHIEF ENGINEER

September 20, 2013

Section 1: Qualifications and Expert reports

Q: Please state your name, professional position, and address for the record.

A: David W. Barfield, Chief Engineer, Division of Water Resources, ("DWR"), Kansas Department of Agriculture, 109 SW 9th St., Topeka, Kansas, 66612.

Q: Please identify this document identified as Ex. CCP/BR-K9.

A: This is a copy of my curriculum vitae.

Q: Is Ex. CCP/BR-K9 an accurate description of your experience and qualifications?

A: Yes.

Q: Please give an overview of your experience and qualifications, particularly with respect to the Republican River Basin ("Basin") and the issues in this litigation.

A: I earned a B.S. in civil engineering in 1978, and an M.S. in water resources engineering in 1991, both from the University of Kansas. I have been a licensed professional engineer since 1984. After earning my B.S., I spent three years doing engineering consulting work in Minnesota, and then spent another three years in South Africa as a water supply engineer in Bophuthatswana, a so-called "independent" homeland of 300,000 people that relied predominantly on groundwater. I came to DWR in 1984 and have spent the last twenty-nine years working in various capacities. I have performed numerous hydrologic analyses to support water management decisions, including closing tributaries to the Republican River in northwest Kansas to new surface and hydrologically

connected groundwater appropriations. I have also served five years as head of DWR's dam safety program.

From 1992 until 2007, I led the team of technical experts devoted to Kansas' interstate water interests, focusing on the Republican River Compact, the Colorado-Kansas Arkansas River Compact, and Missouri River issues.

In 2007, I succeeded David Pope as Chief Engineer. In this capacity, I am responsible for the enforcement and administration of the Kansas Water Appropriation Act, which governs the use of all water – both surface and groundwater – within the state of Kansas. I exercise exclusive state regulation of dams and other water structures, and regulate the state's floodplains for public safety and to protect public and private property. I represent the state on its four interstate water compacts. I have numerous duties with respect to special water districts including Groundwater Management Districts ("GMDs"), Watershed Districts, and others. I regularly provide legislative testimony and participate in developing legislation to enhance the set of statutes administered by the Division.

I am the state's lead representative to the Western States Water Council, which was created by the Western Governors' Association to encourage cooperation among the western states in conserving and managing the Region's water resources and to maintain and develop helpful and productive working relationships with federal agencies.

Q: Please provide a summary of your fifteen years' experience as the leader of DWR's interstate water issues technical team and as Chief Engineer.

A: I dedicated nearly all of my work in my fifteen years in interstate water issues to three interstate basins: the Missouri River, the Colorado-Kansas region of the Arkansas River, and the Republican River. These matters have also involved a significant amount of my time as Chief Engineer.

First, the Missouri River Basin. From the early 1990's to 2003, the U.S. Army Corps of Engineers ("Corps") performed an extensive review and revision of its master manual for Missouri River main stem reservoirs. The master manual governs the operation of the reservoir system and therefore has extensive implications to the benefits and impacts to the eight Missouri River Basin states and numerous basin tribes. I reviewed the proposed revisions for their impacts to Kansas and advised state officials and the public. I assisted and represented the Chief Engineer in matters related to the Missouri River Basin Association and was a member of its technical committee. I participated in negotiations among the states on recommendations to the Corps on revised navigation rule curves that the Corps ultimately adopted in their revised master manual. I also acted as Kansas representative on the Spring Rise Plenary work group and led its hydrology technical work group during 2005-2006. I currently serve as the Kansas representative to the Missouri River Recovery Implementation Committee.

Q: Please summarize your involvement in matters related to the Arkansas River Compact between Kansas and Colorado, including Kansas' lawsuit against Colorado concerning the Arkansas River, *Kansas v. Colorado,* No. 105 Orig.

A: My work in the Arkansas River Basin over the last nine years has been directed towards the resolution of numerous, complex, long-standing disputes related to the water-supply accounting and the operations of John Martin Reservoir, including the measurement and crediting of water deliveries from that reservoir to Kansas. To resolve many of these disputes, Colorado and Kansas presented seven recommendations to the Arkansas River Compact Administration which I helped to negotiate. The Administration subsequently adopted resolutions based on those recommendations. This ultimately led to the 2010 amendment of the 1980 *Resolution Concerning an Operating Plan For John Martin Reservoir*.

I also participated in finalizing and implementing the decree in that case, particularly Appendices A and B, which prescribes the Hydrologic-Institutional Model ("H-I Model") to measure Colorado's compliance with the compact and how H-I Model data is collected and exchanged. The H-I Model quantifies the effects of Colorado's post-compact groundwater well development and replacement.

In my tenure as Chief Engineer, Kansas and Colorado have reached agreement on several contentious issues in the course of Decree implementation. These include a 2009 agreement on the sufficiency of Colorado's "Use Rules," whereby Colorado requires its water users to replace certain depletions to river flow. Kansas also proposed a change to the H-I Model to recognize that groundwater irrigation efficiency improvements are reducing the percentage of irrigation diversions that return to the river. This change was approved in a 2011 agreement between the states and resulted in modifications to the decree.

Q: Please describe your experience related to the Republican River Basin.

A: Beginning in 1992, I assisted Chief Engineer Pope as a member of the Kansas team in Kansas' efforts to secure its entitlement to its allocation of Republican River waters under the compact, and to resolve Kansas' concerns with Nebraska's over-development in the Basin and Nebraska's failure to consistently meet its compact obligations. I was appointed Kansas' representative to the engineering committee of the Republican River Compact Administration ("RRCA") and served in that capacity until I became chief engineer. I led Kansas' technical work in developing proposals for consideration by the RRCA to resolve Kansas' concerns through 1995.

When those efforts failed, I participated in mediated negotiations with Nebraska from late 1995 to early 1997. These negotiations produced a settlement proposal co-developed and mutually agreed upon by Nebraska and Kansas. That settlement proposal was rejected by Nebraska due to opposition by Nebraska groundwater interests.

I was extensively involved in *Kansas v. Nebraska & Colorado,* No. 126 Orig. After Special Master McKusick's January, 2000 ruling, Ex. CCP/BR J-11, that the Compact governed depletions to streamflow resulting from groundwater pumping, the states began settlement discussions. I was involved in all aspects of these detailed and complex negotiations that dealt with all matters in the Final Settlement Stipulation ("FSS"). I was co-author of what became the RRCA Accounting Procedures, with Dr. Ann Bleed of Nebraska and Dr. Ken Knox of Colorado. I was a member of the modeling committee formed during the

negotiations, and it was my duty to ensure that the RRCA Groundwater Model ("Model") and its output were consistent with the Accounting Procedures. After the states agreed to the FSS, I played a central role in working with Nebraska and Colorado to implement the FSS including the Accounting Procedures and the Model. This included working through the RRCA Engineering Committee to review and clarify the Accounting Procedures, develop the initial accountings and tools to complete those accountings, and update the Model to correct minor errors and to facilitate its ease of use.

I have been the Kansas Commissioner to the RRCA since 2007. At the 2007 annual RRCA meeting, I addressed Nebraska's failure to meet its first compliance test since the signing of the FSS—the two-year test for the years 2005 and 2006 that was triggered by the Water Short Year conditions in 2006. In December, 2007, I wrote Nebraska's RRCA Commissioner and the head of the Nebraska Department of Natural Resources ("DNR"), Dr. Ann Bleed, detailing the need for immediate Nebraska action, Kansas' proposed remedy for Nebraska's violation, and the actions that Kansas believed would ensure future compliance. When Nebraska rejected Kansas' proposals, I initiated and directed Kansas' participation in the RRCA's attempts to resolve them from January to May 2008. I represented Kansas in the 2008-2009 arbitration over Nebraska's 2005-2006 noncompliance with the Compact. I also represented Kansas in the 2009-2010 combined arbitration over Colorado's Compact Compliance Pipeline ("CCCP") and Nebraska's proposal to credit Nebraska's water overuse in the Compact

accounting based on payment of money or water. In both of these arbitrations I produced and submitted expert reports.

When the dispute resolution process regarding Nebraska's 2005-2006 noncompliance with the Compact was unsuccessful, Kansas filed suit in 2010. The Supreme Court accepted Kansas' case, appointing as Special Master William J. Kayatta, Jr. of Portland, Maine. In November 2011, I prepared and submitted an expert report in that proceeding and during May 2012, I prepared and submitted an expert rebuttal report. I participated as an expert witness in the August 2012 trial before Special Master Kayatta.

Q: What experience do you have in groundwater modeling?

A: In addition to graduate coursework, I have more than a decade of experience developing and utilizing hydrologic models, including my modeling experience in the Basin. I have supported and contributed to Kansas' successful development and application of the following Kansas-specific groundwater models: (1) a model for the mid-Arkansas River basin of south central Kansas; (2) customizing the Model to the specific needs of Northwest Kansas GMD No. 4; (3) the model for Southwest Kansas GMD No. 3; (4) the model for Big Bend GMD No. 5; (5) the ongoing development of a model in Equus Beds GMD No. 2; and (6) the model for the Upper and Lower Solomon Rivers. I have also overseen the process by which DWR has adopted models built by the U.S. Geological Survey to determine safe yields for: the Ozark-Springfield Aquifer system, and the lower Arkansas River alluvium. DWR uses these models routinely, as the technical foundation for its resource management decisions.

Q: Please describe your experience resolving conflicts created by the over-development of the state's groundwater systems.

A: I have dedicated much of my work at DWR to address the problem of over-appropriation of groundwater supplies in Kansas—a problem that my fellow state engineers are facing across the High Plains-Ogallala Aquifer.

In surface water systems, protecting the rights of senior appropriators under the KWAA is relatively straightforward. In groundwater systems, however, it is much more complicated. As a general rule, pumping rates decline with groundwater levels. Where neighboring wells are closely hydraulically connected, the decline in rate, and the attending inability to exercise the full extent of the senior water right, can rise to the level of impairment. Determining the extent of that impairment (and its commensurate remedy) requires a detailed understanding of the hydrogeology of the local setting, including how significant the declines are during the pumping season, how much the aquifer recovers before the next pumping season begins, and the extent to which long-term declines are affecting all water rights in the local setting.

In 2009, after a multi-season hydrologic investigation, I ordered the first administration of a junior Ogallala groundwater right for the protection of a senior groundwater right in Kansas. I also promulgated a significant revision of DWR's rules for impairment investigations and actions, amending the rules to clearly address groundwater impairment scenarios. DWR is investigate and acted on other groundwater right impairment complaints over the Ogallala and the related High Plains aquifer.

Since becoming Chief Engineer, I have devoted considerable effort to extending and conserving Kansas' non-renewable groundwater supplies in the High Plains-Ogallala Aquifer. I have been active with state's GMDs to encourage and support groundwater modeling, requiring metering, closing additional areas to new appropriations, and encouraging other conservation efforts.

In recent years, I have worked closely with Northwest Kansas GMD No. 4, which lies above the Ogallala, in this regard. Irrigators in GMD No. 4 sought to reduce their groundwater use, but were hesitant to concede too much control over their water rights. In response, I worked with GMD No. 4 and the Kansas Legislature to develop a new regulatory mechanism, known as Local Enhanced Management Areas ("LEMAs"), which allow local stakeholders to control the plan by which they achieve substantial reductions in groundwater use—provided those reductions are substantial. LEMAs combine locally-developed groundwater conservation plans with the central authority of the Chief Engineer. The Kansas Legislature passed the statute enabling LEMA's in 2012. During the fall of 2012, I conducted hearings to establish the first LEMA within GMD No. 4. Other GMDs are actively exploring use of the tool in other areas.

Offer of Mr. Barfield as an Expert

To The Arbitrator: The State of Kansas offers Mr. Barfield as an expert in the fields of water resources engineering, application of hydrologic modeling, and state and interstate water rights administration.

<u>Section 2: Assignment in This Case</u>

Q: Mr. Barfield, as Chief Engineer, what responsibility was yours with respect to this case?

A: As Chief Engineer and Kansas Commissioner to the RRCA, it is my duty to ensure that Kansas fulfills its Compact obligations and to ensure that Kansas receives its share of Republican River waters. I closely monitor Colorado's and Nebraska's activities related to the Compact, and work cooperatively with them to improve administration of the Compact. To that end, I prepared an expert report on the two issues under arbitration in this case.

Q: Please identify the document identified as Ex. CCP/BR-K10.

A: This is my expert report on Colorado's Compact Compliance Pipeline ("CCP") Proposal and Bonny Reservoir Accounting Proposal.

Q: Do you still agree with everything in that report?

A: Yes.

Tender: The State of Kansas tenders to the Arbitrator the expert report of Mr. Barfield, to be accepted as part of Mr. Barfield's direct testimony.

Section 3: CCP Proposal

Q: As a general matter, why must augmentation proposals be scrutinized so closely?

A: While allowed under the FSS, augmentation is a very significant change in status quo of the settlement's compliance tests, accounting and modeling. Augmentation credits are granted as direct credit against excessive groundwater depletions. If a state is given a credit for augmentations flows that are subsequently lost, it results in the following:

- first, the upstream state taking less action than it otherwise would be required to take, meaning less water is available downstream, and
- second, the unaccounted-for losses are reductions in the computed water supply and allocations in the sub-basin where those losses occur.

It is therefore critical that augmentation plans be properly modeled and integrated into the accounting.

Q: Is the revised CCP proposal is the same as Colorado's 2009 version?

A: No. They did make some changes to address our concerns, as described the Kansas expert reports from the 2009-2010 arbitration.

Q: Are Ex. CCP/BR-K19 (David Barfield), Ex. CCP/BR-K20 (Dale Book), Ex. CCP/BR-K21 (Steven Larson) copies of those reports?

A: Yes.

Q: Colorado listed eight "objections" by Kansas – which of those are still at issue for this hearing?

A: As I stated in my report, as a result of the changes in the proposal and additional discussion and agreements reached since the proposal was submitted, only

three issues remain. I would note, however, the remaining issues are among the most significant issues.

Kansas believes that Colorado and Kansas have reached conceptual agreement to resolve several of the issues identified in the prior arbitration. While Kansas believes the proposed resolution's provisions related to periodic review are insufficient, the States have subsequently agreed in principle to a more defined statement of required review elements. Likewise, while Kansas believes that Colorado's markup of the Accounting Procedures attached to its application is insufficient, the States have subsequently agreed in principle that the terms and conditions related to the project will be made an attachment to the RRCA's Accounting Procedures. That would make the procedures complete for the purpose of documenting Colorado's proposal.

Q: Have you read the report of Dick Wolfe?

A: Yes.

Q: Do you agree with his first opinion, which says that Kansas has no reasonable basis vote against Colorado's CCP proposal?

A: I do not agree with him.

Q: Why not?

A: As is detailed in my expert report and those of Kansas other experts, Colorado's proposal as submitted to the RRCA still remains insufficient on several points. Based on our understanding of Arbitrator Pagel's 2010 final decision, it is reasonable to expect that there will be a policy cost associated with an

augmentation proposal to address the Compact Accounting consequences of implementing the proposal. At an obvious conceptual level, the language in Colorado's proposed resolution and revised application were deficient in three ways.

First, Colorado's modeling proposal captures only a small part of the expected losses that will occur in the Swanson reach, therefore granting to Colorado an inappropriate credit to offset their overuse.

Second, its proposal lacks sufficient protection for Kansas' interest in the South Fork basin. This is particularly concerning when combined with Colorado's Bonny Reservoir proposal. Colorado's resolution and revised application assert that Colorado is entitled to use an augmentation credit from deliveries to the North Fork sub-basin to achieve statewide compliance and then, in turn, use that credit to allow Colorado to consume both its allocation and the unallocated flows on the South Fork sub-basin. Kansas continues to hold the same position as it did during the 2009-2010 arbitration: The FSS does not allow this approach, and even if it were permitted, it is not mandatory for Kansas to be forced to accept it over its reasonable objection.

Third, Colorado's proposed operational limits remain unclear. While Colorado states that it will make deliveries based on its compliance need, the language in its proposed resolution and revised application does not require it.

Q: As a general matter, do you agree with Mr. Wolfe's accusation that you acted "unreasonably, arbitrarily and without sufficient basis" when Kansas voted no on May 2, 2013?

A: Not at all.

Q: Why not?

A: As is covered in my expert report and those of the other Kansas experts, and as I explained earlier, Colorado's revised proposal does not satisfy Kansas' principal concerns and does not conform to Arbitrator Pagel's 2010 decision on several key issues.

Q: Is Mr. Wolfe correct when he says that Colorado and Kansas have attempted to reach agreement over the succeeding years?

A: Yes. However there have been significant periods of time when discussions have languished such as during the initial arbitration period; during the period when Colorado sought a solution for its South Fork overuse; and during 2012 when some of Colorado's experts were unavailable.

The challenge of reaching a solution on the CCP has been significantly expanded with Colorado insisting that Kansas agree to its Bonny Reservoir Modeling Proposal as part of settling the CCP issues.

Q: How productive were the discussions with Colorado during these years?

A: I believe we have made progress on several of the issues as is noted in my report. We have had substantive discussions on the method of modeling augmentation outflows and have exchanged modeling results on different approaches. We discussed an approach to resolve our differing opinions on access to the South Fork unallocated water, but Colorado chose not to include this in its final proposal and has been unwilling to accept this approach in our more recent discussions. I believe we have made significant progress on the operational limits issue but the final method submitted with its application does not fully reflect those discussions. The Bonny Reservoir Modeling issue has made getting to agreement on the full package very difficult.

Our negotiations have been principally with Mr. Wolfe and his staff as well as Dr. Schreüder. We believed that we were negotiating terms and conditions that would address Kansas' concerns and Kansas ultimately presented a settlement offer to Colorado that was developed in consultation with Mr. Wolfe and Dr. Schreüder. Mr. Wolfe then "consulted" with the Republican River Water Conservation District, resulting in a retreat from some of the progress we seemed to be making.

Q: The augmentation modeling approach advocated by Kansas has been called Kansas Method 3, is that right?

A: Yes.

Q: How many augmentation modeling approaches have been evaluated by Kansas and what were they?

A: Method 1 includes augmentation flows in the base condition for evaluating the states' pumping impacts, the IWS credit, and Colorado's augmentation credit. This approach was shared with the RRCA Engineering Committee during May 2008.

Method 2 includes augmentation flows in the base case for evaluating state's pumping impacts and the IWS credit. However, Colorado's net impact due to both its groundwater pumping and augmentation supply is evaluated by comparing this base run with a run that does not include either Colorado groundwater pumping or augmentation flows. Thus this combined impact is determined in a single set of runs.

Method 3 uses the current RRCA base run for all impact runs. The state's pumping impacts and IWS credit is done as per the current Accounting Procedures. A new run with the augmentation flows is used to determine the augmentation credit.

Methods 2 and 3 are equivalent for Colorado's net impact due to its groundwater pumping and augmentation water.

Q: Turning to the method Colorado used for its 2013 proposal, is that method something that Kansas evaluated prior to it being proposed by Colorado?

A: No.

Q: In your expert report, you state the Kansas did not advocate or suggest Colorado's proposed modeling approach. Are you aware that Dr. Willem Schreüder's August 21, 2013 report states that you suggested this method to Colorado on a telephone conference held on September 13, 2012?

A: Yes.

Q: What do you recall of the nature of the discussions on September 13, 2012?

A: The call was one of a series of discussions with Colorado over a wide variety of issues related to the CCP and Bonny. We looked at 6 or 8 issues on the call as we explore potential means to seek to resolve the matters.

Q: Did you discuss alternatives to explore with respect to augmentation modeling?

A: Yes, briefly.

Q: Did you offer any new concepts to explore?

A: Yes. I understood that Colorado's Sand Hills Groundwater Management District had approved the transfer of groundwater on the condition that Colorado must receive 100% credit for the water. See Ex. CCP/BR K23 (RRWCD Board Minutes, 4/12/2012). This is at odds with using the model to determine the augmentation credit as Kansas had proposed. My main interest was to determine whether an approach could be explored where Colorado gets 100% augmentation credit in Tables 3, 4 and 5 and where the model is used to evaluate the impacts in the Above Swanson reach

Q: Did you get into specifics of the model runs to be used?

A: No. I wanted to see if Colorado had any interest in the general concept.

Q: Did you suggest that the augmentation flows be included in all runs of the model.

A: I do not recall making that statement or suggesting much in the way of specifics on the Above Swanson reach evaluation or exactly which model runs should contain the augmentation water in this discussion. I was exploring the general concept, especially on whether we could find a way to give Colorado full credit in Tables 3, 4, and 5 and evaluate the Above Swanson impacts as a separate matter.

Q: Had the Kansas team discussed or evaluated the effects of including the CCP flows in all model runs prior to this conversation with Colorado?

A: No. Kansas evaluated only the three methods I described previously.

Q: Did Kansas evaluate the effects of including the CCP flows in all model runs after this conversation with Colorado?

A: No. Kansas understood that Colorado would evaluate the concept discussed and that the states would discuss Colorado's findings.

Q: What was the conclusion of the discussion?

A: The Colorado representatives on the call expressed that they thought the idea was worth exploring and said Dr. Schreüder would take a look at it and that we would all discuss it further.

Q: Did you discuss the idea further with Colorado?

A: No. Kansas and Colorado had no further discussions of the idea, nor did Colorado provide any model runs until it submitted its official proposal on April 5, 2013.

Q: Do you think it is appropriate to characterize Colorado's CCP modeling proposal as your idea?

A: No. I was exploring ideas with Colorado ideas to fulfill the requirements of Colorado's Sand Hills Groundwater Management District while also fulfilling Kansas' need to account for the impacts that the CCP flows will have on the groundwater system.

Q: When was the first time that the Kansas team became aware of an approach of putting the augmentation water in every run of the model?

A: When we received the Colorado proposal in April 5, 2013.

Q: When did Colorado submit its revised CCP application to the RRCA pursuant to the dispute resolution provisions of the FSS?

A: On April 5, 2013.

Q: Was it designated as a fast-track dispute?

A: Yes.

Q: How long did the RRCA have to consider the new modeling approach that Colorado had first proposed on April 5, 2013?

A: Commissioner Wolfe requested that the RRCA have a special meeting to consider the matter with 30 days.

Q: What did you do when Kansas received Colorado's new augmentation modeling approach?

A: I immediately forwarded the proposal to the entire Kansas team. I spent time reviewing the proposal personally and assigning Dr. Perkins of my staff to take the lead in reviewing the proposal, particularly in regard to its quantitative effects. He shared his initial assessment with the technical team, including Dale Book and Steve Larson. During that time period, Kansas team was very engaged in litigation preparation and there were discussions with the broader team on one or more of those calls. The principle review was done internally by Dr. Perkins, Mr. Beightel and me. I worked with Commissioner Wolfe to schedule an RRCA work session to discuss the proposal, which occurred on April 22.

Q: Did you believe that additional time or additional review by Kansas outside expert would have resulted in a different action at the RRCA Special meeting?

A: No.

Q: Why, in summary, is Colorado's proposed use of the model not appropriate?

A: Colorado's current proposal is an inappropriate use of the Model to account for losses. Instead of using the model to determine the "augmentation credit" as required by the FSS, it increases each state's groundwater CBCU in the Swanson reach based on the additional flows. This also increases CBCU to Nebraska and Kansas.

The Colorado method of including augmentation outflows in the "No Colorado Pumping" run of the Model creates an artificial condition, one that has never

occurred, and one that appears to contradict itself, since the outflows cannot occur without the pumping that produces them.

The Colorado method underestimates the downstream losses of augmentation flows.

Q: Turning to the second main area of dispute on Colorado's CCP proposal, what is that dispute?

A: As was raised in the first arbitration, Kansas continues to believe that North Fork accounting credits must be limited to protect Kansas' interests on the South Fork.

Q: What is the main problem with Colorado's CCP proposal as it relates to the South Fork?

A: The North Fork CCP project, if not properly limited, allows Colorado to claim statewide compliance and thereby access the South Fork unallocated waters. We believe this is an inappropriate use of augmentation.

Q: Are you aware of James Slattery's opinion number 1, which addresses Colorado's ability to access the unallocated supply on the South Fork sub-basin?

A: Yes.

Q: Do you agree with his statement on page 2 that "the FSS gives Colorado the flexibility to use the unallocated water in the South Fork sub-basin in calculating its compliance with the Statewide CBCU test as long as Colorado does not impair Kansas' ability to use its allocated portion of the

South Fork sub-basin within the South Fork sub-basin and the overall Statewide test is satisfied"?

A: I don't think the statement addresses the fundamental issue. The issue of whether Colorado can use augmentation to get to statewide compliance and thereby access the South Fork unallocated supply. I am particularly concerned with them accessing Kansas' share of the unallocated supply.

Q: Are you aware of James Slattery's opinion number 4, which addresses the operational limits of the CCP Proposal?

A: Yes.

Q: Do you agree with his statement on page 6 that "Colorado and the other States understood and intended that so long as depletions were replaced though an augmentation plan, Colorado, Kansas, and Nebraska could continue to use the unallocated water in another sub-basin in compliance with the FSS."

A: No. I am aware of no discussions during the settlement on how augmentation might fit with unallocated waters.

Q: Were you present during the negotiations of the major components of the FSS?

A: Yes. I was a member of the negotiating committee, accounting committee and modeling committee. The provisions on augmentation and the provision on use of the unallocated waters in a sub-basin were major and significant to Kansas.

Q: Did you have any discussions with either Mr. Slattery or Mr. Hendrix about the interpretation of those provisions?

A: No. Mr. Slattery was a member of the modeling committee but that committee had no discussions on such matters of interpretation in its work. I don't recall Mr. Hendrix being involved in any of the committees.

Q: Did you have discussions with your counterparts from Colorado and Nebraska about the augmentation provisions and the provisions related to use of the unallocated waters in a sub-basin?

A: Yes.

Q: Did those discussions include an agreement to interpret the augmentation provisions as Mr. Slattery has described in his expert report?

A: No. In my discussions in the negotiations with my counterparts from Colorado and Nebraska, we did not agree to interpret the augmentation provisions to allow an augmentation credit in one sub-basin that would then allow consumption of unallocated waters from another sub-basin.

Q: Did either Hal Simpson or Dr. Ken Knox explain to you that Colorado interpreted the augmentation provisions in the way that Mr. Slattery describes in his expert report?

A: No.

Q: Did either Roger Patterson or Dr. Ann Bleed explain to you that Nebraska interpreted the augmentation provisions in the way that Mr. Slattery describes in his expert report?

A: No.

Q: Did anyone from the United States explain to you that the United States interpreted the augmentation provisions in the way that Mr. Slattery describes in his expert report?

A: No.

Q: Are you aware of any discussions between any representatives of the States and the United States where the representatives agreed to Mr. Slattery's interpretation of the augmentation provisions, as described in his expert report?

A: No.

Q: Has Kansas offered a compromise on this issue?

A: Yes. Through our settlement discussions, the States jointly developed language that would allow Colorado to use the entire unallocated supply of the South Fork until Kansas notified Colorado of its need for its share of that supply. There would then be a time period allowed for Colorado to develop means to keep from using that portion of the unallocated supply.

Q: What has been Colorado's response?

A: It is something we continue to discuss but they chose not to include it in their proposal to the RRCA.

Q: Colorado maintains that Kansas is not currently using its South Fork allocation and therefore is not being injured by Colorado's use of the South Fork.

A: It is true that Kansas use has always been within its specifically allocated share of the South Fork's water supply. In part, this is because of the lack of a

consistent supply from Colorado. Kansas will not willingly surrender, via Colorado's CCP plan approval, Kansas' potential for future use of its share.

Q: Turning to the third main area of dispute on Colorado's CCP proposal, what is that dispute?

A: Whether the revised application's provisions related to operational limits are sufficient.

Q: What is the problem with Colorado's proposal on this issue?

A: Kansas continues to hold that defined, transparent, and enforceable operational limits are necessary to ensure that CCP operations are reasonably tied to Colorado's North Fork overuse and that CCP deliveries should not replace Colorado's overuse in any other subbasin. As is discussed in Mr. Book's report, Colorado's revised proposal continues to have insufficient operational limits.

The FSS ties augmentation plans and augmentation credits to the purpose of a state keeping its use within its allocations. FSS Section III.B.1.k. states, "*Wells acquired or constructed by a State for the sole purpose of offsetting stream depletions in order to comply with its Compact Allocations.*"

In addition, plans and their accounting and modeling must be approved by the RRCA to ensure the augmentation is done in a way that is both consistent with the FSS and that is in the interests of all the States. This is necessary because augmentation can be done in quantities, timing and/or locations that may achieve

quantitative compliance but could reduce the usability of that water to the downstream state entitled to it.

Kansas needs to be able to verify that Colorado's CCP deliveries are needed for compact compliance. Kansas has agreed to reasonable over-delivery terms to allow for the uncertainty that is inherent in planning and projections.

The revised application's operational limits remain ambiguous and are not tied to Colorado's North Fork overuse but instead to its North Fork depletions which are much greater than its compliance needs.

Q. What are your concerns with respect to the use of augmentation to offset excessive groundwater CBCU?

A. Augmentation projects are complex water-engineering plans that provide a means by which groundwater depletions can replace the streamflow depletions their pumping causes, usually from an external source. These projects are used in Colorado and elsewhere in the west. As I understand it, under the laws of these states, such augmentation must replace streamflow depletions in such a way that senior users can obtain the same quantity of water to which they are entitled as they obtained before junior groundwater pumping impacted their supplies, and at the same time and location.

Timeliness and location are two critical components of the value of water. In the context of Compact compliance, augmentation plans require careful coordination between the states. Absent coordination with Kansas, there is the potential for Nebraska to implement augmentation in a way that would deliver water at times and locations divorced from the depletions they are meant to replace, potentially denying Kansas the full benefit of the water to which it is entitled.

The States must coordinate and negotiate to ensure that augmentation is done in a way that fulfills the Compact's purpose to avoid controversy and makes the most efficient and beneficial use of the waters of the Basin.

Q: Can you explain the distinction between depletions and overuse of allocations as it applies here?

A: Colorado's operational limits in Section 8 of its Resolution has a mixture of methods for projecting its delivery requirements, and it is unclear which, if any of them, are controlling.

First in Section 8.A, its deliveries are initially projected based on Colorado's largest stream depletions to the North Fork during the previous five years without Pipeline deliveries. Depletions in this context are synonymous with total Computed Beneficial Consumptive Use. This standard is not consistent with the FSS requirement that augmentation be for the purpose of insuring a state complies with its allocations, which requires that depletions be less than

allocations. Therefore it is the difference in allocations and use that is the measure of appropriate deliveries.

Q: Why does that matter for Colorado's CCP proposal?

A: The projection of delivery requirements based on the highest North Fork depletions is not an effective limit to ensure the deliveries are needed for compact compliance.

Q: What is Kansas seeking in terms of operational limits?

A: Resolution paragraph 8.E provides a framework for an operational limit that is tied to compact compliance. In subsequent discussions with Colorado, the states have developed refinements to the language of this paragraph to make it clear that this projection controls the deliveries for the year. Kansas recognizes that Colorado's compliance requirement is a 5-year average requirement and that it measured "after the fact." Thus Kanas has agreed that Colorado should be able to deliver up to 115% of a projected delivery based on its compliance need, when considering its South Fork obligation.

Q: Does Mr. Slattery refer to an upper limit of plus 15% for projected delivery?

A: Yes. It is in his Opinion number 4 on page 6 of his report.

Q: Where is this projected delivery limit in Colorado's proposed RRCA resolution or revised application for the CCP?

A: Colorado has not committed to that limit anywhere in the text of the proposed resolution or revised application.

Q: Do you believe that what Kansas has requested is unduly burdensome on the state of Colorado?

A: No. Colorado must have a means to project its delivery requirement in any case. Kansas is only seeking that its methods be defined, transparent, and enforceable.

<u>Section 3: Bonny Reservoir</u>

Q: Switching to the Bonny Reservoir Accounting Proposal, what are the main issues separating the States?

A: Colorado is characterizing its proposal as a straightforward and simple plan to reflect the draining of Bonny Reservoir and effectively return the model configuration to the "pre-Bonny condition". However, because of the current level of depletions that are occurring upstream of Bonny Reservoir, Colorado's proposed modeling change is inappropriate and inconsistent with the agreement that Kansas bargained for in the FSS. Colorado's proposal produces a substantial and unjustified impact on the Compact accounting; unreasonably reducing Colorado's groundwater computed beneficial consumptive use, increasing unaccounted for depletions (residuals) and reducing Kansas allocations, all with no reduction in pumping and little likelihood of an increase in wet water at the stateline over the long-term.

Q: Are you aware of Mr. Wolfe's second opinion, which says that Kansas had "no reasonable basis" to vote against the Bonny Reservoir Accounting Proposal?

A: Yes.

Q: Do you agree with that opinion?

A: No.

Q: Why not?

A: In light of the very significant impacts I just noted and have clearly and consistently relayed to Mr. Wolfe, I find his statement to be very surprising.

Q: Do you agree with Mr. Wolfe's accusation that you acted "unreasonably, arbitrarily and without sufficient basis" when Kansas voted no on May 2, 2013?

A: Not at all.

Q: Why not?

A: The impacts of Colorado's proposal noted above were well understood by Kansas and provided a reasonable basis for Kansas actions.

Q: When did Colorado submit its Bonny Reservoir Accounting Proposal to the RRCA pursuant to the dispute resolution provisions of the FSS?

A: April 5, 2013.

Q: Was it designated as fast-track dispute?

A: Yes

Q: How long did the RRCA have to consider Colorado's April 5, 2013 approach to Bonny Reservoir?

A: Commissioner Wolfe requested that the RRCA have a special meeting to consider the matter with 30 days.

Q: What did you do once you received Colorado's Bonny Reservoir proposal?

A: I immediately forwarded the proposal to the entire Kansas team. I spent time reviewing the proposal personally and assigning Dr. Perkins of my staff to take the lead in reviewing the proposal, particularly in regard to its quantitative effects.

Most of the essentials of the proposal conformed to the proposals the states had reviewed in our settlement discussions, so we had a fairly good idea of its quantitative impacts.

During that time period, the Kansas team was engaged in litigation preparation and there were discussions with the team on one or more of those calls. The principal review during the 30 day period allowed was done internally by Dr. Perkins, Mr. Beightel and me.

I worked with Commissioner Wolfe to schedule an RRCA work session to discuss the proposal, which occurred on April 22, 2013.

Q: Colorado asserts that it drained Bonny Reservoir to comply with the Compact – has Kansas ever requested that Colorado drain Bonny Reservoir?

A: No.

Q: What's the historical record of inflows going into Bonny Reservoir?

A: As in shown in Figure 4 of my 2010 report, inflows into Bonny Reservoir have been steadily declining for decades. This has led to drastic reductions in

reservoir storage contents since the mid-1990s as is show in Figure 5 of my 2010 report.

Q: Before Bonny Reservoir was drained, what were the major consumptive uses (component of CBCU) in Colorado in the South Fork sub-basin?

A: The principal uses are evaporation from Bonny Reservoir and Colorado's groundwater CBCU which was composed of the impacts due to groundwater pumping above and below the reservoirs and groundwater impacts at the reservoir itself. See Ex. CCP/BR-K24.

Q: Are you aware of any groundwater pumping reductions that have taken place in Colorado in the South Fork sub-basin?

A: As I have heard reported by Mr. Wolfe, Colorado has reduced surface water use, mostly through retirements, and has retired a limited amount of groundwater acreage, particularly using federal programs. I have heard no reports from Mr. Wolfe of Colorado implementing any particular controls or allocations on irrigation pumping from wells that remain authorized.

Q: Are those pumping reductions significant relative to Colorado's Compact overuse?

A: No. As is shown in Attachments 4 to my report, the impacts of Colorado's groundwater pumping continue to climb.

Q: Why does Kansas want Colorado to come into compliance with the Compact?

A: Kansas entitlements pursuant to the Compact are protected through the Compact's requirements for the upstream states to limit their use to their allocation. All of the Basin's waters are allocated between the states. When an upstream state uses more than its allocation, one or more of the downstream states will receive less than their allocation. It is a zero-sum game.

Q: How does it affect Kansas' water users in the South Fork sub-basin?

A: To the extent Colorado is using water beyond its entitlements, it reduces the availability and usability of the water supply available for Kansas water users.

Q: Does Colorado's proposal for modeling Bonny Reservoir have implications to Kansas water users beyond the South Fork basin?

A: Yes, it does in two ways. First, by reducing Kansas' allocation on the South Fork, the proposals also make Kansas' compliance on the Northwest Kansas test more difficult during water-short years. Kansas has relied upon unused South Fork allocation to help meet its Water-Short Year Administration compliance test. Second, to the extent the model change inappropriately reduces Colorado's CBCU, it would allow Colorado to use more water elsewhere, reducing downstream water availability on the main stem Republican River, of which Kansas is allocated at 51.1% share, which is critical to our lower Republican River water users. As the Bonny model change is sought as permanent change, I must be concerned about its potential effects on Kansas compliance and the usability of the supply on the South Fork into the long-term future.

Q: Is draining Bonny Reservoir likely to produce wet water at the Colorado-Kansas state line?

A: I believe it is likely to produce some additional water in the short term, as a result of reduced evaporation from Bonny. My concern is that over the long term, if facilitated by Colorado's proposals for Bonny Reservoir modeling and if Colorado is allowed to claim access to all the unallocated supply of the South Fork, Colorado will be able to continue the long-term dewatering of the basin, resulting in the drying up of the stateline for extended periods of time.

Q: Regarding Colorado's attempt to link the Bonny Reservoir Proposal to the CCP Proposal, is that necessary to reach resolution on both issues??

A: I do not see an essential tie between the CCP and Bonny proposals. Kansas has offered to settle the CCP issue separately from the Bonny Reservoir Proposal. I believe that the issues that separate Colorado and Kansas on the CCP are more straightforward and will be easier to resolve than the issues surrounding the changes to Bonny Reservoir operations.

Q: Did you read Mr. Wolfe's example on page 4 of his report of how he thinks that the RRCA review process under the FSS should work?

A: Yes.

Q: Is his example a fair comparison to the situation that Kansas faces?

A: As I read Mr. Wolfe's opinion he indicates his belief that the states should give deference to proposals of the other states as long as they are "rational" and do not injure another state's interest as protected by the Compact and FSS. He gives an example based on Colorado's own review of Nebraska's recent proposals. This standard is nowhere in the Compact or FSS and was not part of the FSS negotiations. His example has little similarity to the decision Kansas

faces in reviewing and responding to the present disputes. Colorado and Nebraska are seeking to implement permanent changes to the FSS. The FSS requires RRCA approval for a limited set of actions, principally those actions that implement previously unused provisions and change existing provisions. As the downstream state, the availability and usability of Kansas Republican River water supply is dependent on the non-use by the upstream states. Greater flexibility to upstream states affords greater opportunity for use. Mr. Wolfe does not have to weigh these considerations as he evaluates the impacts of Nebraska's actions downstream of Colorado.

Contrary to Mr. Wolfe's argument for deference, I believe the upstream states, when seeking to implement previously unused provisions of the FSS affording them increased and permanent flexibility for compliance, should anticipate the need to work closely with Kansas to ensure that the delicate balance of upstream flexibility and downstream protection, as negotiated in the FSS, is not upset.

Q: Is his characterization of Colorado's analysis of Nebraska's Rock Creek Augmentation a fair one?

A: No. Colorado and Nebraska have agreed to support each others' proposals before the RRCA, as shown by their 2010 and 2012 agreements. See Ex. CCP/BR-K22 (stip). Mr. Wolfe testified that this remains the situation at the recent arbitration hearing for Nebraska's Rock Creek Augmentation Plan, which I personally attended. These agreements undercut the idea that Colorado and

Nebraska are engaged in the same level of technical, legal, and policy analysis when evaluating each others' proposals.

Q: Did Kansas undertake a serious evaluation of Nebraska's proposal?

A: Yes, and it was clear very quickly that the proposal did not address Kansas' legitimate concerns about augmentation plans. Perhaps the most obvious deficiency was that Nebraska refuses to accept that FSS Section IV.H. requires informing the model of the augmentation water in order to calculate the augmentation credit. See Ex. CCP/BR-K18, p. 5 (using the "measured quantity of water" for the augmentation credit). Nebraska has proposed that it be given a 100% credit in the accounting for augmentation deliveries with no reduction for downstream losses. Kansas agreed with Arbitrator's Pagel's determination in 2010 that using measured augmentation discharge alone, with no adjustment for downstream impacts, failed to satisfy the requirement in FSS Section IV.H. to use the model to calculate the augmentation credit. See Ex. CCP/BR J-15, p. 10-11. Nebraska refused to agree to that approach, and therefore Kansas could not accept Nebraska's proposal.

Q: Mr. Wolfe has indicated that Kansas had no reasonable basis for its vote against its Bonny Reservoir Proposal. Has Kansas expressed its concerns with the approach?

A: Yes. From the beginning we have repeatedly and consistently expressed concerns about the proposal's radical reduction in groundwater CBCU, its implications to the accountings for both states, and our view that the change

does not realistically represent the effect of Colorado's pumping impacts on the South Fork system.

Q: How would you characterize Colorado's response to Kansas' concerns with the Bonny Modeling Proposal?

A: While there have been some refinements to Colorado's proposed modeling approach over time and increasing sophistication, the results of these approaches have changed very little. There has been nothing to address Kansas' fundamental concerns. Each proposal continues to allow the drastic reduction in Colorado's groundwater CBCU via evaluation of these pumping impacts through the long reach below Bonny Reservoir, most of it in Kansas with Kansas pumping on.

This is a complex issue that has no precedent in the Compact's history: a state draining a federal reservoir and leaving the structure intact. Furthermore, the physical situation has been in flux for the past two years and I think it is fair to say that no one knew how the reservoir would operate in its "drained" state. There have been and continue to be significant uncertainties regarding the ability of the outlet works to pass all inflows and runoff events in a manner that would reasonable called "run of the river" under current conditions, much less the "No Colorado Pumping" condition. There is uncertainty regarding the extent and composition of the riparian area now and into the future and the reservoir-induced water table that will remain in the "drained" condition and whether it will the source of significant losses.

Kansas has long-held the that continuing physical presence of dam structure means that inflows will continue to be re-timed. While Colorado makes some accommodation for this in its proposal, it does so based on current depleted inflow conditions. The RRCA evaluation of pumping impacts compares this condition with a “No Colorado Pumping” condition, which would have significantly greater baseflows.

The Bureau of Reclamation has expressed varies concerns about whether the outlet works would be able pass inflows through winter conditions. Even now we do not have a reliable rating curve for the outlet. See CCP/BR-K26.

Q: What is your response to Dr. Schreüder argument that, with the changed Bonny operations, Colorado should be provided the same transit loss offset (”credit”) for its South Fork groundwater CBCU that it is allowed in the Swanson Reach of the main stem?

A: The States were aware of the so-called negative depletions that accrue regularly to the mainstem reach of the Republican River above Swanson and at a few other locations with less regularity and in lesser amounts. The State’s agreed to these peculiarities of the accounting as part of the overarching agreement the resulted in the FSS due to their understood and limited magnitudes, not as a matter of general principle. Kansas has not agreed to such an arrangement on the South Fork.

Q: What concerns do you have regarding Colorado's proposal for assessing evaporation from Bonny Reservoir?

A: Colorado's proposal would assess evaporation from the free water surface area only. I believe there is potential for significant water use due to growth of phreatophytes within the reservoir area that will not be considered in this approach.

Q: Do you have a recommendation for determining this use?

A: Not at this time. The reservoir area is undergoing significant change and this is likely to continue into the future. In our discussions, Colorado has suggested that this vegetation is currently and will continue to be similar to a normal riparian corridor of the area. I believe it is premature to assume that this will continue to be the case. I believe the issue must remain open to further review and action by the States and that Colorado should be assessed losses from the reservoir area that are not water surface but are beyond the normal band of riparian vegetation of a stream corridor as a result of Colorado's action in draining the reservoir.

Pursuant to 28 U.S.C. §1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on September 20th , 2013.

David W. Banfield