Engineering Committee Report Republican River Compact Administration

August 21, 2020

EXECUTIVE SUMMARY

The Engineering Committee (EC) met five times since the August 22, 2019, Republican River Compact Administration (RRCA) Annual Meeting. Over the past year, the EC completed these assignments: 1) hold quarterly meetings; 2) exchange information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, including all required data and documentation; 3) finalize 2019 accounting; 4) review the Flood Flows provisions of the RRCA Accounting Procedures so that 2019 accounting results can be approved at the 2020 Annual Meeting; 5) continue work on documenting historical changes to the RRCA Accounting Procedures; 6) provide updates on the progress of new and ongoing management strategies for maintaining compact compliance; 7) continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC; 8) continue work and provide updates on improving accounting tools developed by the Engineering Committee; and 9) prepare the 2019 RRCA annual meeting report.

Ongoing assignments include: 1) hold quarterly meetings; 2) continue to work on developing a recommendation for modifying the Flood Flows provisions of the RRCA Accounting Procedures to bring them into conformance with the intent of the Final Settlement Stipulation (FSS); 3) continue work on documenting historical changes to the RRCA Accounting Procedures; 4) provide updates on the progress of new and ongoing management strategies for maintaining compact compliance; 5) work on maintaining and enhancing the RRCA public website; 6) continue work and provide future updates on improving accounting tools developed by the Engineering Committee.

The EC recommends discussion by the RRCA on the exchange of data, modeling results, and proposed accounting for 2019; modeling and data tasks to be assigned to Principia Mathematica for 2020; the ongoing maintenance and updating of the RRCA website; the EC findings regarding Flood Flows provisions in the current Accounting Procedures and proposed revisions to the Accounting Procedures and Rules and Regulations; and the recommended EC assignments for the following year.

Details of the various EC tasks are described further in the remainder of this report, including:

Attachment 1: Minutes of the quarterly meetings of the EC
Attachment 2: Accounting Inputs and Accounting Tables from the RRCA Accounting for 2019 recommended by the EC for approval by the RRCA
Attachment 3: Compilation of documents exchanged regarding the Flood Flows provision

COMMITTEE ASSIGNMENTS AND RELATED WORK ACTIVITIES

1. Meet quarterly to review the tasks assigned to the committee.
    a. The EC met October 10, 2019; January 16, 2020; April 16, 2020; July 23, 2020; and August 19, 2020. See Attachment 1 for the approved notes of these meetings.
    b. The EC recommends that this task continue.
2. Exchange by April 15, 2020, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including all necessary documentation. By July 15, 2020, the states will exchange any updates to these data.
    a. Nebraska posted its data on April 15, 2020 and provided an update on July 15, 2020.
    b. Kansas posted its data on April 15, 2020 and provided an update to the data on June 22, 2020.
    c. Colorado posted its data on April 4, 2020 and added Crop Irrigation Requirement (CIR) data on July 3, 2020.
3. Finalize the 2019 accounting and recommend it for approval by the RRCA.
    a. Colorado, Kansas, and Nebraska accounting data for 2019 is final and the EC hereby recommends its approval by the RRCA.
    b. The applicable summary accounting tables are presented in Attachment 2.
4. Review the Flood Flows provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.
    a. The EC agrees that the Accounting Procedures (Rev. May 25, 2017) do not properly implement the Flood Flows provisions at the Hardy gage with respect to the calculation of Computed Water Supply above and below Guide Rock and that Attachment 6 calculates the Virgin Water Supply Guide Rock to Hardy rather than Computed Water Supply Guide Rock to Hardy which would reduce the Virgin Water Supply by the relevant Flood Flows as described in Section II. Definitions and Section III. Basic Formulas.
    b. Due to the infrequent occurrence of Flood Flows, the EC recommends deferred resolution of the matter to a future date necessitated by and preceding impact to Nebraska's Table 5C compliance. The EC proposes adding clarifying notes to the RRCA Accounting Procedures and Reporting Requirements, and subsequently adopting the revised Accounting Procedures into the RRCA's the Rules and Regulations, to document these findings.
    c. Attachment 3 is provided as a compilation of the documents that were exchanged between Colorado, Kansas, and Nebraska in efforts to resolve the issue between the 2019 and 2020 annual meetings.

d. The EC recommends that the task of modifying the Flood Flows provisions of the RRCA Accounting Procedures to bring them into conformance with the intent of the FSS continue.

5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
    a. A draft of this document has been developed by Kansas and is currently being reviewed by Colorado and Nebraska.
    b. The EC recommends that this task continue.
6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
    a. Nebraska provided updates on projects in-progress by the Nebraska Bostwick Irrigation District (automation of headgates at Guide Rock and work on Courtland/Superior canals) and Frenchman-Cambridge Irrigation District (automation of the Meeker-Driftwood canal system). In addition, Nebraska described Middle Republican Natural Resources District's remote meter monitoring project.
    b. Kansas provided an update on Kansas Bostwick Irrigation District's progress burying lateral pipes in the district. Kansas also provided an update on a project to evaluate water management effectiveness.
    c. Colorado provided two updates on deliveries by the Colorado Compliance Pipeline.
    d. The EC recommends this task as a recurring assignment.
7. Continue efforts to develop and publish an administrative website that would be an informational page for the public.
    a. State staff have maintained and updated the website which is accessible to the public.
    b. The EC recommends this task as a recurring assignment to maintain the website and provide regular updates to the EC.
8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
    a. The EC continues to use the website accounting tool to validate the accounting spreadsheet results.
    b. The EC recommends this task as a recurring assignment.
9. Prepare the 2019 RRCA annual meeting report for approval by the RRCA at the 2020 annual meeting
    a. The report has been finalized and approved by the EC and is hereby recommended for approval by the RRCA.

ITEMS FOR RRCA DISCUSSION & ACTION

1. Data exchange and modeling results for 2019. The EC recommends the proposed 2019 accounting presented in Attachment 2 and in the spreadsheet titled "RRCA Accounting 2019 Final.xlsx" for approval by the RRCA. Upon approval of the accounting, the above-mentioned spreadsheet file will be placed on the public website.
2. Modeling and data tasks to be assigned to Principia Mathematica for 2020. The EC recommends that Principia Mathematica continue to perform periodic model and accounting updates at the same level of service as in 2019.
3. The EC has continued to maintain and update the RRCA website. The website's purpose is to provide public information, including history of the compact and the RRCA, links to compact-related data and reports, state information, etc. The EC requests any additional comments and direction from the commissioners on the content that the RRCA wants published to the website.
4. Discussion on the EC's finding that the Accounting Procedures (Rev. May 25, 2017) do not properly implement the Flood Flows provisions at the Hardy gage with respect to the calculation of Computed Water Supply above and below Guide Rock and that Attachment 6 calculates the Virgin Water Supply Guide Rock to Hardy rather than Computed Water Supply Guide Rock to Hardy which would reduce the Virgin Water Supply by the relevant Flood Flows as described in Section II. Definitions and Section III. Basic Formulas. Due to the infrequent occurrence of Flood Flows, the EC recommends deferred resolution of the matter to a future date necessitated by and preceding impact to Nebraska's Table 5C compliance. The EC is providing a proposed revision to the RRCA Accounting Procedures and Reporting Requirements, and subsequent revision to the Rules and Regulations, to make note of these findings.
5. Discussion of the recommended EC assignments and other potential assignments for the next year and agreement on a final set of assignments. The EC presents the following list of recommended assignments to report on at the 2021 annual meeting of the RRCA.

RECOMMENDED ASSIGNMENTS FOR THE COMING YEAR

The Engineering Committee recommends that the Republican River Compact Administration assign the following tasks:

1. Meet quarterly to review the tasks assigned to the committee.
2. Exchange by April 15, 2021, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including all necessary documentation. By July 15, 2021, the states will exchange any updates to these data.
3. Finalize the 2020 accounting and recommend it for approval by the RRCA.
4. Continue to work on developing a recommendation for modifying the Flood Flows provisions of the RRCA Accounting Procedures to bring them into conformance with

the intent of the FSS.

5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
7. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.
8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
9. Prepare the 2020 RRCA annual meeting report for approval by the RRCA at the 2021 annual meeting

The Engineering Committee Report and the exchanged data will be posted on the web at

http://republicanriver.org/

SUBMITTED TO THE RRCA BY

Ivan Franco, Engineering Committee Member for Colorado

Christopher Beightel, Engineering Committee Member for Kansas

Carol Flaute, Chair and Engineering Committee Member for Nebraska

Meeting Minutes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
10 October 2019, 1:00 PM Central Time
Meeting was held via conference call

Attendees:

Carol Myers Flaute, Nebraska
Kari Burgert, Nebraska
Jesse Bradley, Nebraska
Catherine Jensen, Nebraska
Ivan Franco, Colorado
Chris Beightel, Kansas

Agenda Items and Notes:

1. Introductions
2. Review/Modify Agenda (Attachment A)
   - Flaute amended task list item 9.c. to include 2016 and 2017 annual meeting reports, in addition to the 2018 report.
3. Review and Update Progress on Engineering Committee Task List

   3.1. Meet quarterly to review the tasks assigned to the committee.
   - This is the first quarterly Engineering Committee (EC) meeting for the 2019 reporting year

   3.2. Exchange by April 15, 2020, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including all necessary documentation. By July 15, 2020, the states will exchange any updates to these data.
   - No updates.

   3.3. Finalize the 2019 accounting and recommend it for approval by the RRCA.
   - No updates.

   3.4. Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.

- Nebraska distributed a handout (Attachment B) about the flood flow provisions at the August 22, 2019 Annual meeting, and later emailed both the first handout and a second handout (Attachment C) to Kansas and Colorado in preparation for this meeting. The second handout outlines a timeline for addressing this assignment before the 2020 annual meeting and introduces some conceptual options for how the flood flows procedures for Guide Rock could be adjusted to address the flood flows issue.
- Bradley reviewed the options presented in the second handout. Beightel and Franco reported that Kansas and Colorado have not yet reviewed the second handout fully and have no specific questions at this time. Nebraska requested that Kansas and Colorado complete their reviews and provide feedback within the next 45 days.
- Bradley outlined that the next steps for completing this assignment are 1) to try to reach an agreement that the intent of the flood flows accounting procedure is not currently being met for the Guide Rock accounting point, then 2) to reach agreement on how the three states want the procedure to work conceptually, and 3) work on developing procedures. Once Nebraska receives input from the other states on the conceptual options presented, Nebraska can begin drafting technical details for the EC to review.
- Franco noted that he appreciates the additional clarity provided at this meeting about Nebraska's proposed approach for this task.
- **Action item: Kansas and Colorado will send Nebraska comments and guidance on which alternative or intention the other states would like to see the handling of flood flows, within 45 days.**

3.5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.

- KS is still working on incorporating NE comments.
- **Action item: KS will send out document for review when all comments have been incorporated.**

3.6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.

- Nebraska, reported that NBID has submitted a WaterSMART grant with the Bureau of Reclamation for automation of headgates at Guide Rock. FCID has received a grant from WaterSMART for automation of the Meeker-Driftwood canal system, and Nebraska has also committed about $2 million from the settlement with Colorado to supporting this project.
- Kansas reported KBID is continuing the burying of lateral pipes in the district using existing WaterSMART grants.

- Colorado had no updates at this time.

3.7. Continue development and maintenance of the RRCA administrative website (www.republicanriver.org) that serves as an informational page for the public and provide regular updates to the EC.

- No website committee members were present. Flaute pointed out that only the 2017 annual report is currently on the administrative site, and that the administrative site currently links to the technical site for all other reports; however, the technical data sharing site (http://www.republicanrivercompact.org/) does not have any reports after 2016. All EC members agreed that the preference would be to have the reports on the administrative site rather than on the technical site.
- **Action item: Nebraska's website team member will reach out to Chelsea (Kansas) to work on adding the annual reports to the administrative site.**

3.8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.

- No updates.

3.9. Prepare the 2019 RRCA annual meeting (KS) report.

3.9.1. Status of meeting summary for November 6, 2018, Special Meeting (KS)

- Kansas expects to be sending out November 6th meeting summary to the other states soon.

3.9.2. Status of meeting summary for August 22, 2019, Annual Meeting (KS)

- Kansas is expecting the transcript shortly, and after they review it, they will send it to both Nebraska and Colorado at the same time for their reviews.

3.9.3. Reminder to distribute 2016–2018 RRCA annual meeting reports to President of the United States and Federal agencies (KS), and State Governors (CO, KS, and NE)

- Nebraska has not sent any reports after the 2015 annual meeting report to the Nebraska Governor and wants to make sure that all reports have been sent to the President's office and all federal agencies that normally get it. In the past, the annual meeting host state has sent annual reports to the President and federal agencies, and all states have sent the reports to their own Governor and any other in-state recipients. Flaute asked the other states to verify whether they have already sent reports for the 2016–2018 annual meetings to the President and federal agencies. A suggestion was made to use RRCA letterhead to create one letter, to be emailed simultaneously to all state and federal recipients, and that the letter will direct all agencies to the website to download the reports. All states agreed. Nebraska will draft the

letter for the EC to review. Following EC review, identification of which state and federal contacts have not yet received the 2016–2018 annual meeting reports, upload of the 2016–2018 annual reports to the administrative website, the letter will be emailed to the appropriate recipients.

- **Action item: Colorado will verify whether they already sent the 2016 and 2017 annual meeting reports to President and federal agencies, and Kansas will verify the same for the 2018 annual report.**
- **Action item: Nebraska will draft a letter to the President and to federal and state agencies, on RRCA letterhead, to provide a link for where to download the 2016–2018 annual meeting reports.**

4. Summary of Meeting Actions/Assignments
    - Kansas and Colorado will send comments and guidance to Nebraska on which alternative or intention the other states would like to see the handling of flood flows, within 45 days.
    - KS will send out Accounting Procedure documentation memorialization document for review when all comments have been incorporated.
    - Nebraska's website committee representative will contact Chelsea (Kansas) to work on updating the annual reports on the administrative site.
    - Kansas will provide a summary of the November 6, 2018, Special Meeting to the other states when it is ready.
    - Kansas will send out the draft transcript of the 2019 Annual Meeting to both Colorado and Nebraska after their initial review.
    - Colorado will verify whether they already sent the 2016 and 2017 annual meeting reports to President and federal agencies, and Kansas will verify the same for the 2018 annual report, and both will verify whether they have already sent the 2016–2018 reports to their states' governors NE will send the 2016–2018 annual reports to Nebraska Governor and related offices.
5. Future Meetings
    5.1. Next meeting is January 16, 2020 at 1:30 pm
6. Adjournment 1:35 PM Central

AGENDA for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
October 10, 2019 1:00 PM Central Time

Desktop Share info: https://zoom.us/j/106882033
Call in #: 720 707 2699
Meeting ID: 106 882 033

1. Introductions
2. Review/Modify Agenda
3. Review and Update Progress on Engineering Committee Task List (Below agenda items)
4. Summary of Meeting Actions/Assignments
5. Future Meetings
    a. Q2 – January 16, 2020, 1:30 pm
    b. Q3 – April 16, 2020, 1:30 pm
    c. Q4 – July 23, 2020, 1:30 pm
6. Adjourn

ENGINEERING COMMITTEE TASK LIST

1. Meet quarterly to review the tasks assigned to the committee.
2. Exchange by April 15, 2020, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including all necessary documentation. By July 15, 2020, the states will exchange any updates to these data.
3. Finalize the 2019 accounting and recommend it for approval by the RRCA.
4. Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.
5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
7. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.
8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
9. Prepare the 2019 RRCA annual meeting (KS) report.
    a. Status of meeting summary for November 6, 2018, Special Meeting (KS)
    b. Status of meeting summary for August 22, 2019, Annual Meeting (KS)
    c. Reminder to distribute 2018 RRCA annual meeting report to President of the United States and Federal agencies (KS), and State Governors (CO, KS, and NE)

Overview:

Preliminary 2019 accounting results suggest the RRCA accounting will need to employ procedures for addressing "flood flows" as described in the Final Settlement Stipulation (FSS) and Accounting Procedures and Reporting Requirements (Accounting Procedures). This will be the first time that the Accounting Procedures have needed to account for flood flows since the implementation of the FSS and Accounting Procedures. Streamflow data indicate that the flood flow trigger for the Main Stem at the Hardy gage was met at the end of July. Flood flow adjustments are also expected to occur in the Sappa Creek and Prairie Dog Sub-basins in 2019 based on current streamflow projections. In developing updated accounting estimates of the impacts of these flood flows, NeDNR staff recognized that an oversight appears to have been made with the way the Accounting Procedures handle flood flows when splitting allocations between above and below Guide Rock. Under the current methods, gains between Guide Rock and Hardy are subtracted from the above Guide Rock allocation when flood flows are present on the Main Stem. This apparent accounting oversight causes Guide Rock allocations to decrease after the flood flow threshold is met and could result, in extreme conditions, in producing negative allocations for the above Guide Rock portion of the Main Stem (Figure 1).

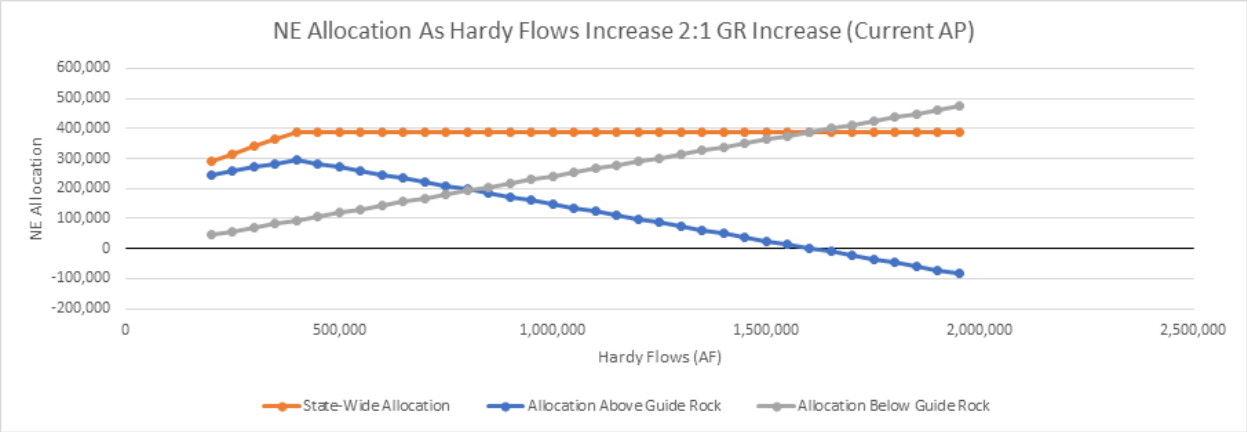

Figure 1: Results based on current Accounting Procedures when streamflow gains downstream of Guide Rock

Application of the flood flow adjustment would typically result in establishing an upper limit of allocations that the state will receive within that sub-basin once the flood flow threshold has been reached. The Accounting Procedures describe the methods used to apply the flood flow adjustment and the application of the flood flow adjustment in the accounting spreadsheet appears to conform to the methods outlined in the Accounting Procedures for all state-based tests with the exception of the Table 5C and Table 5D tests for the sub-basin upstream of Guide Rock. The result of applying the flood flow adjustment to the Table 5C and Table 5D tests seems inconsistent with the flood flow adjustment methods applied to other state-based tests and creates a unexpected result in which the allocation above Guide Rock in the Table 5C and 5D tests can be reduced as streamflow continues to accrue downstream. No other sub-basin allocations are reduced in this manner, and it appears this adjustment is inconsistent with the intent of the flood flow procedures and may not have been fully contemplated in the development of the Accounting Procedures.

Background of FSS and Accounting Procedures:

Flood flows are defined in the FSS and Accounting Procedures as follows:

> **Flood Flows:** The amount of water deducted from the Virgin Water Supply as part of the computation of the Computed Water Supply due to a flood event as determined by the methodology described in the RRCA Accounting Procedures, Subsection III.B.1.;

Additionally, the Accounting Procedures also describe the method used to determine when flood flows occur and how they are to be adjusted from the Main Stem Virgin Water Supply to calculate the computed water supply. The following is an excerpt from the May 25, 2017 version of the Accounting Procedures (page 14).

> 1. Flood Flows
> If in any calendar year there are five consecutive months in which the total actual stream flow at the Hardy gage is greater than 325,000 Acre-feet, or any two consecutive months in which the total actual stream flow is greater than 200,000 Acre-feet, the annual flow in excess of 400,000 Acre-feet at the Hardy gage will be considered to be Flood Flows that will be subtracted from the Virgin Water Supply to calculate the Computed Water Supply, and Allocations. The Flood Flow in excess of 400,000 Acre-feet at the Hardy gage will be subtracted from the Virgin Water Supply of the Main Stem to compute the Computed Water Supply unless the Annual Gaged Flows from a Sub-basin, minus the Augmentation Pumping Volume for that Sub-basin, were in excess of the flows shown for that Sub-basin in Attachment 1. These excess Sub-basin flows shall be considered to be Sub-basin Flood Flows.
>
> If there are Sub-basin Flood Flows, the total of all Sub-basin Flood Flows shall be compared to the amount of Flood Flows at the Hardy gage. If the sum of the Sub-basin Flood Flows are in excess of the Flood Flow at the Hardy gage, the flows to be deducted from each Sub-basin shall be the product of the Flood Flows for each Sub-basin times the ratio of the Flood Flows at the Hardy gage divided by the sum of the Flood Flows of the Sub-basin gages. If the sum of the Sub-basin Flood Flows is less than the Flood Flow at the Hardy gage, the entire amount of each Sub-basin Flood Flow shall be deducted from the Virgin Water Supply to compute the Computed Water Supply of that Sub-basin for that year. The remainder of the Flood Flows will be subtracted from the flows of the Main Stem.

Additionally, the Accounting Procedures describe the methods used to determine the computed water supply between Guide Rock and Hardy and above Guide Rock. The following is an excerpt from the Accounting Procedures (page 19).

> The Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage shall be determined by taking the difference in stream flow at Hardy and Guide Rock, adding Computed Beneficial Consumptive Uses in the reach (this does not include the Computed Beneficial Consumptive Use from the Superior and Courtland Canal diversions), and subtracting return flows from the Superior and Courtland Canals in the reach. The Computed Water Supply above Guide Rock shall be determined by subtracting the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage from the total Computed Water Supply. Nebraska's Allocation above Guide Rock shall be determined by subtracting 48.9% of the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage from Nebraska's total Allocation. Nebraska's Computed Beneficial Consumptive Uses above Guide Rock shall be determined by subtracting Nebraska's Computed Beneficial Consumptive Uses below Guide Rock from Nebraska's total Computed Beneficial Consumptive Use.

Calculations contained in the current accounting spreadsheet attempt to implement the above method but appear to fail in connecting the flood flow adjustment with these calculations of the allocation above Guide Rock. This is evidenced by the fact that as streamflows increase from Guide Rock to Hardy, the results indicate a reduction of allocation above Guide Rock, which is inconsistent with results when adjustments are made to the entire Main Stem or the sub-basins. Therefore, it appears that the allocation above Guide Rock is being modified differently than other allocations and the specific methodology for making the flood flow adjustment at this location does not seem to have been fully contemplated in the Accounting Procedures.

Example of the Issue:

Three examples of the impacts on the allocation above Guide Rock are illustrated below. Example one establishes the allocation above Guide Rock as the flood flow threshold is reached. The second example illustrates that the allocation above Guide Rock is unchanged as the flood flow threshold is exceeded and the same amount of streamflow travels past both Guide Rock and Hardy. The third example illustrates how the allocation above Guide Rock decreases as streamflow continues to accrue in the Guide Rock to Hardy reach (downstream of Guide Rock). This third example is the typical characteristic of the sub-basin downstream of Guide Rock.

Example 1 – Flood Flow Threshold Met

(415,300 AF streamflow at Hardy and 300,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	53,497	**334,763**

*Excerpt from Table 5C. These same values are included in Table 5D.

Example 2 –Flood Flow Threshold Exceeded by 120,000 AF at Hardy with the same amount of increased flow at Guide Rock

(535,300 AF streamflow at Hardy and 420,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	53,497	**334,763**

*Excerpt from Table 5C. These same values are included in Table 5D.

Example 3 –Flood Flow Threshold Exceeded by 120,000 AF at Hardy with a lower amount of increased flow at Guide Rock (80,000 AF)

(535,300 AF streamflow at Hardy and 380,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	73,057	**315,203**

*Excerpt from Table 5C. These same values are included in Table 5D.

In Example 2, the same amount of additional streamflow is added to both the Hardy and Guide Rock gages. With the streamflow increase being the same at both locations, the resulting allocation above Guide Rock is unchanged. In Example 3, additional streamflow is added to Hardy and Guide Rock, but the increase at Guide Rock (80,000 AF) is less than the increase at Hardy (120,000 AF). The resulting allocation above Guide Rock is reduced by 19,560 AF [0.489* (120,000 – 80,000)] even as the amount of streamflow traveling past Guide Rock increases by 80,000 AF. This result is driven by additional allocation accruing downstream of Guide Rock as the streamflow term increases between Guide Rock and Hardy. Thus, as can been seen from Example 3, for every two acre-feet of flow past Hardy that does not flow past Guide Rock, the allocation above Guide Rock is reduced by approximately one acre-foot. This impact on the allocation appears to be erroneous, inconsistent with other sub-basin adjustments implemented in the Accounting Procedures, and not fully contemplated in the Accounting Procedures.

Proposed Path Forward:

Nebraska seeks concurrence from the RRCA Commissioners that the principle issue requires resolution to be in conformance with the intent of the FSS and Accounting Procedures and that an assignment be made to the RRCA Engineering Committee to recommend an appropriate solution to the commissioners prior to the 2020 Annual Meeting.

September 9, 2019

RRCA Engineering Committee Assignment: Review Flood Flow Provisions of the RRCA Accounting Procedures

OVERVIEW OF TASK

At the RRCA annual meeting working session Nebraska reviewed a memorandum provided to the Engineering Committee (EC) on August 19, 2019 in which concern related to a flood-flow accounting issue was identified. The memorandum provided by Nebraska explained the unexpected behavior of the allocation above Guide Rock due to mainstem flood-flow adjustments. Based on these discussions the RRCA agreed to establish the following assignment for the EC:

> *Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.*

PROPOSED TIMELINE FOR COMPLETION

The EC assignment was adopted by the RRCA at the annual meeting on August 22, 2019. The assignment must be completed in time for the 2019 accounting to be approved at the 2020 RRCA Annual Meeting. Nebraska is proposing the following subtasks and timeline for this assignment:

October 2019:	EC discuss current accounting provisions and establish conceptual understanding of how Guide Rock allocation should behave when flood flows occur in the mainstem
January 2020:	EC review and discuss potential accounting procedure changes needed to accommodate expected behavior of Guide Rock allocation.
April 2020:	EC discuss and agree to specific draft changes to Accounting Procedures methods
July 2020:	EC implement agreed upon changes in conjunction with completion of 2019 accounting
August 2020:	Recommend updated Accounting Procedures and final 2019 accounting for approval by RRCA

Since there are no specific instructions in the FSS or the Accounting Procedures about how to handle flood flows at the Guide Rock gage nor to the allocation above Guide Rock, we are proposing to start with conceptual agreement about how to apply the flood-flow adjustment. Once a conceptual agreement has been reached we will then work to make the necessary modification to the Accounting Procedures and accounting spreadsheet conform to the agreed upon concepts and implement those changes in performing final 2019 accounting.

GUIDE ROCK FLOOD-FLOW ADJUSTMENT OPTIONS

Guide Rock flood flows are not defined in the Accounting Procedures, and unlike other accounting sub-basins, no Guide Rock flood flow threshold has been established . Conceptually, the Accounting Procedures should define when Guide Rock Flood Flows should be applied and the method of determining the appropriate threshold or limit on stream flows. Nebraska has provided fictional examples in Figure 1 for purposes of furthering this conceptual conversation.

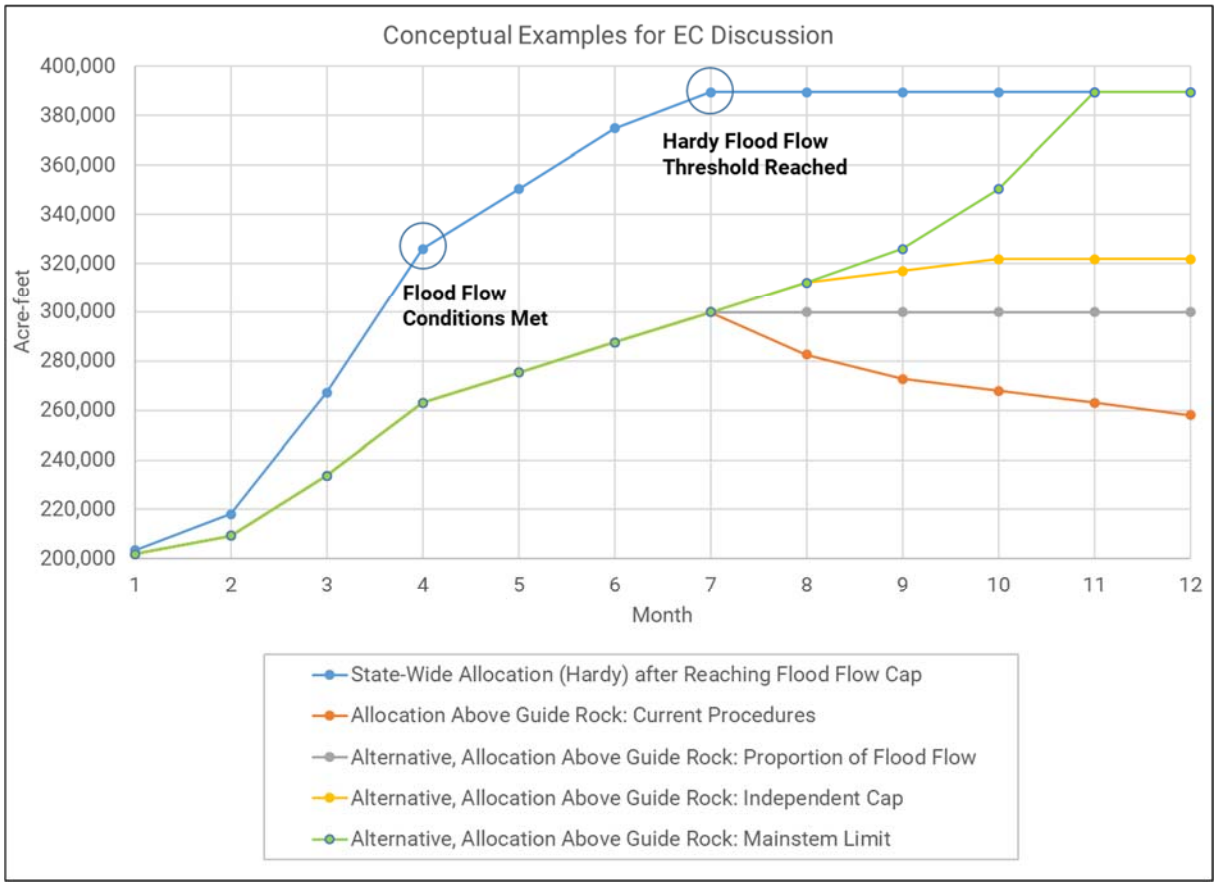

Figure 1. Conceptual examples of above Guide Rock behavior for Discussion with EC

Meeting Minutes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
January 16, 2020, 1:30 PM Central Time
Meeting was held via Conference call

Attendees:

Carol Myers Flaute, Nebraska
Jesse Bradley, Nebraska
Kari Burgert, Nebraska
Catherine Jensen, Nebraska
Ivan Franco, Colorado
Chris Beightel, Kansas
Chelsea Erickson, Kansas
Ginger Pugh, Kansas
Willem Schreüder, Principia Mathematica

Agenda Items and Notes:

1. Introductions
2. Review/Modify Agenda (Attachment A)
3. Approval of Minutes October 10, 2019
   3.1. Nebraska has sent the draft minutes to Kansas and Colorado.
   3.2. Action item: All states will review the October minutes and approve them through email.
4. Review and update progress on engineering committee task list
   4.1. Meet quarterly to review the tasks assigned to the committee.
      - This is the second quarterly meeting for the 2019 reporting year.
   4.2. Exchange by April 15, 2020, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including all necessary documentation. By July 15, 2020, the states will exchange any updates to these data.
      - Nebraska has started to request data from Irrigation Districts, Power Companies and the Bureau of Reclamation. Kansas and Colorado did not have any updates.
   4.3. Finalize the 2019 accounting and recommend it for approval by the RRCA.
      - No states had any updates at this time.

4.4. Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.

- Kansas sent an email (Attachment B) in response to Nebraska's preliminary proposal for how to address the flood flows accounting issue. Beightel brought up a scenario showing how Nebraska's preliminary proposal could result in a negative allocation below Guide Rock. Kansas is asking Nebraska and Colorado if they concur that this is an issue. Kansas has offered an alternative proposal and asked Nebraska to review the email and see if there is agreement on whether there is a problem with the original proposition and if so, whether the Kansas proposal is the way to address it. Nebraska will need more time to consider.
- **Action item: Nebraska will aim to review Kansas proposal on flood flow proportioning by the Three-States meeting.**

4.5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.

- Kansas is still working on incorporating Nebraska comments.
- **Action item: Kansas will send out document with Nebraska comments to Colorado.**
- **Action Item: Kansas will send out document for review to all states when all comments have been incorporated.**

4.6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.

- No state had any updates at this time.

4.7. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.

- Annual reports from 1960 to 2017 are now on the administrative website (republicanriver.org). There are two reports that not uploaded due to technical difficulties, but Chelsea (Kansas) will continue to work on those. When the next annual meeting (August 20 - 21, 2020) has more details, Nebraska will send the info to Kansas to update the website. Kansas reported that the domain name subscription has been renewed through 2024.

- **Action item: Catherine (Nebraska) will send Chelsea (Kansas) more info on the 2020 Annual Meeting as information is available.**
- **Action item: Chelsea (Kansas) will continue work on uploading the rest of the Annual reports to the website.**

4.8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.

- Willem reported that the EC tool has been updated to test the flood flow scenarios. Kansas noted that the tool has been helpful in working through the flood flow proposals.

4.9. Prepare the 2019 RRCA annual meeting (Kansas) report.

a. Status of meeting summary for November 6, 2018, Special Meeting (Kansas)
   - Kansas is close to sending meeting summary to group.

b. Status of meeting summary for August 22, 2019, Annual Meeting (Kansas)
   - Kansas is still working on getting transcript from the transcriptionist and is hopeful that they will have that soon and be able to get meeting summary created and sent to other states in time to approve the Annual Report at the 2020 Annual meeting.

c. Reminder to distribute 2016-2018 RRCA annual meeting report to President of the United States and Federal agencies (Kansas), and State Governors (Colorado, Kansas, and Nebraska)
   - Letterhead image from Kansas has been sent out to all states. Nebraska will work on getting a draft of the letter to distribute to the three states for approval that will come from the RRCA. The question of who signs communications from RRCA will be brought up at the Three-States meeting.
   - **Action item: Nebraska will create a draft of the letter to state and federal agencies that receive the Annual Report.**

5. Summary of Meeting Actions/Assignments

- Kansas, Colorado, and Nebraska will review the October minutes and send edits and approval of them through email.
- Nebraska will aim to review Kansas proposal on flood flow proportioning by the Three-States meeting.
- Kansas will send out Accounting Procedure documentation memorialization document with Nebraska comments to Colorado.
- Kansas will send out Accounting Procedure documentation memorialization document for review to all states when all comments have been incorporated.
- Nebraska will send Kansas more info on the 2020 Annual Meeting as information is available.

- Kansas will continue work on uploading the rest of the Annual reports to the website.
- Nebraska will create a draft of the letter to state and federal agencies that receive the Annual Report.

6. Future Meetings
    a. Q3 – April 16, 2020, 1:30 pm (Central Time)
    b. Q4 – July 23, 2020, 1:30 pm (Central Time)
    c. Annual Meeting – August 20th and 21st in McCook, Nebraska
7. Adjournment: 2:02 PM Central

AGENDA for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
January 16, 2020 1:30 PM Central Time

Desktop Share info: https://zoom.us/j/656444668
Call in #: 720 707 2699
Meeting ID: 656 444 668

1. Introductions
2. Review/Modify Agenda
3. Approval of Minutes
    a. October 10, 2019
4. Review and update progress on engineering committee task list (Page 2)
5. Summary of Meeting Actions/Assignments
6. Future Meetings
    a. Q3 – April 16, 2020, 1:30 pm (Central Time)
    b. Q4 – July 23, 2020, 1:30 pm (Central Time)
    c. Annual Meeting – August 20th and 21st McCook, NE
7. Adjourn

ENGINEERING COMMITTEE TASK LIST

1. Meet quarterly to review the tasks assigned to the committee.
    a. Upcoming meeting April 16, 2020.
2. Exchange by April 15, 2020, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including all necessary documentation. By July 15, 2020, the states will exchange any updates to these data.
3. Finalize the 2019 accounting and recommend it for approval by the RRCA.
4. Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.
5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
7. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.
8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
9. Prepare the 2019 RRCA annual meeting (KS) report.
    a. Status of meeting summary for November 6, 2018, Special Meeting (KS)
    b. Status of meeting summary for August 22, 2019, Annual Meeting (KS)
    c. Reminder to distribute 2016-2018 RRCA annual meeting report to President of the United States and Federal agencies (KS), and State Governors (CO, KS, and NE)

From:	Beightel, Chris [KDA]
To:	Flaute, Carol; "ivan.franco@state.co.us" (ivan.franco@state.co.us)
Cc:	Barfield, David [KDA]; Burgert, Kari; Bradley, Jesse; Erickson, Chelsea [KDA]; Perkins, Sam [KDA]; Pugh, Ginger [KDA]; Cao, Hongsheng [KDA]
Subject:	RE: Flood flows memorandum from Nebraska
Date:	Thursday, January 16, 2020 8:55:06 AM
Attachments:	image001.png image003.png

Hi All;

In our review of Nebraska's December 3, 2019 memorandum proposing to change how flood flows are treated in the RRCA Accounting, Kansas has identified a concern with how Nebraska's proposal to adjust flood flows in the Mainstem Guide Rock to Hardy reach affects the allocations in that reach, and by extension the allocations above Guide Rock.

The problem we've identified occurs when most or a large portion of the flood flows originate above Guide Rock. In such a scenario, the proposal to reduce the Guide Rock to Hardy CWS by the entire amount of the flood flows can end up distorting where the allocation is generated such that the Guide Rock to Hardy allocation is inappropriately adjusted.

The example of this behavior can be seen in the latest preliminary 2019 accounting developed by Willem Schreüder (see here). Implementing Nebraska's December 3, 2019 proposal, the preliminary accounting shows the CWS below Guide Rock is -67,510 AF resulting in an allocation to Nebraska of -33,012 AF. In this case, the WSY accounting in Table 5C would, by subtracting the Guide Rock to Hardy allocation, increase Nebraska's allocation above Guide Rock by 33,012 AF. This does not seem reasonable.

A possible alternative is to develop a method to parse where, above or below Guide Rock, the flood flows originate and make the respective adjustments to each reach. We haven't thoroughly thought through a method for doing this but we envision it might assign the flood flows according the ratio of the flows at Guide Rock to the flows at Hardy.

In 2019, according to Dr. Shreüder's latest preliminary accounting, flows at Guide Rock were 502,276 AF, and flows at Hardy were 625,783 AF. Main stem flood flows were determined to be 184,496 AF. If the simple ratio was used, then, for the purpose of Table 5C and Table 5D, we would adjust the above Guide Rock reach by $184{,}496AF \times \frac{502{,}276AF}{625{,}783\ AF} = 148{,}083\ AF$ then the Guide Rock to Hardy reach would be adjusted by 184,496 AF – 148,083 AF = 36,412 AF. The CWS would then be reduced to 116,990 AF – 36,412 AF = 80,578AF and Nebraska's allocation of that that would be .489 X 80,578 AF = 39,402 AF. This demonstration is for discussion and illustration purposes only. As I mentioned above, we haven't fully thought through this, but we're concerned the current Nebraska proposal's potential to generate negative allocations is problematic.

Incorporating the above method into Nebraska's December 3, 2019 proposal yields (changes in highlight):

NE AbvGR Allocation = NE Total Allocation – 48.9% * CWS GRtoHdy

NE Total Allocation = S NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

*NE Main Stem Allocation = 48.9% * Main Stem CWS*
Main Stem CWS = Main Stem VWS – ΔReservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

GRtoHdy Flood Flow Adjustment (when applicable)

$$= \left(\frac{Hardy\ Flows - Guide\ Rock\ Flows}{Hardy\ Flows}\right) \times Mainstem\ Flood\ Flow\ Adjustment$$

~~*CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy – Main Stem Flood Flow Adjustment*~~

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy – GRtoHdy Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

Let us know what you think.

Chris

Chris Beightel, P.E.
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From: Flaute, Carol <carol.flaute@nebraska.gov>
Sent: Tuesday, December 3, 2019 3:55 PM
To: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>; 'Ivan.Franco@state.co.us' <Ivan.Franco@state.co.us>
Cc: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>; Barfield, David [KDA] <David.Barfield@ks.gov>; Beam, Mike [KDA] <Mike.Beam@ks.gov>; Don Blankenau <don@aqualawyers.com>; Grother, Brittney [KDA] <Brittney.Grother@ks.gov>; Jasper Fanning <jasperfanning@urnrd.org>; Fassett, Jeff <jeff.fassett@nebraska.gov>; Bradley, Jesse <Jesse.Bradley@nebraska.gov>; Kate Greenberg <kate.greenberg@state.co.us>; Kevin Rein <kevin.rein@state.co.us>; Lavene, Justin <Justin.Lavene@nebraska.gov>; Letourneau, Lane [KDA] <Lane.Letourneau@ks.gov>; Lewis, Earl <Earl.Lewis@kwo.ks.gov>; mike.sullivan@state.co.us; Scott Steinbrecher <Scott.Steinbrecher@coag.gov>; Titus, Kenneth [KDA] <Kenneth.Titus@ks.gov>; Tom Riley <triley@flatwatergroup.com>; Tom Wilmoth <tom@aqualawyers.com>; Goff, Katie <Katie.Goff@kwo.ks.gov>; cscott@usbr.gov; Burgert, Kari <kari.burgert@nebraska.gov>; Schellpeper, Jennifer <jennifer.schellpeper@nebraska.gov>; Willem Schreuder <willem@prinmath.com>
Subject: Flood flows memorandum from Nebraska

EXTERNAL: This email originated from outside of the organization. Do not click any links or open any attachments unless you trust the sender and know the content is safe.

Chris and Ivan,

Before Friday's 3-States meeting, please read the attached memorandum from Nebraska describing

proposed revisions to the flood-flow accounting methodology. We will plan to discuss this memorandum at Friday's meeting.

Carol J. Myers Flaute
INTEGRATED WATER MANAGEMENT COORDINATOR

Nebraska Department of Natural Resources
301 Centennial Mall South
P.O. Box 94676
Lincoln, Nebraska 68509

CELL 402-471-1114 / FAX 402-471-2900
carol.flaute@nebraska.gov

dnr.nebraska.gov

Meeting minutes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
April 16, 2020 1:30 PM Central Time

Meeting was held via Zoom meeting.

Attendees:

Chris Beightel KS
Kari Burgert, NE
David Engelhaupt, KS
Chelsea Erickson, KS
Elizabeth Esseks, NE
Carol Myers Flaute, NE
Ivan Franco, CO
Lizzie Hickman, KS
Sam Perkins, KS
Willem Schreüder, CO

Agenda Items and Notes:

1. Introductions
   1.1. The meeting started at approximately 1:35 PM CT. Carol said that the meeting was being recorded for notetaking purposes only, and the recording will be deleted once minutes are final.
2. Review/Modify Agenda
   2.1. Chris said that there were no changes from Kansas.
3. Approval of Minutes
   3.1. October 10, 2019 meeting minutes were sent out for review. Chris and Ivan confirmed that the minutes are OK.
      3.1.1. **Action Item: Nebraska will format the October 10, 2019, minutes as final and send them back out to Kansas and Colorado**.
   3.2. January 16, 2020 meeting minutes were distributed for review on Tuesday. Chris and Ivan both indicated that they are fine with the minutes.
      3.2.1. Action Item: Nebraska will format the January 16, 2020, minutes as final and send them back out to Kansas and Colorado.
4. Review and update progress on engineering committee task list.
   4.1. Meet quarterly to review the tasks assigned to the committee.
      4.1.1.The next meeting is scheduled for July 23, 2020.
      4.1.2. The working session after that is scheduled for August 20, and Annual Meeting will be August 21, 2020.
         4.1.2.1. Tentatively plan for 2 PM working session on August 20, and 9 AM start time on August 21 for Annual Meeting.
         4.1.2.2. Nebraska is working on details for lodging in McCook for the Annual Meeting. Nebraska will ask the 3-states group on Monday, April 20, 2020, about proposed meeting times and whether they want to schedule a 3-states meeting in conjunction with the Annual Meeting.
         4.1.2.3. Action item: Nebraska will ask at 3-states meeting on Monday, April 20, about meeting times in August, and whether the commissioners want to schedule a 3-states meeting during that time.
      4.1.3. The meeting after that will likely be in October 2020.

4.2. Exchange by April 15, 2020, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including all necessary documentation. By July 15, 2020, the states will exchange any updates to these data.

4.2.1. Kansas and Nebraska emailed data yesterday (April 15, 2020).

4.2.2. Colorado data was finalized earlier, and final data was sent late yesterday (April 15, 2020).

4.2.3. No problems were reported. The next step is to review the data and each state will finalize its own data by July 15, 2020.

4.2.4. Willem is hoping to do an initial cut at accounting with Kari and complete a cross-check in the next week or two. Kari said she hopes to get to these tasks soon, also.

4.2.4.1. Action item: Willem and Kari will do an initial cut at accounting.

4.2.5. Kari discussed an issue with Attachment 7. In 2019, federal canals in Nebraska did have non-irrigation season diversions (recharge diversions) with no deliveries. This past year was the first time this process was used. The diversions are listed separately in Attachment 7 (irrigation season diversions and non-irrigation season diversions). The formulas for the inputs tab were not including non-irrigation season diversions, so Kari updated the inputs tab formulas to include both irrigation and non-irrigation season diversions.

4.2.5.1. Action item: Colorado and Kansas will look at the modified inputs tab when Kari sends out the accounting spreadsheet, and let her know if the combined inputs is acceptable or if the inputs should be separated.

4.2.5.2. Willem indicated that he updated his spreadsheets, also.

4.2.5.3. Chris asked if Kari will propose to change Attachment 7 and add another line on the inputs tab. Kari said that in the past, the accounting packet has included Attachment 7, and the information is already separated out in Attachment 7 (irrigation season and non-irrigation season diversions).

4.2.6. Willem had another question on Attachment 7. Kansas and Nebraska agree on diversions and deliveries. However, Nebraska reported 2427 acre-ft in Courtland Canal spills from Lovewell, but Kansas did not report any spills. Willem asked Sam to double-check to see if that information was omitted.

4.2.6.1. **Action item: Kansas will check to see if they agree with Nebraska reporting of Courtland Canal spills.**

4.2.7. Harlan County Lake evaporation split

4.2.7.1. Kari did not include the Harlan County Lake evaporation split estimate in the exchange data this year. The accounting procedures indicate that estimates for the evaporation split between Kansas and Nebraska will be made based on diversions by NBID and KBID during the time irrigation releases are being made from Harlan County Lake. In 2019 there were no irrigation releases from Harlan County Lake, only flood releases. For a year with no irrigation releases, the annual net evaporation charges to Kansas and Nebraska are based on the average of the calculation of the most recent 3 years in which irrigation releases from Harlan County Lake were made (section IV.A.2.e)(1), page 25 of Accounting Procedures). Kari asked if Kansas has thought about this, and whether the approach she proposed is acceptable.

4.2.7.1.1. **Action item: Kansas will look at accounting procedures related to Harlan Co Lake evaporation split for a year with no irrigation releases, and reply back to Nebraska.**

4.2.8. Review Flood Flow provisions assignment of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify

the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.

4.2.8.1. The last discussion about flood flow provisions was at the 3-states meeting. After that conversation, it became clear that more discussion is needed to reach agreement.

4.2.8.2. Carol proposed setting this issue aside since the 2019 accounting is not affected and further discussion is needed. She proposed adding a footnote to the accounting procedures, describing how there is an issue that needs to be resolved.

4.2.8.3. Chris agreed to this proposal.

4.2.8.4. Chelsea proposed to incorporate a written explanation into the document memorializing accounting procedures changes. The group needs to reach agreement on what will go into footnote.

4.2.8.5. Action item: Nebraska will propose to set the flood flow provisions issue aside at the 3-states meeting on Monday, April 20, 2020. If that is agreeable, Nebraska will draft language to address the issue, including Chris's email from October 2019, regarding splitting flood flows at Guide Rock, to be included in the document memorializing accounting procedures changes.

4.2.9. Willem mentioned that there are inconsistencies regarding what accounting procedures were agreed to and what is in the spreadsheet being used. The accounting procedures refer to computed water supply, but the column in the spreadsheet refers to virgin water supply (Attachment 6). There might be an issue with translating the accounting procedures to the spreadsheet. It might be good to mention this in the footnote, also.

4.2.9.1. Action item: Nebraska will propose at the 3-states meeting on April 20, 2020, to include in the document memorializing accounting procedures changes Willem's observation about how accounting procedures refer to computed water supply but the spreadsheet uses virgin water supply. If this is approved, Nebraska will draft language about this issue to be included in the document memorializing accounting procedures changes.

4.3. Continue working on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.

4.3.1. Chelsea reported that there was no significant progress on the document in past few months. Kansas aims to have a complete draft by July meeting so it can be reviewed and approved at the Annual Meeting.

4.3.1.1. Action item: Kansas will send out a draft of the document memorializing accounting procedures changes prior to the July 23, 2020, EC meeting so it can be reviewed prior to the August 20, 2020, Annual Meeting.

4.4. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.

4.4.1. Willem reported that CCP delivered more than 5000 acre-ft in the first three months, and they are anticipating additional releases (another 3000). He anticipates an over-delivery of more than 1000 acre-ft, which will make overall management easier

4.4.2. Kansas reported that there is nothing new.

4.4.3. Carol reported on the Frenchman Cambridge Irrigation District project to automate the Meeker/Driftwood canal system. Nebraska is finalizing a project with Middle Republican NRD to upgrade water meters in the District's quick response area to provide real-time telemetry (funded by WRCF). NBID was awarded a WaterSmart grant to work on the headgates of the Courtland/Superior canals. Kansas is also helping fund the NBID project.

4.4.3.1. Action item: Nebraska will check on who has access to telemetry data for MRNRD water meter project, and report back to the group.

4.5. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.

4.5.1. Nebraska is looking at times for the Annual Meeting, proposing 2 PM for the August 20 working session, and 9 AM for the August 21 Annual meeting. Carol will send dates, times, and locations to Chelsea when those are final.

4.5.1.1. Action item: Nebraska will send Chelsea annual meeting details when they have been finalized to put on the RRCA website.

4.5.2. Chelsea reported that the annual reports from 2005 and 2014 will not load to the website. She is working with a person in her office on this problem.

4.5.2.1. Action item: Kansas will continue to investigate why the 2 annual reports will not load to the RRCA website.

4.6. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.

4.6.1. Willem reported that he and Kari worked on Attachment 7 (irrigation vs non-irrigation season diversion issue).

4.7. Prepare the 2019 RRCA annual meeting report (KS)

4.7.1. Status of meeting summary for November 6, 2018 special meeting (KS)

4.7.1.1. Chelsea emailed draft minutes to Colorado and Nebraska yesterday. Nebraska provided clarification on several questions Chelsea had, and will submit comments and edits by email.

4.7.1.2. **Action item: Colorado and Nebraska will send comments to Chelsea on draft minutes for November 6, 2018, special meeting.**

4.7.2. Status of meeting summary for August 22, 2019, Annual Meeting (KS)

4.7.2.1. Update from Chris: They were unable to get a transcript from the court reporter from that meeting until this week. They received a plain text file of the rough draft that includes numbers instead of the names of people who were speaking. Kansas will add the names to the transcript and then send out the draft to Colorado and Nebraska to get name changes and other edits. After that round of editing, the draft will be sent back to the court reporter to get a final legally approved version of the transcript. Chris proposed that if the court reporter does not return the corrected draft promptly, the group consider using the revised draft of the transcript that was sent back to the court reporter as the final draft. Carol suggested waiting to see if the final transcript is received back from the court reporter before making a decision on Chris's proposal.

4.7.2.1.1. Action item: Kansas will send a draft transcript to Colorado and Nebraska from the August 22, 2019, Annual Meeting.

4.7.3. Distribute 2016-2018 RRCA annual meeting reports to the President of the United States and Federal agencies (KS) and State Governors (CO, KS, and NE)

4.7.3.1. Nebraska has been working on a letter to be emailed jointly by the 3 states to the relevant contacts. The draft will be circulated to Colorado and Kansas to review before the Annual Meeting. The commissioners want to sign the letter at the Annual Meeting.

4.7.3.2. **Action item: Nebraska will circulate a draft of the letter to accompany the 2016 - 2018 annual reports before the July meeting to be signed at the Annual Meeting.**

5. Summary of Meeting Actions/Assignments: listed above in bold

6. Future Meetings

6.1. Q4 – July 23, 2020, 1:30 pm (Central Time)

6.2. Annual Meeting – August 20th and 21st McCook, NE

7. Adjourn*:*

7.1. The meeting ended at approximately 2:25 PM CT.

Meeting Minutes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
July 23, 2020 1:30 PM Central

Meeting was held via Zoom meeting.

Attendees: draft

Chris Beightel KS
Kari Burgert, NE
Chelsea Erickson, KS
Elizabeth Esseks, NE
Carol Myers Flaute, NE
Ivan Franco, CO
Sam Perkins, KS
Willem Schreüder, CO

1. Introductions

   1.1 The meeting started at approximately 1:31 PM CT.

2. Review/Modify Agenda

   2.1 Chris asked about scheduling a meeting before the annual meeting to finish up the report. Ivan and Carol agreed that another meeting would be a good idea.

   2.1.1 **Action Item: Nebraska will send an invitation for an additional EC meeting to be held Wednesday morning, August 19, 2020.**

3. Approval of minutes

   3.1 April 16, 2020 meeting minutes were sent out earlier this week for review. Kansas did not have comments on the April meeting minutes. Ivan would like more time to review the April meeting minutes.

   3.1.1 **Action Item: Colorado will provide comments by email to Nebraska on the April meeting minutes.**

   3.1.2. **Action Item: When the April meeting minutes are approved, Nebraska will format the April meeting minutes as final and send them back out to Kansas and Colorado.**

4. Review and update progress on engineering committee task list

   4.1 Meet quarterly to review the tasks assigned to the committee.

   4.1.1 Task fulfilled. The EC will have additional meeting on August 19, 2020.

   4.1.2 July meeting minutes will be turned around quickly.

   4.1.3 A draft of the August meeting minutes will be written on August 19 and sent out to Colorado and Kansas as quickly as possible. Chris suggested limiting the agenda for the August meeting so minutes can be shorter and more focused.

   4.2 Exchange by April 15, 2020, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including

all necessary documentation. By July 15, 2020, the states will exchange any updates to these data.

4.2.1 Carol noted that Kansas submitted updates on June 22 and Nebraska submitted updates on July 15. There were no follow-up questions.

4.2.2 Colorado added CIR (Crop Irrigation Requirement) comparison on July 3, but the data did not change.

4.3 Finalize the 2019 accounting and recommend it for approval by the RRCA.

4.3.1 Data

4.3.1.1 All data are final (updates have been made).

4.3.1.2 Nebraska is working on a draft of the 2019 accounting for the EC report.

4.3.1.2.1 Action item: Nebraska will complete a draft of the 2019 accounting for the EC report, and will send it to Colorado and Kansas for review.

4.3.1.3 Willem did a comparison of Kari's data and the continuous accounting spreadsheet, and there were no discrepancies.

4.3.2 Flood Flows language

4.3.2.1 The EC needs agreement on Flood Flows language. Kansas and Nebraska agree on the current language; Colorado also agrees with the current language.

4.3.3 Harlan County Lake (HCL) evaporation split with no irrigation releases

4.3.3.1 Kari emailed a draft and asked for comments; she had not received comments prior to the meeting.

4.3.3.2 Chris found the reference in the Accounting Procedures and had questions about which diversions are being considered and how the previous three years were calculated. Kari sent an email to the group during the meeting with the calculations.

4.3.3.3 Carol said that HCL split will go into accounting as it is now, and then it can be amended if necessary.

4.3.3.3.1 Action item: Nebraska will incorporate the HCL evaporation split into accounting for 2019.

4.3.3.4 Sam proposed reviewing Nebraska's Attachment 7 in the future. Kari explained that she just copies over data from the Bureau, and there is no reason to do the same work twice.

4.4 Review the Flood Flows provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.

4.4.1 Since the Flood Flows language is approved, it will be incorporated into the Accounting Procedures.

4.4.1.1 Action item: Nebraska will incorporate the approved Flood Flows language into the draft Accounting Procedures and send the draft to Colorado and Kansas for review.

4.4.2 The specific language in the assignment for this year may need to be changed; the group discussed what the assignment for next year should be to keep this assignment moving forward.

4.4.3 The group discussed whether to fill out Table 5c or leave it blank. Ivan said that filling out the table seemed more consistent with the assignment. Willem suggested adding a footnote in Table 5c directing people to the footnote in Table 6 for additional information.

4.4.3.1 Action item: Nebraska will fill out Table 5c for 2019 accounting and add a footnote directing the reader to the footnote in Table 6 for additional information.

4.5 Continue working on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.

4.5.1 Chelsea sent out new draft yesterday and offered to walk the group through outstanding issues.

4.5.1.1 Carol and Ivan asked for more time to review and weren't sure they would be finished with their reviews before the RRCA annual meeting.

4.5.1.1.1 Action item: Colorado and Nebraska will finish reviewing the new draft document memorializing changes in Accounting Procedures and send comments to Kansas.

4.6 Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.

4.6.1 Chris reported on a strategy for evaluating water management effectiveness by isolating climactic effects from management effects.

4.6.1.1 Sam gave a quick summary. He compared estimates based on annual precipitation for 2000–2017 baseline to actual numbers observed in 2018–2019. Significant savings were observed in Kansas from GMD 4's LEMA. He also did calculations for Nebraska and Colorado.

4.6.1.2 Chris proposed that Sam send out data for review, and then have the committee talk about it at the first meeting after the annual meeting.

4.6.1.2.1 Action item: at the first EC meeting after the RRCA annual meeting, Sam will present about his analysis methods to evaluate water management effectiveness and his results.

4.6.2 Willem reported on the Colorado Compliance Pipeline. It is still running and may continue through November and December. The projection on the pipeline for the year is approximately 9000 Ac-ft.

4.6.3 Nebraska had no updates.

4.7 Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC.

4.7.1 The information about the annual meeting needs to be updated on the website.

4.7.1.1 Action item: Nebraska will generate a draft annual meeting notice and send it to Colorado and Kansas for review.

4.7.1.2 Action item: When the annual meeting notice is final, Kansas will post it on the RRCA website.

4.7.2 Chelsea reported that she found a workaround to overcome previous technical difficulties in uploading the 2005 report to the website. She did upload the 2005 report today and is still working on the 2014 report, which is very large (the 2014 report was successfully uploaded after the meeting).

4.8 Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.

4.8.1 Willem reported that he made quite a few changes related to accommodating splits on Attachment 7 for irrigation season versus non-irrigation season.

4.9 Prepare the 2019 RRCA annual meeting report (KS)

4.9.1 Chelsea reported that she received comments back from CO and NE on the November 2018 special meeting summary and August 2019 annual meeting transcript and summary. She is working on incorporating comments into those documents, and then she will put together the whole package as one document and will send it out for review.

4.9.1.1 Action item: Kansas will send out the 2019 annual report to Colorado and Nebraska for review.

4.9.2 Carol discussed the backlog of annual reports that need to be sent to state and federal entities under the Rules and Regulations of the RRCA. The 2015-2018 reports need to be sent. At a previous three-states meeting, the states agreed that instead of having states send to entities in their own states, the RRCA would send a letter by email on RRCA letterhead, with all three commissioners' signatures, to all parties who should receive the annual reports, with a link to the reports on the RRCA website.

4.9.2.1 Since the letter doesn't require action at the annual meeting, the commissioners could sign the letter either prior to or after the annual meeting.

4.9.2.2 There was discussion about whether to include this year's report in the letter so as to be able to send the letter prior to the RRCA annual meeting as a test of the e-signature software, or to send the letter after the RRCA meeting so as to be able to include this year's report, too. Chris suggested that we wait until after the RRCA meeting and include this year's report with the rest of the backlog. Alternatively, Chris said that since the letter is a form letter, we could send reports that are ready now and then send another letter after the annual meeting. Carol suggested that the recipients might prefer receiving one letter instead of two, and Chris and Ivan agreed with Carol.

4.9.2.3 Chris noted that a summary of the plans for sending the letter after the meeting should be included under this assignment in the EC report. Carol noted that because this letter does not require a vote by the RRCA commissioners, it does not need to be included as an action item on the annual meeting agenda.

4.9.2.4 Carol asked we should add USGS to the recipient list (they were not included in previous years), since USGS participates in the annual meeting. The consensus was that states can add recipients to the draft letter as they deem appropriate.

4.9.2.5 Action item: After the RRCA annual meeting, Nebraska will generate a draft cover letter to be signed by the three commissioners, notifying officials previously listed as recipients and USGS of the

availability of past RRCA annual reports available on the RRCA website, and will send the draft to Kansas and Colorado for review.

4.9.2.5.1 Action item: Each state will determine who should receive the email letter about the availability of past RRCA annual reports and will add that information to the draft letter if the recipient is not already listed.

5. Summary of Meeting Actions/Assignments (listed in bold throughout minutes)

6. Future Meetings

6.1 Annual Meeting and Working Session

6.1.1 Materials for Annual Meeting

6.1.1.1 EC report

6.1.1.1.1 Carol suggested that an appendix be included in the EC Report to document progress on the Flood Flows assignment, which would include the proposals submitted by KS and NE. Carol asked whether there is anything else about Flood Flows provisions that should be included in the appendix for documentation. Chris suggested including Nebraska's memo from the annual meeting last year and the supplemental write-up to that, as well as any other emails or other relevant communication. Nebraska and Colorado agreed. Chris also suggested including the documentation in the Accounting Procedures tracking document, and Carol agreed.

6.1.1.1.1.1 **Action item: Nebraska will compile all documentation related to discussion of last year's Flood Flows assignment as an appendix to the EC report and will send the draft to KS and CO for review.**

6.1.1.1.1.2 **Action item: Kansas will add the Flood Flows discussion documentation from this year's EC Report to the draft Accounting Procedures tracking document.**

6.1.1.1.2 Updated Accounting Procedures and Rules and Regulations

6.1.1.1.2.1 Action item: NE will generate a draft of updated Accounting Procedures and Rules and Regulations to reflect the agreed-upon updates pertaining to the Flood Flows assignment, and will send the draft to Kansas and Colorado for review.

6.1.2. Assignments for next year

6.1.2.1. Meet quarterly to review the tasks assigned to the committee (unchanged from the current year's assignment)

6.1.2.2. Exchange by April 15, 2021, the information listed in Section V of the RRCA Accounting Procedures and Reporting Requirements, and other data required by that document, including all necessary documentation. By July 15, 2021, the states will exchange any updates to these data (the same as the current year's assignment, except with the year updated to 2021)

6.1.2.3. Finalize the 2020 accounting and recommend it for approval by the RRCA (the same as the current year's assignment, but with the year updated to 2020)

6.1.2.4. Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting. We will keep this assignment, but we can't use same language moving forward because the parts of this assignment pertaining to evaluating whether the accounting methods are in conformance with the intent of the FSS have already been completed. The group discussed that it would be good to have a timeline, but decided against it because this situation may not fit a timeline.

6.1.2.4.1. **Action item: Nebraska will draft language for a continuation of the Flood Flows assignment based on the footnote in the Accounting Procedures and will send it to Colorado and Kansas for review.**

6.1.2.5. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures (unchanged from the current year's assignment)

6.1.2.6. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance (unchanged from the current year's assignment)

6.1.2.7. Continue development and maintenance of the RRCA administrative website that serves as an informational page for the public and provide regular updates to the EC (unchanged from current year's assignment)

6.1.2.8. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee (unchanged from current year's assignment)

6.1.2.9. Prepare the 2020 RRCA annual meeting report (the same as the current year's assignment, but with the year updated to 2020)

6.1.2.10. Are there any new assignments to recommend for next year? - Chris said he has no items to add at this time; Willem suggested asking commissioners if they want to give us a specific Flood Flows assignment for next year. There were no other comments.

6.1.3. Resolutions honoring David Barfield and Jeff Fassett

6.1.3.1. Action item: Kansas will draft a resolution honoring David Barfield and will send it to Colorado and Nebraska for review.

6.1.3.2. Nebraska sent a draft Resolution honoring Jeff Fassett to Colorado and Kansas for review.

6.1.3.2.1. **Action item: Kansas and Colorado will review Nebraska's draft resolution honoring Jeff Fassett and provide comments to NE.**

6.1.4. Logistics of annual meeting

6.1.4.1. e-signature software options for commissioners and EC representatives

6.1.4.1.1. **Action item: Nebraska will test e-signature software.**

6.1.4.2. Transcriptionist will be listening in during the meeting; the meeting will be recorded for the transcriptionist (an announcement will be made when the meeting starts that the meeting is being recorded for note-taking purposes). Ivan and Chris agreed to this proposal.

6.1.4.3. Livestreaming option on YouTube: Kansas has used this and could set up a livestream. This conversation will continue at the August EC meeting.

6.1.4.4. Carol suggested that the commissioners use video during the entire meeting and other presenters use video while they are presenting.

6.1.4.5. Nebraska will have a listening station in McCook for anyone who wants to listen with state staff and there will be sign-in sheets for people participating at the listening station.

6.1.4.5.1. **Action item: Nebraska will generate sign-in sheets for the listening station in McCook.**

6.1.4.6. How to handle introductions and attendance without sign-in sheets for people participating via Zoom or livestream - This conversation will continue at the August EC meeting.

6.1.4.7. Annotated agenda for commissioners

6.1.4.7.1. **Action item: Nebraska will generate an annotated agenda for commissioners that will include items that are not usually part of the annual meeting (e.g., Zoom components)**

6.1.4.8. Presenters will be asked to submit hand-outs at least a week in advance of the meeting since the handouts will be uploaded to the RRCA website.

6.2 Next EC meeting: August 19, 2020, at 9 AM CT.

7. Adjourn

7.1. The meeting adjourned at approximately 3:07 PM CT.

Meeting Minutes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
August 19, 2020 9:00 AM Central

Meeting was held via Zoom meeting.

Attendees:

Chris Beightel KS
Kari Burgert, NE
Chelsea Erickson, KS
Elizabeth Esseks, NE
Carol Myers Flaute, NE
Ivan Franco, CO
Sam Perkins, KS
Willem Schreüder, CO

1. Introductions

   1.1 The meeting started at 9:06 AM CT

2. Review/Modify Agenda

   2.1 There were no changes or additions to the agenda.

3. Annual Meeting Preparation

   3.1 Working Session Materials and Logistics
   - 3.1.1 Zoom and streaming meeting
     - 3.1.1.1 There will be a separate Zoom links for each meeting (recording Annual meeting only).
     - 3.1.1.2 Kari Burgert and Elizabeth Esseks will be moderators.
     - 3.1.1.3 The meetings will open up 15 minutes before the scheduled start time.
     - 3.1.1.4 Commissioners and Engineering Committee members should be prepared to be on camera when they are speaking.
     - 3.1.1.5 Chris asked about streaming via YouTube.
       - 3.1.1.5.1 Carol responded that NeDNR IT turned on the Zoom option but staff haven't tested it (there is a plan to test that today).
       - 3.1.1.5.2 If YouTube doesn't work, Nebraska can post the Zoom recording of the meeting.
       - 3.1.1.5.3 Chris said that using YouTube to livestream is simple to do, but the directions aren't straightforward. He offered that Kansas could walk Nebraska through process if that would be helpful.
       - **3.1.1.5.4 Action item – Nebraska will test YouTube livestreaming on Zoom.**

   3.2 EC report
   - 3.2.1 Comments
     - 3.2.1.1 Chris sent comments this morning.
     - 3.2.1.2 Ivan said that he has no major issues, and is waiting to see attachments. Carol responded that two of the draft attachments were included in an

email this morning and the remaining attachment that still needs to be completed is the compilation of EC minutes. Nebraska plans to send all attachments this afternoon.

3.2.1.2.1 Action item – Nebraska will send all EC Report Attachments to Kansas and Colorado

3.2.1.2.2 Action item – Kansas and Colorado will review and provide comments on all EC Report attachments, including approval of the July and August minutes.

3.2.2 Flood Flows appendix

3.2.2.1 Introductory paragraph

3.2.2.1.1 This was added to explain the purpose of the appendix.

3.2.2.2 Table of Contents

3.2.2.2.1 There are formatting issues which Nebraska is trying to fix; please let us know if there are any other changes that should be made.

3.2.2.3 The appendix includes the initial memo, emails, items from Chris about Kansas's proposals, and the various comments received.

3.2.2.3.1 All documents have headers to identify what they are.

3.2.2.4 Carol asked that people review the document and let us know if anything is missing.

3.2.2.4.1 Action item – Kansas and Colorado will review the draft Flood Flows appendix and return comments to Nebraska.

3.2.2.5 Chris said that this will be useful moving forward to document progress, and avoid re-inventing the wheel.

3.2.2.6 Chris suggested that we can make formatting changes after the fact if necessary.

3.2.2.7 Ongoing/new assignments

3.2.2.7.1 No one is aware of any potential new assignments;

3.2.2.7.2 Ongoing Flood Flows assignment

3.2.2.7.2.1 Nebraska is proposing a modified flood flows assignment to continue to work on developing a recommendation to modify Flood Flows provisions to bring them into conformance with the intent of the Final Settlement Stipulation.

3.3 Annual Meeting Materials and Logistics

3.3.1 Logistic

3.3.1.1 Logistics will be the same as for the Working Session.

3.3.1.2 Nebraska is recording the session for the transcriptionist.

3.3.1.3 Kari and Elizabeth will be sharing documents on screen during the meeting.

3.3.2 Agenda

3.3.3 2019 RRCA report

3.3.3.1 Chelsea will give the update.

3.3.3.2 The motion to take action on report will be after Chelsea's update (which is a different procedure than for action on the EC report).

3.3.4 Commissioners reports

3.3.5 Federal reports

3.3.5.1.1 USBR - Craig Scott plans to provide a report.

3.3.5.1.2 USGS - John Miller plans to provide a report.

3.3.5.1.3 USACE probably will not provide a report.

3.3.6 Committee Reports

3.3.6.1 EC report

3.3.6.1.1 Carol plans to hit highlights of report.

3.3.6.1.2 Chris said that he prepared a bulleted list to keep his report complete but succinct.

3.3.6.1.3 Since so many future actions are related to the Flood Flows update, Carol will read into the record the Flood Flows paragraph in the "Items for RRCA Discussion & Action" section of the EC report.

3.3.7 Old business

3.3.7.1 No one was aware of anything to be discussed.

3.3.8 New business

3.3.8.1 Action on updated Accounting Procedures

3.3.8.1.1 Document was sent this morning

3.3.8.1.2 Work done includes Flood Flows changes and formatting issues.

3.3.8.1.3 Nebraska will clean up the document and not use a redlined version.

3.3.8.1.4 Chris and Ivan will review documents after the call.

3.3.8.2 Action on Rules and Regulations draft

3.3.8.2.1 Only changes are dates referenced and signature blocks.

3.3.8.3 Action on Engineering Committee report and assignments

3.3.8.4 Action on 2019 Accounting

3.3.8.4.1 Carol proposed to combine the action on the EC report and Accounting since the Accounting is an attachment to the EC report (this was done at the 2019 RRCA Annual Meeting).

3.3.8.5 Action on Resolutions for David Barfield and Jeff Fassett

3.3.8.5.1 Carol proposed that the Kansas and Nebraska commissioners read their respective states' resolutions into the record.

3.3.8.5.2 Carol also proposed that the commissioners vote on both resolutions as single action.

3.3.8.5.3 Nebraska will make formatting changes so both resolutions match.

3.3.9 Public comment

3.3.9.1 Carol anticipates that at least one group will speak at the meeting.

3.3.10 Future meeting arrangements

3.3.10.1 Nebraska will host the next meeting in late August 2021.

3.4 E-signing

3.4.1 Action item - Carol will test e-signing today.

4. Summary of Meeting Actions/Assignments (items in bold above and below)
   a. **Action items - Everyone will review documents sent this morning and let Nebraska know if you have comments so we can finalize them.**
5. Future Meetings
   a. Annual Meeting and Working Session, August 21, 2020
6. Adjourn – meeting ended at approximately 9:38 AM CT.

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ACCOUNTING INPUTS

Calendar Year		**2019**
Groundwater Data		
North Fork Subbasin	GW CBCU Colorado	*17,492*
	GW CBCU Kansas	*0*
	GW CBCU Nebraska	*1,229*
Arikaree Subbasin	GW CBCU Colorado	*2,084*
	GW CBCU Kansas	*111*
	GW CBCU Nebraska	*76*
Buffalo Subbasin	GW CBCU Colorado	*537*
	GW CBCU Kansas	*0*
	GW CBCU Nebraska	*3,660*
Rock Subbasin	GW CBCU Colorado	*134*
	GW CBCU Kansas	*0*
	GW CBCU Nebraska	*5,293*
South Fork Subbasin	GW CBCU Colorado	*13,154*
	GW CBCU Kansas	*3,366*
	GW CBCU Nebraska	*607*
Frenchman Subbasin	GW CBCU Colorado	*1,684*
	GW CBCU Kansas	*0*
	GW CBCU Nebraska	*81,732*
Driftwood Subbasin	GW CBCU Colorado	*0*
	GW CBCU Kansas	*0*
	GW CBCU Nebraska	*826*
Red Willow Subbasin	GW CBCU Colorado	*0*
	GW CBCU Kansas	*0*
	GW CBCU Nebraska	*10,339*
Medicine Creek Subbasin	GW CBCU Colorado	*0*
	GW CBCU Kansas	*0*
	GW CBCU Nebraska	*21,376*
Beaver Subbasin	GW CBCU Colorado	*0*
	GW CBCU Kansas	*6,509*
	GW CBCU Nebraska	*4,081*
Sappa Subbasin	GW CBCU Colorado	*0*
	GW CBCU Kansas	*2,675*
	GW CBCU Nebraska	*1,886*
Prairie Dog Subbasin	GW CBCU Colorado	*0*
	GW CBCU Kansas	*8,738*
	GW CBCU Nebraska	*23*
Mainstem Subbasin	GW CBCU Colorado	*(2,522)*
	GW CBCU Kansas Above Guide Rock	*352*
	GW CBCU Kansas Below Guide Rock	*49*
	GW CBCU Nebraska Above Guide Rock	*83,486*
	GW CBCU Nebraska Below Guide Rock	*1,723*
Import Water Data		
North Fork Subbasin	Imported Water Nebraska	*0*
Arikaree Subbasin	Imported Water Nebraska	*0*
Buffalo Subbasin	Imported Water Nebraska	*0*
Rock Subbasin	Imported Water Nebraska	*0*
South Fork Subbasin	Imported Water Nebraska	*0*
Frenchman Subbasin	Imported Water Nebraska	*10*
Driftwood Subbasin	Imported Water Nebraska	*0*
Red Willow Subbasin	Imported Water Nebraska	*65*
Medicine Creek Subbasin	Imported Water Nebraska	*11,292*
Beaver Subbasin	Imported Water Nebraska	*0*
Sappa Subbasin	Imported Water Nebraska	*32*
Prairie Dog Subbasin	Imported Water Nebraska	*0*
Mainstem Subbasin	Imported Water Nebraska Above Guide Rock	*15,131*
	Imported Water Nebraska Below Guide Rock	*(14)*
	Total	***26,516***

Calendar Year		**2019**
SW Pumping Data		
North Fork Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	217
	SW Diversions - Irrigation - Small Pumps - Colorado	19
	SW Diversions - M&I - Colorado	0
Arikaree Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - M&I - Nebraska	0
Buffalo Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	295
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - M&I - Nebraska	0
Rock Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - M&I - Nebraska	0
South Fork Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - M&I - Nebraska	0
Frenchman Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	2
	SW Diversions - M&I - Nebraska	0
Driftwood Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	0
	SW Diversions - M&I - Nebraska	0
Red Willow Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	0
	SW Diversions - Irrigation - Small Pumps - Nebraska	1
	SW Diversions - M&I - Nebraska	0
Medicine Creek Subbasin	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	0
	SW Diversions - M&I - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	160
	SW Diversions - M&I - Nebraska - Below Gage	0

Calendar Year		**2019**
SW Pumping Data		
Beaver Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	0
	SW Diversions - Irrigation - Small Pumps - Colorado	0
	SW Diversions - M&I - Colorado	0
	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	2
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	0
	SW Diversions - M&I - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	0
	SW Diversions - M&I - Nebraska - Below Gage	0
Sappa Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	0
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Small Pumps - Nebraska - Above Gage	0
	SW Diversions - M&I - Nebraska - Above Gage	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	0
	SW Diversions - M&I - Nebraska - Below Gage	0
Prairie Dog Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	908
	SW Diversions - M&I - Kansas	288
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	196
	SW Diversions - M&I - Nebraska - Below Gage	0
Mainstem Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	197
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	3,286
	SW Diversions - Irrigation - Small Pumps - Nebraska	316
	SW Diversions - M&I - Nebraska	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska Below Guide Rock	0
	SW Diversions - Irrigation - Small Pumps - Nebraska Below Guide Rock	84
	SW Diversions - M&I - Nebraska - Below Guide Rock	0

Non-Federal SW Consumptive Use		
	% Non-Federal Canal Diversion Consumed	60%
	% Small Surface Water Pumps Consumed	75%
	% Municipal And Industrial SW Consumed	50%

Calendar Year		**2019**
Non-Federal Reservoir Evaporation Data		
North Fork Subbasin	Non-Federal Reservoir Evaporation - Colorado	40
Arikaree Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	12
	Non-Federal Reservoir Evaporation - Nebraska	0
Buffalo Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Nebraska	7
Rock Subbasin	Non-Federal Reservoir Evaporation - Nebraska	88
South Fork Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	107
	Non-Federal Reservoir Evaporation - Nebraska	0
Frenchman Subbasin	Non-Federal Reservoir Evaporation - Nebraska	69
Driftwood Subbasin	Non-Federal Reservoir Evaporation - Kansas	11
	Non-Federal Reservoir Evaporation - Nebraska	0
Red Willow Subbasin	Non-Federal Reservoir Evaporation - Nebraska	88
Medicine Creek Subbasin	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	93
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	1
Beaver Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	252
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	70
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	0
Sappa Subbasin	Non-Federal Reservoir Evaporation - Kansas	271
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	42
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	2
Prairie Dog Subbasin	Non-Federal Reservoir Evaporation - Kansas	194
	Non-Federal Reservoir Evaporation - Nebraska	13
Mainstem Subbasin	Non-Federal Reservoir Evaporation - Kansas	76
	Non-Federal Reservoir Evaporation - Nebraska - Above Guide Rock Gage - Whole Basin Value:	536
	Non-Federal Reservoir Evaporation - Nebraska - Below Guide Rock Gage - Whole Basin Value:	(6)
Stream Gage Data		
North Fork Subbasin	North Fork Republican River At Colorado-Nebraska State Line	25,436
Arikaree Subbasin	Arikaree River At Haigler	1,113
Buffalo Subbasin	Buffalo Creek Near Haigler	1,355
Rock Subbasin	Rock Creek At Parks	3,748
South Fork Subbasin	South Fork Republican River Near Benkelman	2,385
Frenchman Subbasin	Frenchman Creek At Culbertson	27,267
Driftwood Subbasin	Driftwood Creek Near McCook	3,284
Red Willow Subbasin	Red Willow Creek Near Red Willow	3,457
Medicine Creek Subbasin	Medicine Creek Below Harry Strunk	48,769
Beaver Subbasin	Beaver Creek Near Beaver City	1,632
Sappa Subbasin	Sappa Creek Near Stamford	42,888
Prairie Dog Subbasin	Prairie Dog Creek Near Woodruff	40,960
Mainstem Subbasin	Republican River At Guide Rock	502,644
	Republican River Near Hardy	626,375
Hardy Gage Data	USGS Gage 06853500 Republican River Near Hardy, NE	
Mainstem Subbasin	January	13,289
	February	6,875
	March	61,131
	April	21,669
	May	66,000
	June	69,761
	July	118,015
	August	82,834
	September	30,188
	October	21,527
	November	59,330
	December	75,757
	ANNUAL	626,376

Calendar Year		**2019**
Reservoir Data		
South Fork Subbasin	Bonny Reservoir Evaporation	0
	Bonny Reservoir Change In Storage	0
Frenchman Subbasin	Enders Reservoir Evaporation	1,193
	Enders Reservoir Change In Storage	424
Red Willow Subbasin	Hugh Butler Lake Evaporation	950
	Hugh Butler Lake Change In Storage	3,001
Medicine Creek Subbasin	Harry Strunk Lake Evaporation	857
	Harry Strunk Lake Change In Storage	5,232
Prairie Dog Subbasin	Keith Sebelius Lake Evaporation	2,714
	Keith Sebelius Lake Change In Storage	9,259
Mainstem Subbasin	Swanson Lake Evaporation	5,787
	Swanson Lake Change In Storage	905
	Harlan County Evaporation Subject to Nebraska/Kansas Split	16,760
	Harlan County Evaporation Charged to Kansas	0
	Harlan County Change In Storage	74,701
	Lovewell Reservoir Ev charged to the Republican River	(131)
Canal Data		
North Fork Subbasin	Haigler Canal Diversions - Colorado	0
	Haigler Canal Diversions - Nebraska	3,963
	Haigler Canal Diversions	***3,963***
South Fork Subbasin	Hale Ditch Diversions	0
Frenchman Subbasin	~~Champion Canal Diversions~~	~~0~~
	Riverside Canal Diversions	0
	Culbertson Canal Diversions	11,598
	Culbertson Canal Extension Diversions	0
	Culbertson Canal % Return Flow	83%
	Culbertson Canal Extension % Return Flow	100%
Driftwood Subbasin	Meeker-Driftwood Canal Diversions	16,468
	Meeker-Driftwood Canal % Return Flow	67.0%
Red Willow Subbasin	Red Willow Canal Diversions	5,772
	Red Willow Canal % Return Flow	71%
Prairie Dog Subbasin	Almena Canal Diversions	1,320
	Almena Canal % Return Flow	56.6%
Mainstem Subbasin	Bartley Canal Diversion	10,539
	Bartley Canal % Return Flow	81%
	Cambridge Canal Diversion	24,399
	Cambridge Canal % Return Flow	64.5%
	Naponee Canal Diversion	2,567
	Naponee Canal % Return Flow	89%
	Franklin Canal Diversion	28,473
	Franklin Canal % Return Flow	89%
	Franklin Pump Canal Diversions	584
	Franklin Pump Canal % Return Flow	70%
	Superior Canal Diversions	7,741
	Superior Canal % Return Flow	81%
	Courtland Canal Diversions At Headgate	*55,120*
	Diversions to Nebraska Courtland	143
	Nebraska Courtland % Return Flow	25%
	Courtland Canal, Loss in NE assigned to upper Courtland KS	1,491
	Courtland Canal, Loss in NE assigned to delivery to Lovewell	2,765
	Courtland Canal At Kansas-Nebraska State Line	*50,721*
	Courtland Canal Diversions to the Upper Courtland District	13,664
	Courtland Canal Above Lovewell % Return Flow	*65.1%*
	Courtland Canal, Loss assigned to deliveries of water to Lovewell, Stateline to Lovewell	*7,553*
	Courtland Canal Deliveries To Lovewell Reservoir	*30,995*
	Diversions of Republican River water from Lovewell Reservoir to the Courtland Canal below Lovewell	10,662
	Courtland Canal Below Lovewell % Return Flow	*56.1%*
	To allocate Harlan County evaporation:	
	Kansas Bostwick Diversions During Irrigation Season (actual, or 3-year average)	37,222
	Nebraska Bostwick Diversions During Irrigation Season (actual or 3-year average)	26,707

ACCOUNTING TABLES

Table 1: Annual Virgin and Computed Water Supply, Allocations, and Computed Beneficial Consumptive Uses by State, Main Stem, and Sub-Basin

2019	Virgin Water	Computed	Allocations				Computed Beneficial Consumptive Use		
Basin	Supply	Water Supply	Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	39,410	39,410	8,830	0	9,690	20,890	17,680	0	3,610
Arikaree	3,390	3,390	2,660	170	570	(10)	2,080	120	80
Buffalo	5,740	5,740	0	0	1,890	3,850	540	0	3,840
Rock	9,260	9,260	0	0	3,700	5,560	130	0	5,380
South Fork	19,620	19,620	8,710	7,890	270	2,750	13,150	3,470	610
Frenchman	115,930	115,510	0	0	61,910	53,600	1,680	0	84,930
Driftwood	1,480	1,480	0	100	240	1,140	0	10	830
Red Willow	23,130	20,130	0	0	3,860	16,270	0	0	10,690
Medicine	65,040	59,810	0	0	5,440	54,370	0	0	21,590
Beaver	12,540	12,540	2,510	4,870	5,090	70	0	6,760	4,150
Sappa	46,100	30,110	0	12,380	12,380	5,350	0	2,950	1,930
Prairie Dog	63,280	28,760	0	13,140	2,190	13,430	0	13,040	180
Main Stem	662,620	399,550	0	204,170	195,380	0	(2,520)	21,560	125,050
Total All Basins	1,067,540	745,310	22,710	242,720	302,610	177,270	32,740	47,910	262,870
Main Stem Including Unallocated		576,820	0	294,750	282,070				
Total	1,067,540	745,310	22,710	333,300	389,300	0	32,740	47,910	262,870

Table 2: Original Compact Virgin Water Supply and Allocations									
Basin	Virgin Water Supply	Colorado Allocation	% of Basin Supply	Kansas Allocation	% of Basin Supply	Nebraska Allocation	% of Basin Supply	Unallocated	% of Basin Supply
North Fork	44,700	10,000	22.4%			11,000	24.6%	23,700	53.0%
Arikaree	19,610	15,400	78.5%	1,000	5.1%	3,300	16.8%	(90)	-0.4%
Buffalo	7,890					2,600	33.0%	5,290	67.0%
Rock	11,000					4,400	40.0%	6,600	60.0%
South Fork	57,200	25,400	44.4%	23,000	40.2%	800	1.4%	8,000	14.0%
Frenchman	98,500					52,800	53.6%	45,700	46.4%
Driftwood	7,300			500	6.9%	1,200	16.4%	5,600	76.7%
Red Willow	21,900					4,200	19.2%	17,700	80.8%
Medicine	50,800					4,600	9.1%	46,200	90.9%
Beaver	16,500	3,300	20.0%	6,400	38.8%	6,700	40.6%	100	0.6%
Sappa	21,400			8,800	41.1%	8,800	41.1%	3,800	17.8%
Prairie Dog	27,600			12,600	45.7%	2,100	7.6%	12,900	46.7%
Tributaries Sub-Total	384,000							175,500	
Main Stem	94,500								
Main Stem + Unallocated	270,000			138,000	51.1%	132,000	48.9%		
Total	478,900	54,100		190,300		234,500			

Table 3A: Table to Be Used to Calculate Colorado's Five-Year Running Average Allocation and Computed Beneficial Consumptive Use for Determining Compact Compliance for Averaging Periods with No Water Short Year Designations Pursuant to Section III.J.

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit and CORWS	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and CORWS Credit Col 1 – (Col 2- Col 3)
2015	24,760	33,780	10,760	1,740
2016	25,190	33,930	10,130	1,390
2017	22,960	31,810	11,330	2,480
2018	25,630	35,130	13,578	4,078
2019	22,710	32,740	8,905	(1,125)
Avg 2015-2019	24,250	33,480	10,940	1,710

Table 3B: Table to Be Used to Calculate Kansas's Five-Year Running Average Allocation and Computed Beneficial Consumptive Use for Determining Compact Compliance

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Col 1 – (Col 2- Col 3)
2015	163,420	50,890	NA	112,530
2016	156,760	51,320	NA	105,440
2017	177,230	62,040	NA	115,190
2018	179,780	51,450	NA	128,330
2019	333,300	47,910	NA	285,390
Avg 2015-2019	202,100	52,720	NA	149,380

Table 3C: Table to Be Used to Calculate Nebraska's Five-Year Running Average Allocation and Computed Beneficial Consumptive Use for Determining Compact Compliance

	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive	Imported Water Supply Credit and NERWS	Difference between Allocation and the Computed Beneficial Consumptive Use offset by Imported Water Supply Credit and NERWS Credit Col 1 – (Col 2- Col 3)
2015	223,860	243,530	36,171	16,501
2016	217,880	256,120	61,816	23,576
2017	238,540	242,140	39,439	35,839
2018	241,680	266,080	25,943	1,543
2019	389,300	262,870	26,541	152,971
Avg 2015-2019	262,250	254,150	37,980	46,090

Table 4A: Colorado Compliance with the Sub-basin Non-impairment Requirement

Table 4A is left unpopulated pursuant to the August 24, 2016 "RESOLUTION BY THE REPUBLICAN RIVER COMPACT ADMINISTRATION APPROVING OPERATION AND ACCOUNTING FOR THE COLORADO COMPACT COMPLIANCE PIPELINE AND COLORADO'S COMPLIANCE EFFORTS IN THE SOUTH FORK REPUBLICAN RIVER BASIN", paragraph E.

2019

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Sub-basin	Colorado Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Credits from Imported Water Supply and CORWS Credit (Five-year Running Average)	Total Available Supply (Five-year Running Average)	Colorado Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use (Five-year Running Average)
North Fork						
Arikaree						
South Fork						
Beaver						

Table 4B: Kansas's Sub-Basin Non-impairment Compliance

2019

	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7
Sub-basin	Kansas Sub-basin Allocation (Five-year Running Average)	Unallocated Supply (Five-year Running Average)	Unused Allocation from Colorado (Five Year Running Average)	Credits from Imported Water Supply (Five-year Running Average)	Total Available Supply Col 1 + Col 2 + Col 3 + Col 4 (Five-year Running Average)	Kansas Computed Beneficial Consumptive Use (Five-year Running Average)	Difference Between Available Supply and Computed Beneficial Consumptive Use Col 5 - Col 6 (Five-year Running Average)
Arikaree	170	(10)	230	N/A	390	174	216
South Fork	9,364	3,260	0	N/A	12,624	5,262	7,362
Driftwood	100	1,104	0	N/A	1,204	10	1,194
Beaver	4,634	68	2,390	N/A	7,092	6,574	518
Sappa	5,952	2,570	0	N/A	8,522	2,186	6,336
Prairie Dog	6,928	7,076	0	N/A	14,004	9,882	4,122

Table 5A: Colorado's Compliance During Water-Short Year Administration

	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7
Year	Is the year Water Short Pursuant to III.J?* (Yes or No)	Statewide Allocation	Beaver Creek Reduction Pursuant to Table 5F	Allocation - Beaver Creek Reduction (Col. 2 - Col.3)	Computed Beneficial Consumptive (excluding the Beaver Creek Sub-basin)	Imported Water Supply Credit - IWS Beaver Creek + CORWS Credit	Difference between Allocation and the Compuated Beneficial Consumptive Use offset by Imported Water Supply Credit and CORWS Credit (Col. 4 - Col. 5 + Col. 6)
2015	Yes	24,760	1,406	23,354	33,780	10,760	334
2016	Yes	25,190	1,650	23,540	33,930	10,130	(260)
2017	No	22,960	0	22,960	31,810	11,330	2,480
2018	Yes	25,630	1,852	23,778	35,130	13,578	2,226
2019	No	22,710	0	22,710	32,740	8,905	(1,125)
Avg 2015-2019	Yes	24,250	980	23,270	33,480	10,940	730

Table 5F: Colorado's Beaver Creek Reduction During Water-Short Years

Water Short Year (WSY) Pursuant to III.J	Beaver Creek Allocation	Reduction = Average of last five WSY
	Col. 1	Col. 2
2002	770	N/A
2003	260	N/A
2004	360	N/A
2005	910	N/A
2006	1,420	N/A
2007	2,320	744
2013	1,130	1,054
2014	1,250	1,228
2015	2,130	1,406
2016	2,430	1,650
2018	2,430	1,852

Table 5B: Kansas's Compliance During Water-Short Year Administration

Year	Allocation				Computed Beneficial Consumptive Use	Imported Water Supply Credit	Difference Between Allocation and the Computed Beneficial Consumpitve Use offset by Imported Water Supply Credit
Column	1	2	3	4	5	6	7
	Sum Sub-basins	Kansas' Share of Unallocated Supply	Kansas' Share of the Unused Colorado Allocation	Total Col 1 + Col 2 + Col 3			Col 4 - (Col 5 - Col 6)
2018	29,280	8,156	1,400	38,836	28,780	N/A	10,056
2019	38,550	11,615	1,579	51,744	26,350	N/A	25,394
Avg 2018-2019	33,915	9,885	1,490	45,290	27,565	N/A	17,725

Table 5C: Nebraska's Compliance During Water-Short Year Administration

Year	Allocation				Computed Beneficial Consumptive Use			Imported Water Supply Credit and NERWS Credit	Difference Between Allocation and Computed Beneficial Consumptive Use offset by Imported Water Supply Credit Above Guide Rock and NERWS Credit
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	Nebraska's Share of Unused Colorado Allocation	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock	Credits Above Guide Rock	Col 3 + Col 4 - (Col 7 - Col 8)
2018	241,680	19,786	221,894	1,340	266,080	3,314	262,766	25,943	(13,590)
2019	389,300	56,294	333,006	1,511	262,870	1,780	261,090	26,541	99,968
Avg 2018-2019	315,490	38,040	277,450	1,430	264,480	2,550	261,930	26,240	43,190

Table 5D: Nebraska's Compliance Under a Alternative Water-Short Year Administration Plan

Year	Allocation				Computed Beneficial Consumptive Use			Imported Water	Difference Between Allocation
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9
	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	Share of Unused Colorado	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock	Credits Above Guide Rock	Col 3 + Col 4 - (Col 7 - Col 8)
2017	238,540	11,539	227,001	1,320	242,140	3,585	238,555	39,466	29,232
2018	241,680	19,786	221,894	1,340	266,080	3,314	262,766	25,943	(13,590)
2019	389,300	56,294	333,006	1,511	262,870	1,780	261,090	26,541	99,968
Avg 2017-2019	289,840	29,210	260,630	1,390	257,030	2,890	254,140	30,650	38,540

Table 5E: Nebraska's Tributary Compliance During Water-Short Year Administration

	Allocation			Computed Beneficial Consumptive Use	Water Supply Credit and AWS	Allocation - (CBCU - IWS- AWS)
Year	Sub-Basin Total	Share of Unallocated Supply	Total			
2017	92,370	70,186	162,556	132,440	30,481	60,597
2018	97,670	71,863	169,533	137,900	11,446	43,079
2019	107,230	86,685	193,915	137,820	11,441	67,536
Avg 2017-2019	102,450	79,274	181,724	137,860	11,444	55,308

ATTACHMENTS

Attachment 1: Sub-basin Flood Flow Thresholds

Sub-basin	Sub-basin Flood Flow Threshold Acre-feet per Year[3]
Arikaree River	16,400
North Fork of Republican River	33,900
Buffalo Creek	9,800
Rock Creek	9,800
South Fork of Republican River	30,400
Frenchman Creek	51,900
Driftwood Creek	9,400
Red Willow Creek	15,100
Medicine Creek	55,100
Beaver Creek	13,900
Sappa Creek	26,900
Prairie Dog	15,700

[3] Flows considered to be Flood Flows are flows in excess of the 94% flow based on a flood frequency analysis for the years 1971-2000. The Gaged Flows are measured after depletions by Beneficial Consumptive Use and change i reservoir storage.

Attachment 6: Computing Water Supplies and Consumptive Use Above Guide Rock

Note: At its Annual Meeting on August 21, 2020, the RRCA agreed that the Accounting Procedures (Rev. May 25, 2017) do not properly implement the Flood Flow provisions at the Hardy gage with respect to the calculation of Computed Water Supply above and below Guide Rock. The current implementation could impact Nebraska's Table 5C compliance test, specifically the Allocation above Guide Rock. Nebraska and Kansas each offered proposals to resolve the issue but could not reach agreement on a solution. Due to the infrequent occurrence of Flood Flows, the RRCA deferred resolution of the matter to a future date necessitated by and preceding impact to Nebraska's Table 5C compliance. The states wish to acknowledge and memorialize the issue to encourage work toward its resolution. As it stands, Attachment 6 calculates the Virgin Water Supply Guide Rock to Hardy rather than Computed Water Supply Guide Rock to Hardy which would reduce the Virgin Water Supply by the relevant Flood Flows as described in Section II. Definitions and Section III. Basic Formulas.

Year	Total Mainstem CWS	Hardy Gage	Superior Courtland Diversion Dam	Courtland Canal Diversions	Superior Canal Diversion	Courtland Canal Returns	Superior Canal Returns	Total Bostwick Returns Below Guide Rock	NE CBCU Below Guide Rock	KS CBCU Below Ruide Rock	Total CBCU Below Guide Rock	Gain Guide Rock to Hardy	VWS Guide Rock to Hardy	Mainstem VWS Above Guide Rock	NE MS Allocation Above Guide Rock	KS MS Allocation Above Guide Rock	Nebraska Guide Rock to Hardy Allocation	Kansas Guide Rock to Hardy Allocation
2019	399,550	626,375	502,644	46,704	7,741	4,280	6,308	10,588	1,780	197	1,977	113,143	115,120	284,430	139,086	145,344	56,294	58,826

COURTLAND CANAL	
	2019
Return Flow From Courtland Canal To Republican River Above Lovewell From Kansas	761
Return Flow From Courtland Canal To Republican River Above Hardy From Nebraska	3,519
Courtland Canal Diversions At Headgate	55,120
Courtland Canal At Kansas-Nebraska State Line	50,721
NE Courtland Canal CBCU (includes transportation loss)	108
Superior Canal CBCU	1,433

NEBRASKA	
	2019
SW Diversions - Irrigation - Small Pumps - Nebraska Below Guide Rock	84
SW Diversions - M&I - Nebraska - Below Guide Rock	0
SW Non-Federal Reservoir Evaporation - Below Guide Rock	(6)
SW Return - Irrigation	21
SW Return - M&I	0
GW CBCU Nebraska Below Guide Rock	1,723

KANSAS	
	2019
SW CBCU - Irrigation - Small Pumps	148
SW CBCU - M&I	0
GW CBCU Kansas Below Guide Rock	49

2019

Attachment 7: Calculations of Return Flows from Bureau of Reclamation Canals

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12
Canal	Canal Diversion	Spill to Waste-Way	Net Diversion	Field Deliveries	Canal Loss	Average Field Loss Factor	Field Loss	Total Loss from District	Percent Field and Canal Loss That Returns to the Stream	Total return to Stream from Canal and Field Loss	Return as Percent of Canal Diversion
Name Canal Σ Irrigation Season Σ Non- Irrigation Season	Headgate Diversion	Sum of measured spills to river	Col 2 - Col 3	Sum of Deliveries to the field	Col 4 - Col 5	1 -Weighted Average Efficiency of Application System for the District*	Col 5 x Col 7	Col 6 + Col 8	Estimated Percent Loss*	Col 9 x Col 10 + Col 3	Col 11/Col 2
Culbertson	9,734	601	9,133	279	8,854	30%	84	8,938	82%	7,930	81%
	1,864	267	1,597	0	1,597	30%	0	1,597	92%	1,736	93.1%
Culbertson Extension	0	0	0	0	0	30%	0	0	82%	0	100%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Meeker - Driftwood	16,468	655	15,813	4,511	11,302	30%	1,353	12,655	82%	11,032	67.0%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Red Willow	5,728	0	5,728	1,094	4,634	30%	328	4,962	82%	4,069	71.0%
	44	0	44	0	44	30%	0	44	92%	40	92.0%
Bartley	8,186	4,279	3,907	1,913	1,994	30%	574	2,568	82%	6,385	78.0%
	2,353	0	2,353	0	2,353	30%	0	2,353	92%	2,165	92.0%
Cambridge	24,399	2,276	22,123	8,157	13,966	30%	2,447	16,413	82%	15,735	64.5%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Naponee	2,399	1,602	797	236	561	35%	83	644	82%	2,130	88.8%
	168	103	65	0	65	35%	0	65	92%	163	96.9%
Franklin	28,473	18,636	9,837	2,352	7,485	35%	823	8,308	82%	25,449	89.4%
	0	0	0	0	0	35%	0	0	92%	0	100.0%
Franklin Pump	584	97	487	160	327	35%	56	383	82%	411	70.4%
	0	0	0	0	0	35%	0	0	92%	0	100.0%
Almena	1,320	0	1,320	584	736	30%	175	911	82%	747	56.6%
Superior	6,708	2,795	3,913	1,216	2,697	31%	377	3,074	82%	5,316	79.2%
	1,033	530	503	0	503	31%	0	503	92%	993	96.1%
Nebraska Courtland	143	0	143	130	13	23%	30	43	82%	35	24.6%
Courtland Canal Above Lovewell (KS)	13,664	577	13,087	3,813	9,274	23%	877	10,151	82%	8,901	65.1%
Courtland Canal Below Lovewell	19,275	2,427	16,848	8,613	8,235	23%	1,981	10,216	82%	10,804	56.1%

* The average field efficiencies for each district and percent loss that returns to the stream may be reviewed and, if necessary, changed by the RRCA to improve the accuracy of the estimates.

	CCV and RCCV Tracking[a]												APV and RWS					RCCV Calc
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Colorado		Nebraska			
Year	Start of Year RCCV	RCCV Adjustment	CCV	CCV Inflow Into HCL	RCCV Inflow Into HCL	Total CCV and RCCV Inflow Into HCL	Total CCV and RCCV Available for Release	CCV Released from HCL as Flow	CCV Released from HCL as Evaporation	CCV Retained in HCL (at End of Year)	CWSA	End of Year RCCV	Aug. Pumping Volume (APV)	Resolution Water Supply Credit (CORWS)	Aug. Pumping Volume (APV) Rock Creek That Passed Sub-basin Gage in the Current Year	Aug. Pumping Volume (APV) N-CORPE That Passed Sub-basin Gage in the Current Year	Resolution Water Supply Credit (NERWS)	Extra CCV Efforts Above CCV (Use with RCCV Calc)
	=Col 12 of previous year	b	c			= Col. 4 + Col. 5	=Col. 6 + Col. 10 of previous year			= Col. 7 – (Col. 8 + Col. 9)	=Col. 10 – Col. 10 of previous year	= Col. 1 – Col. 2 + Col. 3 - Col. 6[d]						
2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,766	0	15,766	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	7,448	7,448	19,397	42,758	62,155	0
2015	0	0	0	8332	0	8332	8332	0	0	8332	8332	0	10,760	10,760	1,098	25,932	18,698	8332
2016	0	0	41,935	24752	0	24752	33084	5084	4321	23679	15347	9,300	10,130	10,130	499	22,803	41,935	449
2017	9300	0	20,000	20,000	0	20000	43679	20000	2241	21438	-2241	9,300	11,330	11,330	4,563	11,106	20,000	0
2018	9300	0	0	0	0	0	21438	0	1339	20099	-1339	9,300	13,578	13,578	0	0	0	0
2019	9300	0	0	0	0	0	20099	0	2340	17759	-2340	9,300	8,905	8,905	0	0	0	0

a. Calculations for RCCV, CWSA, & RWS don't start until Oct. 1, 2015

b. See Provision 10 of the RRCA Resolution signed August 24, 2016, titled “Resolution Approving Long-Term Agreement Related to the Operation of Harlan County Lake for Compact Call Years” for the terms of assigning RCCV Adjustment. The RCCV Adjustment for each year is equal to 20% of the unadjusted portion of the RCCV, if it is a non-Compact Call Year, plus any remaining volumetric reductions from the previous four years.

c. In years when the contributions from Nebraska’s water management activities, consistent with the 2016 CCY HCL Operations Resolution, are greater than CCV and the NERWS is equal to the greater contribution volume, CCV in Column 3 should also be set equal to the contribution.

d. The formula for calculation of RCCV is based on calendar year operations and will vary when operations occur in a different calendar year than NERWS Credit is applied.

Flood Flow Calculations Based on Accounting Procedures III.B.1 and Attachment 1.

Hardy Gage Monthly Data (acre-feet)					
	2015	2016	2017	2018	2019
January	1,390	5,429	11,315	4,619	13,289
February	2,093	6,532	6,369	5,521	6,875
March	2,027	6,415	6,420	7,386	61,131
April	2,364	6,625	6,933	3,658	21,669
May	34,054	13,501	33,286	2,309	66,000
June	36,781	5,901	11,956	7,601	69,761
July	7,906	4,844	24,712	3,805	118,015
August	7,712	6,153	5,874	5,065	82,834
September	2,180	9,868	3,532	23,848	30,188
October	1,690	5,278	8,752	17,603	21,527
November	1,944	5,286	2,399	9,231	59,330
December	4,790	4,685	5,575	20,216	75,757
ANNUAL	104,931	80,515	127,122	110,862	626,376
Over 400K	0	0	0	0	226,376

Sub-basin Flows Above Attachment 1 Flood Flow Thresholds					
	2015	2016	2017	2018	2019
North Fork	0	0	0	0	0
Arikaree	0	0	0	0	0
Buffalo	0	0	0	0	0
Rock	0	0	0	0	0
South Fork	0	0	0	0	0
Frenchman	0	0	0	0	0
Driftwood	0	0	0	0	0
Red Willow	0	0	0	0	0
Medicine Creek	0	0	0	0	0
Beaver	0	0	0	0	0
Sappa	0	0	0	0	15,988
Prairie Dog	0	0	0	0	25,260
Sub-basin Sum	0	0	0	0	41,248

5-month Consecutive Period Flows (acre-feet)					
	2015	2016	2017	2018	2019
Jan-May	41,928	38,501	64,322	23,494	168,964
Feb-Jun	77,319	38,973	64,964	26,475	225,436
Mar-Jul	83,132	37,285	83,307	24,760	336,576
Apr-Aug	88,817	37,023	82,760	22,438	358,279
May-Sep	88,633	40,266	79,359	42,628	366,798
Jun-Oct	56,269	32,043	54,825	57,922	322,325
Jul-Nov	21,432	31,428	45,268	59,552	311,894
Aug-Dec	18,316	31,269	26,132	75,962	269,636

5-month Consecutive Period Test					
	2015	2016	2017	2018	2019
Jan-May	0	0	0	0	0
Feb-Jun	0	0	0	0	0
Mar-Jul	0	0	0	0	1
Apr-Aug	0	0	0	0	1
May-Sep	0	0	0	0	1
Jun-Oct	0	0	0	0	0
Jul-Nov	0	0	0	0	0
Aug-Dec	0	0	0	0	0
TOTAL	0	0	0	0	3

2-month Consecutive Period Flows (acre-feet)					
	2015	2016	2017	2018	2019
Jan-Feb	3,483	11,960	17,683	10,140	20,164
Feb-Mar	4,120	12,946	12,789	12,907	68,006
Mar-Apr	4,391	13,039	13,353	11,045	82,800
Apr-May	36,418	20,126	40,219	5,967	87,669
May-Jun	70,835	19,402	45,242	9,910	135,761
Jun-Jul	44,687	10,744	36,668	11,406	187,776
Jul-Aug	15,618	10,996	30,586	8,870	200,849
Aug-Sep	9,892	16,020	9,406	28,912	113,022
Sep-Oct	3,870	15,146	12,283	41,451	51,715
Oct-Nov	3,634	10,564	11,151	26,834	80,857
Nov-Dec	6,734	9,971	7,974	29,447	135,087

2-month Consecutive Period Test					
	2015	2016	2017	2018	2019
Jan-Feb	0	0	0	0	0
Feb-Mar	0	0	0	0	0
Mar-Apr	0	0	0	0	0
Apr-May	0	0	0	0	0
May-Jun	0	0	0	0	0
Jun-Jul	0	0	0	0	0
Jul-Aug	0	0	0	0	1
Aug-Sep	0	0	0	0	0
Sep-Oct	0	0	0	0	0
Oct-Nov	0	0	0	0	0
Nov-Dec	0	0	0	0	0
TOTAL	0	0	0	0	1

Final Sub-basin Flood Flows					
	2015	2016	2017	2018	2019
North Fork Flood Flow	0	0	0	0	0
Arikaree Flood Flow	0	0	0	0	0
Buffalo Flood Flow	0	0	0	0	0
Rock Flood Flow	0	0	0	0	0
Southfork Flood Flow	0	0	0	0	0
Frenchman Flood Flow	0	0	0	0	0
Driftwood Flood Flow	0	0	0	0	0
Red Willow Flood Flow	0	0	0	0	0
Medicine Creek Flood Flow	0	0	0	0	0
Beaver Flood Flow	0	0	0	0	0
Sappa Flood Flow	0	0	0	0	15,988
Prairie Dog Flood Flow	0	0	0	0	25,260
Mainstem Flood Flow	0	0	0	0	185,128

Combined Test					
	2015	2016	2017	2018	2019
FINAL TOTAL	0	0	0	0	4

Documentation of Flood Flows Discussions
8/21/2020

In July 2019, the Flood Flow provisions outlined in the Final Settlement Stipulation (FSS) and Accounting Procedures and Reporting Requirements (Accounting Procedures) were triggered. This was the first time that the Accounting Procedures needed to account for Flood Flows since implementation of the FSS and Accounting Procedures. Nebraska staff noticed that an oversight appears to have been made with the way the Accounting Procedures handle flood flows when splitting allocations between above and below Guide Rock. At the August 21, 2019, RRCA working session in preparation for the Annual Meeting, Nebraska introduced this apparent oversight to Kansas and Colorado. Over the following year, Colorado, Kansas, and Nebraska worked together to determine that the current version of the Accounting Procedures does not properly implement the Flood Flow provisions of the FSS. The states offered and discussed proposals to resolve the issue but have not yet reached agreement on a solution. Due to the infrequent occurrence of Flood Flows, the RRCA deferred resolution of the matter to a future date necessitated by and preceding impact to Nebraska's Table 5C compliance. This appendix contains documents and proposals that were exchanged and discussed over the past year in attempt to reach consensus on an option for the Accounting Procedures to properly implement the Flood Flow provisions.

Table of Contents

Flood Flows Issue Introduction for 2019 Working Session
2019_08_19_Working_Session_Document_GR_Flood_Flows.pdf
NeDNR
08/21/2019

Overview:

Preliminary 2019 accounting results suggest the RRCA accounting will need to employ procedures for addressing "flood flows" as described in the Final Settlement Stipulation (FSS) and Accounting Procedures and Reporting Requirements (Accounting Procedures). This will be the first time that the Accounting Procedures have needed to account for flood flows since the implementation of the FSS and Accounting Procedures. Streamflow data indicate that the flood flow trigger for the Main Stem at the Hardy gage was met at the end of July. Flood flow adjustments are also expected to occur in the Sappa Creek and Prairie Dog Sub-basins in 2019 based on current streamflow projections. In developing updated accounting estimates of the impacts of these flood flows, NeDNR staff recognized that an oversight appears to have been made with the way the Accounting Procedures handle flood flows when splitting allocations between above and below Guide Rock. Under the current methods, gains between Guide Rock and Hardy are subtracted from the above Guide Rock allocation when flood flows are present on the Main Stem. This apparent accounting oversight causes Guide Rock allocations to decrease after the flood flow threshold is met and could result, in extreme conditions, in producing negative allocations for the above Guide Rock portion of the Main Stem (Figure 1).

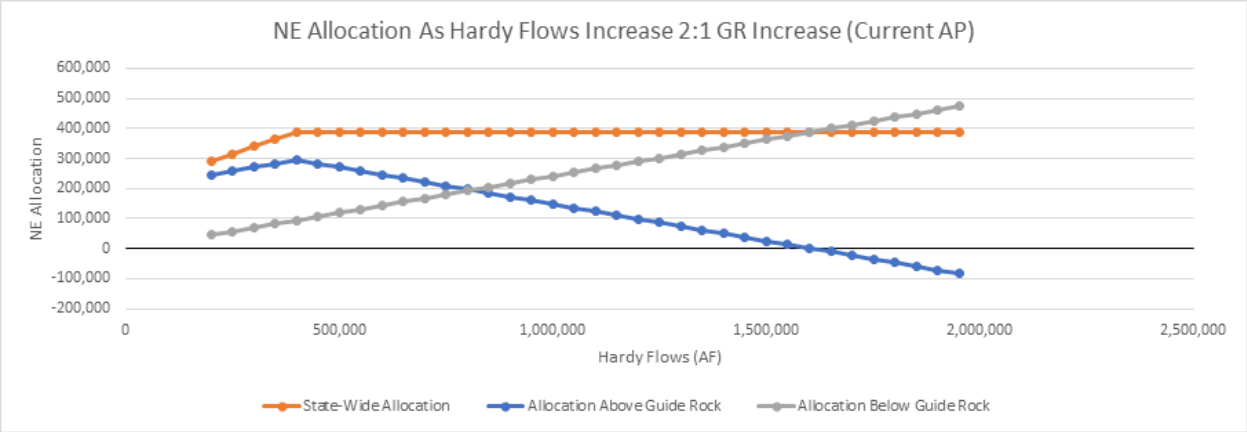

Figure 1: Results based on current Accounting Procedures when streamflow gains downstream of Guide Rock

Application of the flood flow adjustment would typically result in establishing an upper limit of allocations that the state will receive within that sub-basin once the flood flow threshold has been reached. The Accounting Procedures describe the methods used to apply the flood flow adjustment and the application of the flood flow adjustment in the accounting spreadsheet appears to conform to the methods outlined in the Accounting Procedures for all state-based tests with the exception of the Table 5C and Table 5D tests for the sub-basin upstream of Guide Rock. The result of applying the flood flow adjustment to the Table 5C and Table 5D tests seems inconsistent with the flood flow adjustment methods applied to other state-based tests and creates a unexpected result in which the allocation above Guide Rock in the Table 5C and 5D tests can be reduced as streamflow continues to accrue downstream. No other sub-basin allocations are reduced in this manner, and it appears this adjustment is inconsistent with the intent of the flood flow procedures and may not have been fully contemplated in the development of the Accounting Procedures.

Background of FSS and Accounting Procedures:

Flood flows are defined in the FSS and Accounting Procedures as follows:

> **Flood Flows:** The amount of water deducted from the Virgin Water Supply as part of the computation of the Computed Water Supply due to a flood event as determined by the methodology described in the RRCA Accounting Procedures, Subsection III.B.1.;

Additionally, the Accounting Procedures also describe the method used to determine when flood flows occur and how they are to be adjusted from the Main Stem Virgin Water Supply to calculate the computed water supply. The following is an excerpt from the May 25, 2017 version of the Accounting Procedures (page 14).

> 1. Flood Flows
> If in any calendar year there are five consecutive months in which the total actual stream flow at the Hardy gage is greater than 325,000 Acre-feet, or any two consecutive months in which the total actual stream flow is greater than 200,000 Acre-feet, the annual flow in excess of 400,000 Acre-feet at the Hardy gage will be considered to be Flood Flows that will be subtracted from the Virgin Water Supply to calculate the Computed Water Supply, and Allocations. The Flood Flow in excess of 400,000 Acre-feet at the Hardy gage will be subtracted from the Virgin Water Supply of the Main Stem to compute the Computed Water Supply unless the Annual Gaged Flows from a Sub-basin, minus the Augmentation Pumping Volume for that Sub-basin, were in excess of the flows shown for that Sub-basin in Attachment 1. These excess Sub-basin flows shall be considered to be Sub-basin Flood Flows.
>
> If there are Sub-basin Flood Flows, the total of all Sub-basin Flood Flows shall be compared to the amount of Flood Flows at the Hardy gage. If the sum of the Sub-basin Flood Flows are in excess of the Flood Flow at the Hardy gage, the flows to be deducted from each Sub-basin shall be the product of the Flood Flows for each Sub-basin times the ratio of the Flood Flows at the Hardy gage divided by the sum of the Flood Flows of the Sub-basin gages. If the sum of the Sub-basin Flood Flows is less than the Flood Flow at the Hardy gage, the entire amount of each Sub-basin Flood Flow shall be deducted from the Virgin Water Supply to compute the Computed Water Supply of that Sub-basin for that year. The remainder of the Flood Flows will be subtracted from the flows of the Main Stem.

Additionally, the Accounting Procedures describe the methods used to determine the computed water supply between Guide Rock and Hardy and above Guide Rock. The following is an excerpt from the Accounting Procedures (page 19).

> The Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage shall be determined by taking the difference in stream flow at Hardy and Guide Rock, adding Computed Beneficial Consumptive Uses in the reach (this does not include the Computed Beneficial Consumptive Use from the Superior and Courtland Canal diversions), and subtracting return flows from the Superior and Courtland Canals in the reach. The Computed Water Supply above Guide Rock shall be determined by subtracting the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage from the total Computed Water Supply. Nebraska's Allocation above Guide Rock shall be determined by subtracting 48.9% of the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage from Nebraska's total Allocation. Nebraska's Computed Beneficial Consumptive Uses above Guide Rock shall be determined by subtracting Nebraska's Computed Beneficial Consumptive Uses below Guide Rock from Nebraska's total Computed Beneficial Consumptive Use.

Calculations contained in the current accounting spreadsheet attempt to implement the above method but appear to fail in connecting the flood flow adjustment with these calculations of the allocation above Guide Rock. This is evidenced by the fact that as streamflows increase from Guide Rock to Hardy, the results indicate a reduction of allocation above Guide Rock, which is inconsistent with results when adjustments are made to the entire Main Stem or the sub-basins. Therefore, it appears that the allocation above Guide Rock is being modified differently than other allocations and the specific methodology for making the flood flow adjustment at this location does not seem to have been fully contemplated in the Accounting Procedures.

Example of the Issue:

Three examples of the impacts on the allocation above Guide Rock are illustrated below. Example one establishes the allocation above Guide Rock as the flood flow threshold is reached. The second example illustrates that the allocation above Guide Rock is unchanged as the flood flow threshold is exceeded and the same amount of streamflow travels past both Guide Rock and Hardy. The third example illustrates how the allocation above Guide Rock decreases as streamflow continues to accrue in the Guide Rock to Hardy reach (downstream of Guide Rock). This third example is the typical characteristic of the sub-basin downstream of Guide Rock.

Example 1 – Flood Flow Threshold Met

(415,300 AF streamflow at Hardy and 300,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	53,497	**334,763**

*Excerpt from Table 5C. These same values are included in Table 5D.

Example 2 –Flood Flow Threshold Exceeded by 120,000 AF at Hardy with the same amount of increased flow at Guide Rock

(535,300 AF streamflow at Hardy and 420,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	53,497	**334,763**

*Excerpt from Table 5C. These same values are included in Table 5D.

Example 3 –Flood Flow Threshold Exceeded by 120,000 AF at Hardy with a lower amount of increased flow at Guide Rock (80,000 AF)

(535,300 AF streamflow at Hardy and 380,000 AF streamflow at Guide Rock)

Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock
2019	388,260	73,057	**315,203**

*Excerpt from Table 5C. These same values are included in Table 5D.

In Example 2, the same amount of additional streamflow is added to both the Hardy and Guide Rock gages. With the streamflow increase being the same at both locations, the resulting allocation above Guide Rock is unchanged. In Example 3, additional streamflow is added to Hardy and Guide Rock, but the increase at Guide Rock (80,000 AF) is less than the increase at Hardy (120,000 AF). The resulting allocation above Guide Rock is reduced by 19,560 AF [0.489* (120,000 – 80,000)] even as the amount of streamflow traveling past Guide Rock increases by 80,000 AF. This result is driven by additional allocation accruing downstream of Guide Rock as the streamflow term increases between Guide Rock and Hardy. Thus, as can been seen from Example 3, for every two acre-feet of flow past Hardy that does not flow past Guide Rock, the allocation above Guide Rock is reduced by approximately one acre-foot. This impact on the allocation appears to be erroneous, inconsistent with other sub-basin adjustments implemented in the Accounting Procedures, and not fully contemplated in the Accounting Procedures.

Proposed Path Forward:

Nebraska seeks concurrence from the RRCA Commissioners that the principle issue requires resolution to be in conformance with the intent of the FSS and Accounting Procedures and that an assignment be made to the RRCA Engineering Committee to recommend an appropriate solution to the commissioners prior to the 2020 Annual Meeting.

From:	Flaute, Carol
To:	Beightel, Chris [KDA]; "Ivan.Franco@state.co.us"
Cc:	Burgert, Kari; Bradley, Jesse; Jensen, Catherine
Subject:	Memo pertaining to Flood Flow Provisions assignment
Date:	Tuesday, September 17, 2019 11:14:19 AM
Attachments:	20190910_FloodFlowCorrectionOptionsMemorandum.pdf 2019_08_19_Working Session Document_GR Flood Flows.pdf

Chris and Ivan,

In preparation for October's EC meeting, please read the attached memorandum pertaining to the EC's assignment to review the flood flow provisions of the RRCA Accounting Procedures.

Also attached for reference is a copy of the related document that Nebraska distributed during this year's RRCA working session.

Carol J. Myers Flaute
INTEGRATED WATER MANAGEMENT COORDINATOR

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301 Centennial Mall South
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September 9, 2019

RRCA Engineering Committee Assignment: Review Flood Flow Provisions of the RRCA Accounting Procedures

OVERVIEW OF TASK

At the RRCA annual meeting working session Nebraska reviewed a memorandum provided to the Engineering Committee (EC) on August 19, 2019 in which concern related to a flood-flow accounting issue was identified. The memorandum provided by Nebraska explained the unexpected behavior of the allocation above Guide Rock due to mainstem flood-flow adjustments. Based on these discussions the RRCA agreed to establish the following assignment for the EC:

> *Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.*

PROPOSED TIMELINE FOR COMPLETION

The EC assignment was adopted by the RRCA at the annual meeting on August 22, 2019. The assignment must be completed in time for the 2019 accounting to be approved at the 2020 RRCA Annual Meeting. Nebraska is proposing the following subtasks and timeline for this assignment:

October 2019:	EC discuss current accounting provisions and establish conceptual understanding of how Guide Rock allocation should behave when flood flows occur in the mainstem
January 2020:	EC review and discuss potential accounting procedure changes needed to accommodate expected behavior of Guide Rock allocation.
April 2020:	EC discuss and agree to specific draft changes to Accounting Procedures methods
July 2020:	EC implement agreed upon changes in conjunction with completion of 2019 accounting
August 2020:	Recommend updated Accounting Procedures and final 2019 accounting for approval by RRCA

Since there are no specific instructions in the FSS or the Accounting Procedures about how to handle flood flows at the Guide Rock gage nor to the allocation above Guide Rock, we are proposing to start with conceptual agreement about how to apply the flood-flow adjustment. Once a conceptual agreement has been reached we will then work to make the necessary modification to the Accounting Procedures and accounting spreadsheet conform to the agreed upon concepts and implement those changes in performing final 2019 accounting.

GUIDE ROCK FLOOD-FLOW ADJUSTMENT OPTIONS

Guide Rock flood flows are not defined in the Accounting Procedures, and unlike other accounting sub-basins, no Guide Rock flood flow threshold has been established . Conceptually, the Accounting Procedures should define when Guide Rock Flood Flows should be applied and the method of determining the appropriate threshold or limit on stream flows. Nebraska has provided fictional examples in Figure 1 for purposes of furthering this conceptual conversation.

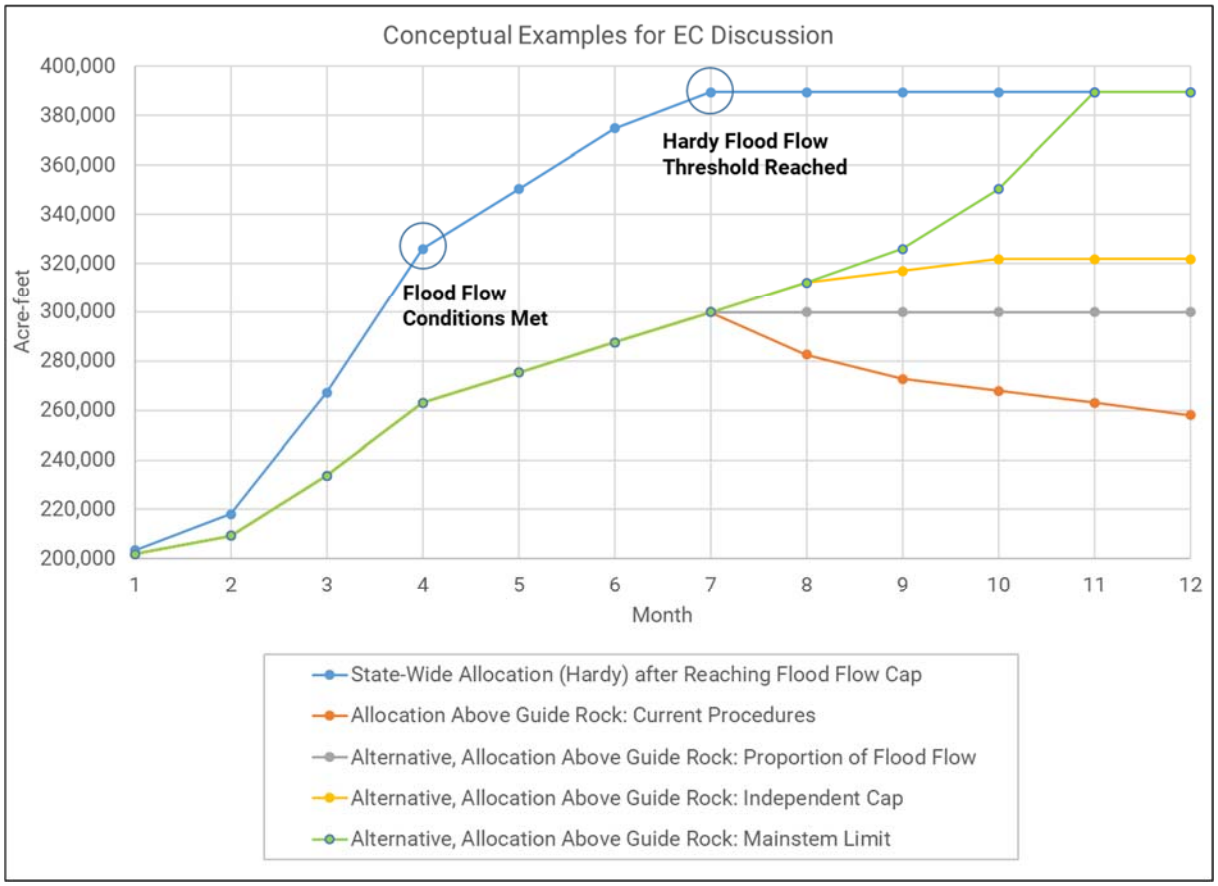

Figure 1. Conceptual examples of above Guide Rock behavior for Discussion with EC

For email attachment *2019_08_19_Working_Session_Document_GR_Flood_Flows.pdf* see *Flood Flows Issue Introduction for 2019 Working Session*, Page 1

From:	Flaute, Carol
To:	Beightel, Chris [KDA]; "Ivan.Franco@state.co.us"
Cc:	Beightel, Chris [KDA]; Barfield, David [KDA]; Beam, Mike [KDA]; Don Blankenau; Grother, Brittney [KDA]; Jasper Fanning; Fassett, Jeff; Bradley, Jesse; Kate Greenberg; Kevin Rein; Lavene, Justin; Letourneau, Lane [KDA]; Lewis, Earl; mike.sullivan@state.co.us; Scott Steinbrecher; Titus, Kenneth [KDA]; Tom Riley; Tom Wilmoth; Goff, Katie; cscott@usbr.gov; Burgert, Kari; Schellpeper, Jennifer; Willem Schreuder
Subject:	Flood flows memorandum from Nebraska
Date:	Tuesday, December 3, 2019 3:55:15 PM
Attachments:	20191203_FloodFlow_ProposedRevision.pdf

Chris and Ivan,

Before Friday's 3-States meeting, please read the attached memorandum from Nebraska describing proposed revisions to the flood-flow accounting methodology. We will plan to discuss this memorandum at Friday's meeting.

Carol J. Myers Flaute
INTEGRATED WATER MANAGEMENT COORDINATOR

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RRCA Engineering Committee Assignment: *Review the Flood Flow provisions of the RRCA Accounting Procedures, especially as they are applied to the allocations in Tables 5C and 5D, to evaluate whether the accounting methods are in conformance with the intent of the FSS and if they are not, develop a recommendation for how to modify the Accounting Procedures to bring them into conformance so that 2019 accounting results can be approved at the 2020 Annual Meeting.*

At the RRCA annual meeting working session Nebraska reviewed a memorandum provided to the Engineering Committee (EC) on August 19, 2019, in which concern related to a flood-flow accounting issue was identified. The memorandum provided by Nebraska explained the unexpected behavior of the allocation above Guide Rock due to Main Stem flood-flow adjustments. In particular, it was noted that as the gains between Guide Rock and Hardy are subtracted from the Guide Rock allocation and the flood flow adjustment is applied to the Main Stem, the result can cause allocations above Guide Rock to be reduced.

A second memorandum was provided by Nebraska to the Engineering Committee that outlined a schedule toward recommending any Accounting Procedures revisions and 2019 Accounting for approval at the 2020 annual meeting and generalized some concepts for changing how the flood flow adjustment is applied in calculation of the Guide Rock allocations. Following this memo and subsequent Engineering Committee meeting, on October 30, 2019, Kansas provided feedback that the accounting issue "…appears to have been made with the way the Accounting Procedures handle flood flows when splitting allocations between above and below Guide Rock" and that reasonable solutions include "implementing the "Proportion of Flood Flow" or the "Independent Cap" as illustrated in Nebraska's September 10, 2019 memorandum." Following the Engineering Committee meeting, Colorado (Willem Schreuder) provided feedback that a correction to calculating Computed Water Supply above and below Guide Rock, in a manner more consistent with the rest of the Accounting, is to include the flood flow adjustment in those calculations (in Attachment 6 of the Accounting Procedures).

Proposed Revision to Attachment 6

Using this feedback from the States, we are recommending the following revision be made: include the Flood Flow Adjustment for the basin above Hardy in the calculation of CWS for the basin between Guide Rock and Hardy in the Attachment 6 calculation. This proposed revision prevents allocation above Guide Rock from decreasing with increasing supply below Guide Rock and is consistent with the rest of the Accounting Procedures descriptions and equations.

Calculating Above Guide Rock Allocation: Current Procedures

Accounting Procedures (revised May 25, 2017) Section III.H., second paragraph**:**

> The Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage shall be determined by taking the difference in stream flow at Hardy and Guide Rock, adding Computed Beneficial Consumptive Uses in the reach (this does not include the Computed Beneficial Consumptive Use from the Superior and Courtland Canal diversions), and subtracting return flows from the Superior and Courtland Canals in the reach. The Computed Water Supply above Guide Rock shall be determined by subtracting the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage from the total Computed Water Supply. Nebraska's Allocation above Guide Rock shall be determined by subtracting 48.9% of the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage from Nebraska's total Allocation. Nebraska's Computed Beneficial Consumptive Uses above Guide Rock shall be determined by subtracting Nebraska's Computed Beneficial Consumptive Uses below Guide Rock from Nebraska's total Computed Beneficial Consumptive Use.

In equation form, the accounting spreadsheet is set up to calculate Nebraska's Above Guide Rock Allocation as is prescribed in Attachment 6 (presented in the Appendix):

NE AbvGR Allocation = NE Total Allocation – 48.9% * VWS GRtoHdy

NE Total Allocation = ∑ NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

*NE Main Stem Allocation = 48.9% * Main Stem CWS*

Main Stem CWS = Main Stem VWS – ΔReservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

VWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

where
AbvGR : Main Stem above Guide Rock
GRtoHdy : Main Stem between Guide Rock and Hardy
Main Stem : Main Stem above Hardy

As shown in these equations, since the Main Stem Flood Flow Adjustment is applied to the CWS Main Stem but not applied to VWS Guide Rock to Hardy, VWS above Guide Rock is reduced by the Flood Flow Adjustment which is measured at the Hardy gage (Hardy gaged streamflow in excess of 400,000 acre-feet less subbasin flood flow).

Proposed Accounting Procedures Changes
We simply propose to subtract the Main Stem Flood Flow Adjustment from the VWS Guide Rock to Hardy. This subtraction will effectively be used to calculate *Computed* Water Supply above and below Guide Rock as defined in the Accounting Procedures. Red font indicates changes from current procedures.

Accounting Procedures Section III.H., second paragraph would become:

> The Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage shall be determined by taking the difference in stream flow at Hardy and Guide Rock, adding Computed Beneficial Consumptive Uses in the reach (this does not include the Computed Beneficial Consumptive Use from the Superior and Courtland Canal diversions), ~~and~~ subtracting return flows from the Superior and Courtland Canals in the reach, and subtracting the Main Stem Flood Flow Adjustment. The Computed Water Supply above Guide Rock shall be determined by subtracting the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage from the total Computed Water Supply. Nebraska's Allocation above Guide Rock shall be determined by subtracting 48.9% of the Computed Water Supply of the Main Stem reach between Guide Rock and the Hardy gage from Nebraska's total Allocation. Nebraska's Computed Beneficial Consumptive Uses above Guide Rock shall be determined by subtracting Nebraska's Computed Beneficial Consumptive Uses below Guide Rock from Nebraska's total Computed Beneficial Consumptive Use.

The changes to Attachment 6 are presented in the Appendix and subsequent proposed changes in equation form would be: (red font indicates changes from current procedures)

NE AbvGR Allocation = NE Total Allocation – 48.9% * CWS GRtoHdy

NE Total Allocation = ∑ NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

*NE Main Stem Allocation = 48.9% * Main Stem CWS*

Main Stem CWS = Main Stem VWS – ΔReservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy - Main Stem Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

Benefit of Proposed Revision

The proposed revision of including the Flood Flow Adjustment in the calculation of Computed Water Supply Guide Rock to Hardy corrects the problem of decreasing above Guide Rock allocation with gains between Guide Rock and Hardy when the Main Stem Flood Flow Adjustment is applied. Consider the example in Table 1 and Figure 1 following where all accounting variables are constant after July except gains in Hardy streamflow.

The proposed correction also allows for allocations above Guide Rock to increase with continued flow past Guide Rock without discounting for gains below Guide Rock when the Flood Flow Adjustment is applied.

Conclusion

Based on the feedback provided by Kansas and Colorado since the last Engineering Committee meeting, Nebraska requests that the Engineering Committee consider including the Flood Flow Adjustment for the basin above Hardy in the calculation of CWS for the basin between Guide Rock and Hardy in the Attachment 6 calculation. This proposed revision prevents allocation above Guide Rock from decreasing with increasing supply below Guide Rock, is consistent with the rest of the Accounting Procedures descriptions and equations, and efficient to implement.

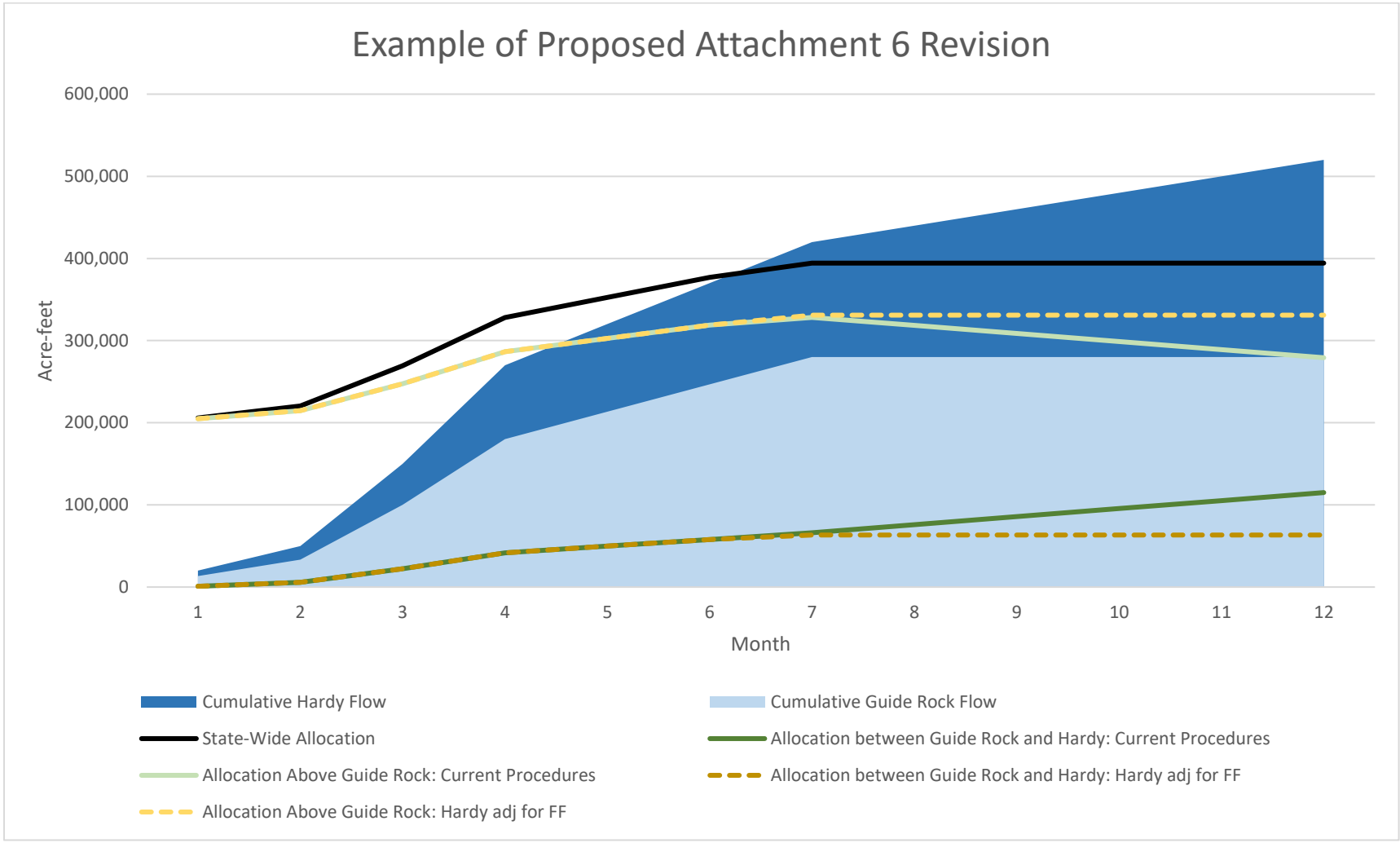

Figure 1. Example corresponding to streamflows and resulting allocations in Table 1, where all accounting variables are constant after July except gains in Hardy streamflow.

Table 1. Example in corresponding to streamflows and resulting allocations displayed in Figure 1, where all accounting variables are constant after July except gains in Hardy streamflow. Note there is no flow past the Guide Rock gage after July, thus Guide Rock Allocation would be expected to remain constant.

	Guide Rock Monthly Streamflow	Hardy Monthly Streamflow	Cumulative Guide Rock Flow	Cumulative Hardy Flow	State-Wide Allocation	Allocation between Guide Rock and Hardy: Current Procedures	Allocation Above Guide Rock: Current Procedures	State-Wide Allocation	Allocation between Guide Rock and Hardy: Proposed Adj for FF	Allocation Above Guide Rock: Proposed Adj for FF
January	13,333	20,000	13,333	20,000	205,830	914	204,916	205,830	914	204,916
February	20,000	30,000	33,333	50,000	220,500	5,804	214,696	220,500	5,804	214,696
March	66,667	100,000	100,000	150,000	269,400	22,104	247,296	269,400	22,104	247,296
April	80,000	120,000	180,000	270,000	328,080	41,664	286,416	328,080	41,664	286,416
May	33,333	50,000	213,333	320,000	352,530	49,814	302,716	352,530	49,814	302,716
June	33,333	50,000	246,667	370,000	376,980	57,964	319,016	376,980	57,964	319,016
July	33,333	50,000	280,000	420,000	394,300	66,114	328,186	394,300	63,327	330,973
August	0	20,000	280,000	440,000	394,300	75,894	318,406	394,300	63,327	330,973
September	0	20,000	280,000	460,000	394,300	85,674	308,626	394,300	63,327	330,973
October	0	20,000	280,000	480,000	394,300	95,454	298,846	394,300	63,327	330,973
November	0	20,000	280,000	500,000	394,300	105,234	289,066	394,300	63,327	330,973
December	0	20,000	280,000	520,000	394,300	115,014	279,286	394,300	633,27	330,973

APPENDIX

Current Attachment 6: Computing Water Supplies and Consumptive Use Above Guide Rock

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Total Main Stem VWS	Hardy Gage	Superior-Courtland Diversion Dam Gage	Courtland Canal Diversions	Superior Canal Diversions	Courtland Canal Returns	Superior Canal Returns	Total Bostwick Returns Below Guide Rock	NE CBCU Below Guide Rock	KS CBCU Below Guide Rock	Total CBCU Below Guide Rock	Gain Guide Rock to Hardy	VWS Guide Rock to Hardy	Main Stem Virgin Water Supply Above Guide Rock	Nebraska Main Stem Allocation Above Hardy	Kansas Main Stem Allocation Above Hardy	Nebraska Guide Rock to Hardy Allocation	Kansas Guide Rock to Hardy Allocation
							Col F + Col G			Col I + Col J	+ Col B − Col C + Col K − Col H	+Col L + Col K	Col A - Col M	.489 x Col N	.511 x Col N	.489 x Col M	.511 x Col M

Proposed Attachment 6: Red font indicates changes from current procedures.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Total Main Stem VWS	Hardy Gage	Superior-Courtland Diversion Dam Gage	Courtland Canal Diversions	Superior Canal Diversions	Courtland Canal Returns	Superior Canal Returns	Total Bostwick Returns Below Guide Rock	NE CBCU Below Guide Rock	KS CBCU Below Guide Rock	Total CBCU Below Guide Rock	Gain Guide Rock to Hardy	CWS Guide Rock to Hardy	Main Stem Computed Water Supply Above Guide Rock	Nebraska Main Stem Allocation Above Hardy	Kansas Main Stem Allocation Above Hardy	Nebraska Guide Rock to Hardy Allocation	Kansas Guide Rock to Hardy Allocation
							Col F + Col G			Col I + Col J	+ Col B − Col C + Col K − Col H	+Col L + Col K − Main Stem Flood Flow Adjustment	Col A - Col M	.489 x Col N	.511 x Col N	.489 x Col M	.511 x Col M

From: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>
Sent: Thursday, January 16, 2020 8:55 AM
To: Flaute, Carol; 'ivan.franco@state.co.us' (ivan.franco@state.co.us)
Cc: Barfield, David [KDA]; Burgert, Kari; Bradley, Jesse; Erickson, Chelsea [KDA]; Perkins, Sam [KDA]; Pugh, Ginger [KDA]; Cao, Hongsheng [KDA]
Subject: RE: Flood flows memorandum from Nebraska

Follow Up Flag: Follow up
Flag Status: Completed

Hi All;

In our review of Nebraska's December 3, 2019 memorandum proposing to change how flood flows are treated in the RRCA Accounting, Kansas has identified a concern with how Nebraska's proposal to adjust flood flows in the Mainstem Guide Rock to Hardy reach affects the allocations in that reach, and by extension the allocations above Guide Rock.

The problem we've identified occurs when most or a large portion of the flood flows originate above Guide Rock. In such a scenario, the proposal to reduce the Guide Rock to Hardy CWS by the entire amount of the flood flows can end up distorting where the allocation is generated such that the Guide Rock to Hardy allocation is inappropriately adjusted.

The example of this behavior can be seen in the latest preliminary 2019 accounting developed by Willem Schreüder (see here). Implementing Nebraska's December 3, 2019 proposal, the preliminary accounting shows the CWS below Guide Rock is -67,510 AF resulting in an allocation to Nebraska of -33,012 AF. In this case, the WSY accounting in Table 5C would, by subtracting the Guide Rock to Hardy allocation, increase Nebraska's allocation above Guide Rock by 33,012 AF. This does not seem reasonable.

A possible alternative is to develop a method to parse where, above or below Guide Rock, the flood flows originate and make the respective adjustments to each reach. We haven't thoroughly thought through a method for doing this but we envision it might assign the flood flows according the ratio of the flows at Guide Rock to the flows at Hardy.

In 2019, according to Dr. Shreüder's latest preliminary accounting, flows at Guide Rock were 502,276 AF, and flows at Hardy were 625,783 AF. Main stem flood flows were determined to be 184,496 AF. If the simple ratio was used, then, for the purpose of Table 5C and Table 5D, we would adjust the above Guide Rock reach by $184{,}496 AF \times \frac{502{,}276 A\,F}{625{,}783\ AF} = 148{,}083\ AF$ then the Guide Rock to Hardy reach would be adjusted by 184,496 AF – 148,083 AF = 36,412 AF. The CWS would then be reduced to 116,990 AF – 36,412 AF = 80,578AF and Nebraska's allocation of that that would be .489 X 80,578 AF = 39,402 AF. This demonstration is for discussion and illustration purposes only. As I mentioned above, we haven't fully thought through this, but we're concerned the current Nebraska proposal's potential to generate negative allocations is problematic.

Incorporating the above method into Nebraska's December 3, 2019 proposal yields (changes in highlight):

NE AbvGR Allocation = NE Total Allocation – 48.9% * CWS GRtoHdy

NE Total Allocation = Σ NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

*NE Main Stem Allocation = 48.9% * Main Stem CWS*

Main Stem CWS = Main Stem VWS – ΔReservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

GRtoHdy Flood Flow Adjustment (when applicable)

$$= \left(\frac{Hardy\ Flows - Guide\ Rock\ Flows}{Hardy\ Flows}\right) \times Mainstem\ Flood\ Flow\ Adjustment$$

~~*CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy - Main Stem Flood Flow Adjustment*~~

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy – GRtoHdy Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

Let us know what you think.

Chris

Chris Beightel, P.E.
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From: Flaute, Carol <carol.flaute@nebraska.gov>
Sent: Tuesday, December 3, 2019 3:55 PM
To: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>; 'Ivan.Franco@state.co.us' <Ivan.Franco@state.co.us>
Cc: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>; Barfield, David [KDA] <David.Barfield@ks.gov>; Beam, Mike [KDA] <Mike.Beam@ks.gov>; Don Blankenau <don@aqualawyers.com>; Grother, Brittney [KDA] <Brittney.Grother@ks.gov>; Jasper Fanning <jasperfanning@urnrd.org>; Fassett, Jeff <jeff.fassett@nebraska.gov>; Bradley, Jesse <Jesse.Bradley@nebraska.gov>; Kate Greenberg <kate.greenberg@state.co.us>; Kevin Rein <kevin.rein@state.co.us>; Lavene, Justin <Justin.Lavene@nebraska.gov>; Letourneau, Lane [KDA] <Lane.Letourneau@ks.gov>; Lewis, Earl <Earl.Lewis@kwo.ks.gov>; mike.sullivan@state.co.us; Scott Steinbrecher <Scott.Steinbrecher@coag.gov>; Titus, Kenneth [KDA] <Kenneth.Titus@ks.gov>; Tom Riley <triley@flatwatergroup.com>; Tom Wilmoth <tom@aqualawyers.com>; Goff, Katie <Katie.Goff@kwo.ks.gov>; cscott@usbr.gov; Burgert, Kari <kari.burgert@nebraska.gov>; Schellpeper, Jennifer <jennifer.schellpeper@nebraska.gov>; Willem Schreuder <willem@prinmath.com>
Subject: Flood flows memorandum from Nebraska

Chris and Ivan,

Before Friday's 3-States meeting, please read the attached memorandum from Nebraska describing proposed revisions to the flood-flow accounting methodology. We will plan to discuss this memorandum at Friday's meeting.

Carol J. Myers Flaute

INTEGRATED WATER MANAGEMENT COORDINATOR

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From:	Beightel, Chris [KDA]
To:	Flaute, Carol; Ivan.Franco@state.co.us
Cc:	Bradley, Jesse; Barfield, David [KDA]; Willem Schreuder
Subject:	KS work on NE"s flood flows/Table 5C issue
Date:	Wednesday, February 5, 2020 1:59:36 PM
Attachments:	20200203.KS.compare_KS-NE_FFmethods.xlsx

Carol and Ivan,

Attached is an Excel workbook file that Kansas has developed to analyze proposed methods for dealing with the Flood Flows in WSY test issue.

Kansas has observed that Nebraska's 6 December 2019 proposed method could potentially increase Nebraska's Above Guide Rock allocation in a flood flow year if that flood flow year was part of the Table 5C test.

We have also observed that Kansas' 16 January 2020 proposed method does partially address Nebraska's original concern.

We also recognize that in a flood flow year, there could be a level of flow in the Guide Rock to Hardy reach that is reasonably unusable to Nebraska and that should be adjusted for. Kansas' 3 February 2020 proposed method is based on Kansas' 16 January method but adds a cap to the Computed Water Supply of the Guide Rock to Hardy reach. The cap in the proposal is set at the largest Computed Water Supply in the Guide Rock to Hardy reach in the record for a non-flood flow year.

Please review this work and let me know if you have any questions about it or would like to discuss it further.

Chris

20200203.KS.compare_KS-NE_FFmethods.xlsx

Contents:

Tab "NE method 20191206" implements Nebraksa's proposal

Tab "KS method 20200116" implements Kansas' proposal as presented to NE by email on January 16, 2020.

Tab "KS method cap 20200203" - Kansas' Jan 16 proposal plus a cap on the Guide Rock to Hardy computed water supply.

Current method

1 Guide R	Main Stem Flood Flow Adjustment (when applicable) assume subbasin FF								41278
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278
450000	8722	8722	8722	8722	8722	8722	8722	8722	8722
500000	58722	58722	58722	58722	58722	58722	58722	58722	58722
550000	108722	108722	108722	108722	108722	108722	108722	108722	108722
625,783	184505	184505	184505	184505	184505	184505	184505	184505	184505
650000	208722	208722	208722	208722	208722	208722	208722	208722	208722
700000	258722	258722	258722	258722	258722	258722	258722	258722	258722
750000	308722	308722	308722	308722	308722	308722	308722	308722	308722
800000	358722	358722	358722	358722	358722	358722	358722	358722	358722
850000	408722	408722	408722	408722	408722	408722	408722	408722	408722
900000	458722	458722	458722	458722	458722	458722	458722	458722	458722

2 Guide R	Gain GRtoHdy (assume Bostwick returns of						10359 AF)		
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-10,359	-60,359	-112,635	-160,359	-210,359	-260,359	-310,359	-360,359	-410,359
450000	39,641	-10,359	-62,635	-110,359	-160,359	-210,359	-260,359	-310,359	-360,359
500000	89,641	39,641	-12,635	-60,359	-110,359	-160,359	-210,359	-260,359	-310,359
550000	139,641	89,641	37,365	-10,359	-60,359	-110,359	-160,359	-210,359	-260,359
625,783	215,424	165,424	113,148	65,424	15,424	-34,576	-84,576	-134,576	-184,576
650000	239,641	189,641	137,365	89,641	39,641	-10,359	-60,359	-110,359	-160,359
700000	289,641	239,641	187,365	139,641	89,641	39,641	-10,359	-60,359	-110,359
750000	339,641	289,641	237,365	189,641	139,641	89,641	39,641	-10,359	-60,359
800000	389,641	339,641	287,365	239,641	189,641	139,641	89,641	39,641	-10,359
850000	439,641	389,641	337,365	289,641	239,641	189,641	139,641	89,641	39,641
900000	489,641	439,641	387,365	339,641	289,641	239,641	189,641	139,641	89,641

3 Guide R	Computed water supply GRtoHdy (assume CBCU GRtoHdy =						3840 AF)		
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-6,519	-56,519	-108,795	-156,519	-206,519	-256,519	-306,519	-356,519	-406,519
450000	43,481	-6,519	-58,795	-106,519	-156,519	-206,519	-256,519	-306,519	-356,519
500000	93,481	43,481	-8,795	-56,519	-106,519	-156,519	-206,519	-256,519	-306,519
550000	143,481	93,481	41,205	-6,519	-56,519	-106,519	-156,519	-206,519	-256,519
625,783	219,264	169,264	116,988	69,264	19,264	-30,736	-80,736	-130,736	-180,736
650000	243,481	193,481	141,205	93,481	43,481	-6,519	-56,519	-106,519	-156,519
700000	293,481	243,481	191,205	143,481	93,481	43,481	-6,519	-56,519	-106,519
750000	343,481	293,481	241,205	193,481	143,481	93,481	43,481	-6,519	-56,519
800000	393,481	343,481	291,205	243,481	193,481	143,481	93,481	43,481	-6,519
850000	443,481	393,481	341,205	293,481	243,481	193,481	143,481	93,481	43,481
900000	493,481	443,481	391,205	343,481	293,481	243,481	193,481	143,481	93,481

4 Guide R	Allocation GRtoHdy =				0.489 X CWS GRtoHdy				
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-3,188	-27,638	-53,201	-76,538	-100,988	-125,438	-149,888	-174,338	-198,788
450000	21,262	-3,188	-28,751	-52,088	-76,538	-100,988	-125,438	-149,888	-174,338
500000	45,712	21,262	-4,301	-27,638	-52,088	-76,538	-100,988	-125,438	-149,888
550000	70,162	45,712	20,149	-3,188	-27,638	-52,088	-76,538	-100,988	-125,438
625,783	107,220	82,770	57,207	33,870	9,420	-15,030	-39,480	-63,930	-88,380
650000	119,062	94,612	69,049	45,712	21,262	-3,188	-27,638	-52,088	-76,538
700000	143,512	119,062	93,499	70,162	45,712	21,262	-3,188	-27,638	-52,088
750000	167,962	143,512	117,949	94,612	70,162	45,712	21,262	-3,188	-27,638
800000	192,412	167,962	142,399	119,062	94,612	70,162	45,712	21,262	-3,188
850000	216,862	192,412	166,849	143,512	119,062	94,612	70,162	45,712	21,262
900000	241,312	216,862	191,299	167,962	143,512	119,062	94,612	70,162	45,712

5 Guide R	WSY allocation (Swide alloc - BlwGR alloc)						SW alloc	391940	
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	395,128	419,578	445,141	468,478	492,928	517,378	541,828	566,278	590,728
450000	370,678	395,128	420,691	444,028	468,478	492,928	517,378	541,828	566,278
500000	346,228	370,678	396,241	419,578	444,028	468,478	492,928	517,378	541,828
550000	321,778	346,228	371,791	395,128	419,578	444,028	468,478	492,928	517,378
625,783	284,720	309,170	334,733	358,070	382,520	406,970	431,420	455,870	480,320
650000	272,878	297,328	322,891	346,228	370,678	395,128	419,578	444,028	468,478
700000	248,428	272,878	298,441	321,778	346,228	370,678	395,128	419,578	444,028
750000	223,978	248,428	273,991	297,328	321,778	346,228	370,678	395,128	419,578
800000	199,528	223,978	249,541	272,878	297,328	321,778	346,228	370,678	395,128
850000	175,078	199,528	225,091	248,428	272,878	297,328	321,778	346,228	370,678
900000	150,628	175,078	200,641	223,978	248,428	272,878	297,328	321,778	346,228

5 Guide R	Reduction to Statewide allocation from flood flow year						SW alloc	391940	
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-3,188	-27,638	-53,201	-76,538	-100,988	-125,438	-149,888	-174,338	-198,788
450000	21,262	-3,188	-28,751	-52,088	-76,538	-100,988	-125,438	-149,888	-174,338
500000	45,712	21,262	-4,301	-27,638	-52,088	-76,538	-100,988	-125,438	-149,888
550000	70,162	45,712	20,149	-3,188	-27,638	-52,088	-76,538	-100,988	-125,438
625,783	107,220	82,770	57,207	33,870	9,420	-15,030	-39,480	-63,930	-88,380
650000	119,062	94,612	69,049	45,712	21,262	-3,188	-27,638	-52,088	-76,538
700000	143,512	119,062	93,499	70,162	45,712	21,262	-3,188	-27,638	-52,088
750000	167,962	143,512	117,949	94,612	70,162	45,712	21,262	-3,188	-27,638
800000	192,412	167,962	142,399	119,062	94,612	70,162	45,712	21,262	-3,188
850000	216,862	192,412	166,849	143,512	119,062	94,612	70,162	45,712	21,262
900000	241,312	216,862	191,299	167,962	143,512	119,062	94,612	70,162	45,712

Values for subbasin flood flows (K2), Bostwick Returns (H18), CBCU CRtoHdy(U2) are from https://www.republicanrivercompact.org/restricted/acct/13jan2020-f1.htm on January 21,2020
Values for 2019 gaged flow at Hardy and Guide Rock are included in highlighted cells

This mehod allows the Guide Rock adjustment to grow with the increasing difference between the Hardy and Guide Rock gages. It does appear that at the extremes, this proposal probably takes too much from NE's allocation. This was the phenomenon that they were trying to address.

In the example above, by the time the difference between Hardy and Guide Rock gages is 350,000 AF, NE's statewide allocation is reduced by nearly 120,000 AF for purposes of the WSY test. This is unlikely to happen, nevertheless there's probably a better solution.

NE method 20191206

1 Guide R	Main Stem Flood Flow Adjustment (when applicable) assume subbasin FF								41278
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278
450000	8722	8722	8722	8722	8722	8722	8722	8722	8722
500000	58722	58722	58722	58722	58722	58722	58722	58722	58722
550000	108722	108722	108722	108722	108722	108722	108722	108722	108722
625,783	184505	184505	184505	184505	184505	184505	184505	184505	184505
650000	208722	208722	208722	208722	208722	208722	208722	208722	208722
700000	258722	258722	258722	258722	258722	258722	258722	258722	258722
750000	308722	308722	308722	308722	308722	308722	308722	308722	308722
800000	358722	358722	358722	358722	358722	358722	358722	358722	358722
850000	408722	408722	408722	408722	408722	408722	408722	408722	408722
900000	458722	458722	458722	458722	458722	458722	458722	458722	458722

2 Guide R	Gain GRtoHdy (assume Bostwick returns of					10359 AF)			
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-10,359	-60,359	-112,635	-160,359	-210,359	-260,359	-310,359	-360,359	-410,359
450000	39,641	-10,359	-62,635	-110,359	-160,359	-210,359	-260,359	-310,359	-360,359
500000	89,641	39,641	-12,635	-60,359	-110,359	-160,359	-210,359	-260,359	-310,359
550000	139,641	89,641	37,365	-10,359	-60,359	-110,359	-160,359	-210,359	-260,359
625,783	215,424	165,424	113,148	65,424	15,424	-34,576	-84,576	-134,576	-184,576
650000	239,641	189,641	137,365	89,641	39,641	-10,359	-60,359	-110,359	-160,359
700000	289,641	239,641	187,365	139,641	89,641	39,641	-10,359	-60,359	-110,359
750000	339,641	289,641	237,365	189,641	139,641	89,641	39,641	-10,359	-60,359
800000	389,641	339,641	287,365	239,641	189,641	139,641	89,641	39,641	-10,359
850000	439,641	389,641	337,365	289,641	239,641	189,641	139,641	89,641	39,641
900000	489,641	439,641	387,365	339,641	289,641	239,641	189,641	139,641	89,641

3 Guide R	Computed water supply GRtoHdy (assume CBCU GRtoHdy =						3840 AF)		
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
450000	34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
500000	34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
550000	34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
625,783	34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
650000	34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
700000	34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
750000	34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
800000	34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
850000	34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241
900000	34,759	-15,241	-67,517	-115,241	-165,241	-215,241	-265,241	-315,241	-365,241

4 Guide R	Allocation GRtoHdy =						0.489 X CWS GRtoHdy		
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
450000	16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
500000	16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
550000	16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
625,783	16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
650000	16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
700000	16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
750000	16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
800000	16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
850000	16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603
900000	16,997	-7,453	-33,016	-56,353	-80,803	-105,253	-129,703	-154,153	-178,603

5 Guide R	WSY alloc (Swide alloc - BlwGR alloc)							SW alloc	391940
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543
450000	374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543
500000	374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543
550000	374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543
625,783	374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543
650000	374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543
700000	374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543
750000	374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543
800000	374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543
850000	374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543
900000	374,943	399,393	424,956	448,293	472,743	497,193	521,643	546,093	570,543

Nebraska's proposal subtracts the entire main stem flood flow adjustment from the virgin water supply of the Guide Rock to Hardy reach. This method decreases the computed water supply Guide Rock to Hardy as the Guide Rock gaged flow increases and produces negative allocations effectively increasing Nebraska's statewide allocation beyond what it was in the actual year that it was calculated.

For example: in 2019, the year that that flood flows occurred, Nebraska's statewide allocation after flood flow adjustment, was 319,940 AF.

If 2020 was a WSY, Nebraska would be required to forgo its allocation below Guide Rock in 2019 and under its proposal the amount that it would forgo is -33,016 AF. Subtracting the negative allocation from its 2019 statewide allocation yeilds 424,956 AF for the 2019 allocation above Guide Rock. So instead of forgoing allocation as the WSY test for Nebraska intends, Nebraska's proposal instead increases available allocation by over 33,000 AF.

Values for subbasin flood flows (K2), Bostwick Returns (H18), CBCU CRtoHdy(U2) are from https://www.republicanrivercompact.org/restricted/acct/13jan2020-f1.htm on January 21,2020
Values for 2019 gaged flow at Hardy and Guide Rock are included in highlighted cells

Nebraska's proposed method

NE AbvGR Allocation = NE Total Allocation – 48.9% * CWS GRtoHdy

NE Total Allocation = ∑ NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

*NE Main Stem Allocation = 48.9% * Main Stem CWS*

Main Stem CWS = Main Stem VWS – ΔReservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy - Main Stem Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

1	Main Stem Flood Flow Adjustment (when applicable) assume subbasin FF								41278
Guide R / Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278
450000	8722	8722	8722	8722	8722	8722	8722	8722	8722
500000	58722	58722	58722	58722	58722	58722	58722	58722	58722
550000	108722	108722	108722	108722	108722	108722	108722	108722	108722
625,783	184505	184505	184505	184505	184505	184505	184505	184505	184505
650000	208722	208722	208722	208722	208722	208722	208722	208722	208722
700000	258722	258722	258722	258722	258722	258722	258722	258722	258722
750000	308722	308722	308722	308722	308722	308722	308722	308722	308722
800000	358722	358722	358722	358722	358722	358722	358722	358722	358722
850000	408722	408722	408722	408722	408722	408722	408722	408722	408722
900000	458722	458722	458722	458722	458722	458722	458722	458722	458722

2	Gain GRtoHdy (assume Bostwick returns of					10359	AF)		
Guide R / Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-10,359	-60,359	-112,635	-160,359	-210,359	-260,359	-310,359	-360,359	-410,359
450000	39,641	-10,359	-62,635	-110,359	-160,359	-210,359	-260,359	-310,359	-360,359
500000	89,641	39,641	-12,635	-60,359	-110,359	-160,359	-210,359	-260,359	-310,359
550000	139,641	89,641	37,365	-10,359	-60,359	-110,359	-160,359	-210,359	-260,359
625,783	215,424	165,424	113,148	65,424	15,424	-34,576	-84,576	-134,576	-184,576
650000	239,641	189,641	137,365	89,641	39,641	-10,359	-60,359	-110,359	-160,359
700000	289,641	239,641	187,365	139,641	89,641	39,641	-10,359	-60,359	-110,359
750000	339,641	289,641	237,365	189,641	139,641	89,641	39,641	-10,359	-60,359
800000	389,641	339,641	287,365	239,641	189,641	139,641	89,641	39,641	-10,359
850000	439,641	389,641	337,365	289,641	239,641	189,641	139,641	89,641	39,641
900000	489,641	439,641	387,365	339,641	289,641	239,641	189,641	139,641	89,641

3	Computed water supply GRtoHdy (assume CBCU GRtoHdy =						3840	AF)	
Guide R / Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-6,519	-61,679	-119,349	-171,998	-227,158	-282,318	-337,478	-392,637	-447,797
450000	42,512	-6,519	-57,782	-104,581	-153,612	-202,643	-251,673	-300,704	-349,735
500000	81,737	37,609	-8,528	-50,647	-94,775	-138,902	-183,030	-227,158	-271,286
550000	113,830	73,713	31,771	-6,519	-46,635	-86,751	-126,868	-166,984	-207,100
625,783	152,694	117,436	80,573	46,920	11,662	-23,596	-58,854	-94,112	-129,370
650000	163,203	129,259	93,769	61,370	27,425	-6,519	-40,463	-74,408	-108,352
700000	182,600	151,080	118,126	88,041	56,521	25,001	-6,519	-38,039	-69,559
750000	199,411	169,992	139,235	111,155	81,737	52,318	22,900	-6,519	-35,938
800000	214,120	186,540	157,705	131,380	103,801	76,221	48,641	21,061	-6,519
850000	227,099	201,141	174,002	149,226	123,269	97,311	71,354	45,396	19,439
900000	238,635	214,120	188,489	165,089	140,574	116,058	91,543	67,027	42,512

4	Allocation GRtoHdy =				0.489	X CWS GRtoHdy			
Guide R / Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-3,188	-30,161	-58,362	-84,107	-111,080	-138,053	-165,026	-192,000	-218,973
450000	20,788	-3,188	-28,255	-51,140	-75,116	-99,092	-123,068	-147,044	-171,021
500000	39,969	18,391	-4,170	-24,766	-46,345	-67,923	-89,502	-111,080	-132,659
550000	55,663	36,046	15,536	-3,188	-22,805	-42,421	-62,038	-81,655	-101,272
625,783	74,668	57,426	39,400	22,944	5,703	-11,538	-28,780	-46,021	-63,262
650000	79,806	63,208	45,853	30,010	13,411	-3,188	-19,787	-36,385	-52,984
700000	89,291	73,878	57,763	43,052	27,639	12,225	-3,188	-18,601	-34,014
750000	97,512	83,126	68,086	54,355	39,969	25,584	11,198	-3,188	-17,573
800000	104,705	91,218	77,118	64,245	50,758	37,272	23,785	10,299	-3,188
850000	111,051	98,358	85,087	72,972	60,278	47,585	34,892	22,199	9,505
900000	116,693	104,705	92,171	80,729	68,741	56,752	44,764	32,776	20,788

5	WSY allocation (Swide alloc - BlwGR alloc)						SW alloc	391940	
Guide R / Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	395,128	422,101	450,302	476,047	503,020	529,993	556,966	583,940	610,913
450000	371,152	395,128	420,195	443,080	467,056	491,032	515,008	538,984	562,961
500000	351,971	373,549	396,110	416,706	438,285	459,863	481,442	503,020	524,599
550000	336,277	355,894	376,404	395,128	414,745	434,361	453,978	473,595	493,212
625,783	317,272	334,514	352,540	368,996	386,237	403,478	420,720	437,961	455,202
650000	312,134	328,732	346,087	361,930	378,529	395,128	411,727	428,325	444,924
700000	302,649	318,062	334,177	348,888	364,301	379,715	395,128	410,541	425,954
750000	294,428	308,814	323,854	337,585	351,971	366,356	380,742	395,128	409,513
800000	287,235	300,722	314,822	327,695	341,182	354,668	368,155	381,641	395,128
850000	280,889	293,582	306,853	318,968	331,662	344,355	357,048	369,741	382,435
900000	275,247	287,235	299,769	311,211	323,199	335,188	347,176	359,164	371,152

This method allows the Guide Rock adjustment to grow with the increasing difference between the Hardy and Guide Rock gages. It does appear that at the extremes, this proposal probably takes too much from NE's allocation. This was the phenomenon that they were trying to address.

In the example above, by the time the difference between Hardy and Guide Rock gages is 350,000 AF, NE's statewide allocation is reduced by nearly 100,000 AF for purposes of the WSY test.

Values for subbasin flood flows (K2), Bostwick Returns (H18), CBCU CRtoHdy(U2) are from https://www.republicanrivercompact.org/restricted/acct/13jan2020-f1.htm on January 21,2020

Values for 2019 gaged flow at Hardy and Guide Rock are included in highlighted cells

3 Table 3 implements the KS proposal to scale the GRtoHdy Flood Flow Adjustment by the ratio of GR flows to Hardy flows

Kansas' proposed method

NE AbvGR Allocation = NE Total Allocation – 48.9% * CWS GRtoHdy

NE Total Allocation = Σ NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

*NE Main Stem Allocation = 48.9% * Main Stem CWS*

Main Stem CWS = Main Stem VWS – ΔReservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

GRtoHdy Flood Flow Adjustment (when applicable)

$$= \left(\frac{\text{Hardy Flows} - \text{Guide Rock Flows}}{\text{Hardy Flows}}\right) \times \text{Mainstem Flood Flow Adjustment}$$

~~*CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy – Main Stem Flood Flow Adjustment*~~

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy – GRtoHdy Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

1 Guide R	Main Stem Flood Flow Adjustment (when applicable) assume subbasin FF								41278
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278	-41278
450000	8722	8722	8722	8722	8722	8722	8722	8722	8722
500000	58722	58722	58722	58722	58722	58722	58722	58722	58722
550000	108722	108722	108722	108722	108722	108722	108722	108722	108722
625,783	184505	184505	184505	184505	184505	184505	184505	184505	184505
650000	208722	208722	208722	208722	208722	208722	208722	208722	208722
700000	258722	258722	258722	258722	258722	258722	258722	258722	258722
750000	308722	308722	308722	308722	308722	308722	308722	308722	308722
800000	358722	358722	358722	358722	358722	358722	358722	358722	358722
850000	408722	408722	408722	408722	408722	408722	408722	408722	408722
900000	458722	458722	458722	458722	458722	458722	458722	458722	458722

2 Guide R	Gain GRtoHdy (assume Bostwick returns of		10359 AF)						
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-10,359	-60,359	-112,635	-160,359	-210,359	-260,359	-310,359	-360,359	-410,359
450000	39,641	-10,359	-62,635	-110,359	-160,359	-210,359	-260,359	-310,359	-360,359
500000	89,641	39,641	-12,635	-60,359	-110,359	-160,359	-210,359	-260,359	-310,359
550000	139,641	89,641	37,365	-10,359	-60,359	-110,359	-160,359	-210,359	-260,359
625,783	215,424	165,424	113,148	65,424	15,424	-34,576	-84,576	-134,576	-184,576
650000	239,641	189,641	137,365	89,641	39,641	-10,359	-60,359	-110,359	-160,359
700000	289,641	239,641	187,365	139,641	89,641	39,641	-10,359	-60,359	-110,359
750000	339,641	289,641	237,365	189,641	139,641	89,641	39,641	-10,359	-60,359
800000	389,641	339,641	287,365	239,641	189,641	139,641	89,641	39,641	-10,359
850000	439,641	389,641	337,365	289,641	239,641	189,641	139,641	89,641	39,641
900000	489,641	439,641	387,365	339,641	289,641	239,641	189,641	139,641	89,641

3 Guide R	CWS GRtoHdy (assume CBCU GRtoHdy =				3840 AF)		cap	68470	
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-6,519	-61,679	-119,349	-171,998	-227,158	-282,318	-337,478	-392,637	-447,797
450000	42,512	-6,519	-57,782	-104,581	-153,612	-202,643	-251,673	-300,704	-349,735
500000	68,470	37,609	-8,528	-50,647	-94,775	-138,902	-183,030	-227,158	-271,286
550000	68,470	68,470	31,771	-6,519	-46,635	-86,751	-126,868	-166,984	-207,100
625,783	68,470	68,470	68,470	46,920	11,662	-23,596	-58,854	-94,112	-129,370
650000	68,470	68,470	68,470	61,370	27,425	-6,519	-40,463	-74,408	-108,352
700000	68,470	68,470	68,470	68,470	56,521	25,001	-6,519	-38,039	-69,559
750000	68,470	68,470	68,470	68,470	68,470	52,318	22,900	-6,519	-35,938
800000	68,470	68,470	68,470	68,470	68,470	68,470	48,641	21,061	-6,519
850000	68,470	68,470	68,470	68,470	68,470	68,470	68,470	45,396	19,439
900000	68,470	68,470	68,470	68,470	68,470	68,470	68,470	67,027	42,512

4 Guide R	Allocation GRtoHdy =			0.489 X CWS GRtoHdy					
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	-3,188	-30,161	-58,362	-84,107	-111,080	-138,053	-165,026	-192,000	-218,973
450000	20,788	-3,188	-28,255	-51,140	-75,116	-99,092	-123,068	-147,044	-171,021
500000	33,482	18,391	-4,170	-24,766	-46,345	-67,923	-89,502	-111,080	-132,659
550000	33,482	33,482	15,536	-3,188	-22,805	-42,421	-62,038	-81,655	-101,272
625,783	33,482	33,482	33,482	22,944	5,703	-11,538	-28,780	-46,021	-63,262
650000	33,482	33,482	33,482	30,010	13,411	-3,188	-19,787	-36,385	-52,984
700000	33,482	33,482	33,482	33,482	27,639	12,225	-3,188	-18,601	-34,014
750000	33,482	33,482	33,482	33,482	33,482	25,584	11,198	-3,188	-17,573
800000	33,482	33,482	33,482	33,482	33,482	33,482	23,785	10,299	-3,188
850000	33,482	33,482	33,482	33,482	33,482	33,482	33,482	22,199	9,505
900000	33,482	33,482	33,482	33,482	33,482	33,482	33,482	32,776	20,788

5 Guide R	WSY allocation (Statewide alloc - GRtoHdy alloc)					Statewide alloc (2019)			391940
Hardy	400,000	450000	502276	550000	600,000	650000	700,000	750000	800,000
400000	395,128	422,101	450,302	476,047	503,020	529,993	556,966	583,940	610,913
450000	371,152	395,128	420,195	443,080	467,056	491,032	515,008	538,984	562,961
500000	358,458	373,549	396,110	416,706	438,285	459,863	481,442	503,020	524,599
550000	358,458	358,458	376,404	395,128	414,745	434,361	453,978	473,595	493,212
625,783	358,458	358,458	358,458	368,996	386,237	403,478	420,720	437,961	455,202
650000	358,458	358,458	358,458	361,930	378,529	395,128	411,727	428,325	444,924
700000	358,458	358,458	358,458	358,458	364,301	379,715	395,128	410,541	425,954
750000	358,458	358,458	358,458	358,458	358,458	366,356	380,742	395,128	409,513
800000	358,458	358,458	358,458	358,458	358,458	358,458	368,155	381,641	395,128
850000	358,458	358,458	358,458	358,458	358,458	358,458	358,458	369,741	382,435
900000	358,458	358,458	358,458	358,458	358,458	358,458	358,458	359,164	371,152

This method implements the same proportional assignment of flood flows as Kansas' Jan 16 initial proposal, but also caps the CWS in the Guide Rock to Hardy reach at the highest historical allocation that was generated in a non-flood flow year, which is currently 68,470 AF.

This method ensures that the allocation below Guide Rock is always positive, but is also reasonably capped.

Values for subbasin flood flows (K2), Bostwick Returns (H18), CBCU CRtoHdy(U2) are from https://www.republicanrivercompact.org/restricted/acct/13jan2020-f1.htm on January 21,2020

Values for 2019 gaged flow at Hardy and Guide Rock are included in highlighted cells

3 Table 3 implements the KS proposal to scale the GRtoHdy Flood Flow Adjustment by the ratio of GR flows to Hardy flows

Kansas' proposed method

NE AbvGR Allocation = NE Total Allocation – 48.9% * CWS GRtoHdy

NE Total Allocation = Σ NE Subbasins Allocations + NE Main Stem Allocation + NE Unallocated

*NE Main Stem Allocation = 48.9% * Main Stem CWS*

Main Stem CWS = Main Stem VWS – ΔReservoir Storage - Main Stem Flood Flow Adjustment – CWSA

Main Stem Flood Flow Adjustment (when applicable) = Hardy gaged streamflow – 400,000 acre-feet – the sum of subbasin flood flow adjustments

GRtoHdy Flood Flow Adjustment (when applicable)

$$= \left(\frac{\text{Hardy Flows} - \text{Guide Rock Flows}}{\text{Hardy Flows}}\right) \times \text{Mainstem Flood Flow Adjustment}$$

~~*CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy – Main Stem Flood Flow Adjustment*~~

CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy – GRtoHdy Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

From:	Flaute, Carol
To:	Beightel, Chris [KDA]
Cc:	Bradley, Jesse; Ivan.Franco@state.co.us; Burgert, Kari
Subject:	RE: KS work on NE"s flood flows/Table 5C issue
Date:	Thursday, March 12, 2020 10:41:28 AM

Chris,

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From: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>
Sent: Wednesday, February 5, 2020 1:58 PM
To: Flaute, Carol <carol.flaute@nebraska.gov>; Ivan.Franco@state.co.us
Cc: Bradley, Jesse <Jesse.Bradley@nebraska.gov>; Barfield, David [KDA] <David.Barfield@ks.gov>; Willem Schreuder <willem@prinmath.com>
Subject: KS work on NE's flood flows/Table 5C issue

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Please review this work and let me know if you have any questions about it or would like to discuss it further.

Chris

From:	Beightel, Chris [KDA]
To:	Flaute, Carol
Cc:	Bradley, Jesse; Ivan.Franco@state.co.us; Burgert, Kari
Subject:	Re: KS work on NE"s flood flows/Table 5C issue
Date:	Monday, March 23, 2020 1:25:03 PM

Carol,

Here finally is our response to your March 12 email:

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Nebraska's December 2019 proposal ("Nebraska's Proposal") solves Nebraska's concern, but its impact on allocations appears to be inconsistent with other sub-basin adjustments implemented in the Accounting Procedures. The inconsistency is that; in the case of normal-year accounting the Flood Flow adjustment is applied to the entire mainstem, but in water short year ("WSY") accounting, the entire Flood Flow adjustment is applied to only the Guide-Rock to Hardy "subbasin".

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The result of subtracting all of the Flood Flows from Hardy when determining the Guide Rock to Hardy allocation for the Table 5C test, is that when the difference between the Guide Rock and Hardy gages is less than the Flood Flows (as happened in 2019), the Guide Rock to Hardy allocation is calculated to be negative, as if no water was beneficially used by Nebraska between Guide Rock and Hardy. Even more concerning to Kansas is that subtracting this calculated negative allocation below Guide Rock as required by the Table 5C test thereby increases the allocation above Guide Rock.

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Again, looking at the preliminary accounting for 2019; in normal-year accounting for Nebraska (Table 3C), Nebraska's 2019 statewide allocation (with adjustments), including accounting for Flood Flows, is 142,076 AF. If that same year is used in a WSY test, Nebraska's Proposal would set the allocation above Guide Rock at 179,898; an increase in water available to Nebraska in a WSY of 37,822 AF. This does not make sense to Kansas. Kansas believes that the Table 5C "allocation above Guide Rock" should always be less than the Table 3C "statewide allocation" because the fundamental purpose of the WSY provisions is to constrain the allowable use by the upstream state and thereby increase the available supply to the downstream state.

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I am available to discuss this issue just about anytime this week.

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To: Flaute, Carol <carol.flaute@nebraska.gov>
Cc: Bradley, Jesse <jesse.bradley@nebraska.gov>; Ivan.Franco@state.co.us <Ivan.Franco@state.co.us>; Burgert, Kari <kari.burgert@nebraska.gov>
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Hope you all are staying safe,
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Cc: Bradley, Jesse <Jesse.Bradley@nebraska.gov>; Ivan.Franco@state.co.us <Ivan.Franco@state.co.us>; Burgert, Kari <kari.burgert@nebraska.gov>
Subject: RE: KS work on NE's flood flows/Table 5C issue

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Please review this work and let me know if you have any questions about it or would like to discuss it further.

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From: Flaute, Carol
To: Beightel, Chris [KDA]
Cc: Bradley, Jesse; Ivan.Franco@state.co.us; Burgert, Kari
Subject: RE: KS work on NE"s flood flows/Table 5C issue
Date: Friday, April 3, 2020 2:55:41 PM

Chris,

Thank you for your March 23, 2020, response and subsequent discussion during the March 27 3-States call. As you will recall, the fundamental issue originally raised by Nebraska at the August 2019 RRCA meeting is that flows occurring downstream of Guide Rock were causing allocations upstream of Guide Rock to decrease when applying the current Flood Flow Adjustment procedures.

From your March 23 email and the March 3-States call, we understand that Kansas is concerned that our December 2019 proposal subtracts all of the Main Stem Flood Flow Adjustment from the Guide Rock to Hardy VWS. We have reviewed Kansas's January 16, 2020, proposal to correct the Guide Rock Allocation. We find that it does not correct the problem behavior of decreasing Guide Rock supply with increasing streamflow between Guide Rock and Hardy when the Flood Flow Adjustment is in effect.

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CWS GRtoHdy = CBCU GRtoHdy + Gain GRtoHdy - ~~Main Stem Flood Flow Adjustment~~

Guide Rock to Hardy Flood Flow Adjustment

Gain GRtoHdy = Hardy gaged streamflow – Guide Rock gaged streamflow – Total Bostwick returns

Guide Rock to Hardy Flood Flow Adjustment (when applicable) = min(Main Stem Flood Flow Adjustment, Guide Rock to Hardy VWS)

We believe this alternative proposal addresses the concerns raised by Kansas about Nebraska's original proposal and that it is consistent with your thoughts expressed during the March 3-States.

Thank you for continuing to work with us toward resolving the Flood Flows Adjustment issue.

Carol J. Myers Flaute
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Nebraska Department of Natural Resources

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Sent: Monday, March 23, 2020 1:25 PM
To: Flaute, Carol <carol.flaute@nebraska.gov>
Cc: Bradley, Jesse <Jesse.Bradley@nebraska.gov>; Ivan.Franco@state.co.us; Burgert, Kari <kari.burgert@nebraska.gov>
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To:	Flaute, Carol
Cc:	Bradley, Jesse; Ivan.Franco@state.co.us; Burgert, Kari
Subject:	Re: KS work on NE"s flood flows/Table 5C issue
Date:	Monday, April 13, 2020 3:30:00 PM
Attachments:	2020-04-13.KS-RespToNE0403-FF.pdf

Carol,

Attached please find our response to your 4/3 email and proposal.

I am available to discuss this issue this week - after 3p Tue or Wed; Thu until noon; Fri until noon. I do think it would be helpful for us to have a more in-depth technical conversation before the larger 3-States call next Monday 4/20.

Chris

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Kansas' fundamental concern is that Nebraska's Proposal erroneously assumes that all Flood Flows originate below Guide Rock.

The result of subtracting all of the Flood Flows from Hardy when determining the Guide Rock to Hardy allocation for the Table 5C test, is that when the difference between the Guide Rock and Hardy gages is less than the Flood Flows (as happened in 2019), the Guide Rock to Hardy allocation is calculated to be negative, as if no water was beneficially used by Nebraska between Guide Rock and Hardy. Even more concerning to Kansas is that subtracting this calculated negative allocation below Guide Rock as required by the Table 5C test thereby increases the allocation above Guide Rock.

In 2019, Flood Flows were triggered by flows past Hardy March-July at 337,000 AF (5 months total greater than 325,000 AF). In that same time period, flows past Guide Rock were 227,000 AF; a difference of 110,000 AF. After July, it appears that the two gages evened out, though USGS has yet to finalize the records for the last quarter of 2019. In any case, the illustration works just as well looking at the estimate that Willem Schreüder included in his preliminary accounting here. That estimate has end-of-year Guide Rock flow at 502,276 AF and Hardy flow at 625,783 AF, a difference of 123,507 AF. Clearly, all of the Flood Flows did not originate below Guide Rock, but Nebraska's Proposal would subtract the entire calculated amount of Flood Flows (184,000 AF) from the Hardy gage to determine the Table 5C allocation. This does not make sense to Kansas.

Again, looking at the preliminary accounting for 2019; in normal-year accounting for Nebraska (Table 3C), Nebraska's 2019 statewide allocation (with adjustments), including accounting for Flood Flows, is 142,076 AF. If that same year is used in a WSY test, Nebraska's Proposal would set the allocation above Guide Rock at 179,898; an increase in water available to Nebraska in a WSY of 37,822 AF. This does not make sense to Kansas. Kansas believes that the Table 5C "allocation above Guide Rock" should always be less than the Table 3C "statewide allocation" because the fundamental purpose of the WSY provisions is to constrain the allowable use by the upstream state and thereby increase the available supply to the downstream state.

Kansas' proposal

The method described in "KS method cap 20200203" which we sent along in a spreadsheet in a Feb 5 email recognizes that a portion of any Flood Flows may be generated above Guide Rock, and if a Flood Flow year is included in a WSY test, then the portion of the Flood Flows generated below Guide Rock should be subtracted from the Computed Water Supply below Guide Rock. The Kansas proposal also recognizes that even when prorating Flood Flows above and below Guide Rock, there is probably a reasonable limit to the amount of allocation that is usable to Nebraska below Guide Rock and so Kansas proposes a cap to be set at the greatest historical allocation that was generated in a non-Flood Flow year. We'd be happy to discuss rationale for a different cap.

In summary, it does not seem reasonable to Kansas to assume, as Nebraska's Proposal does, that all Flood Flows are generated below Guide Rock. And the result of making such an assumption could result in more allocation being available to Nebraska in WSY accounting than in normal-year accounting for the same year, thereby making less water available to Kansas in a WSY which is completely antithetical to the purpose of the WSY test.

I am available to discuss this issue just about anytime this week.

Christopher W. Beightel, PE
Acting Chief Engineer

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From: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>
Sent: Tuesday, March 17, 2020 2:15 PM
To: Flaute, Carol <carol.flaute@nebraska.gov>
Cc: Bradley, Jesse <jesse.bradley@nebraska.gov>; Ivan.Franco@state.co.us <Ivan.Franco@state.co.us>; Burgert, Kari <kari.burgert@nebraska.gov>
Subject: Re: KS work on NE's flood flows/Table 5C issue

Carol,

I did get your note last Thursday; sorry I haven't responded until now. The COVID-19 response has been keeping us pretty busy. I hope to spend some time on the flood flows issue this afternoon and will try to have a response to you tomorrow and then maybe we can have a call or Zoom to discuss it more if we want to.

Hope you all are staying safe,
Chris

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From: Flaute, Carol <carol.flaute@nebraska.gov>
Sent: Thursday, March 12, 2020 10:41 AM
To: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>
Cc: Bradley, Jesse <Jesse.Bradley@nebraska.gov>; Ivan.Franco@state.co.us <Ivan.Franco@state.co.us>; Burgert, Kari <kari.burgert@nebraska.gov>
Subject: RE: KS work on NE's flood flows/Table 5C issue

Chris,

As you will recall, Nebraska's original concern about the flood flows accounting adjustment is that Guide Rock supply decreases with increasing streamflow between Guide Rock and Hardy when the flood flow adjustment is in effect. Upon further review of Kansas's January 2020 and February 2020 proposals for how to address this flood flows accounting issue, Nebraska does not think that either of Kansas's two proposals addresses Nebraska's original concern, because the problematic accounting behavior persists when applying both methods. Furthermore, we still believe that Nebraska's December 2019 proposal does address the original concern.

Nebraska's focus is on continuing to try to resolve the original, agreed-upon problem. We understand that Kansas has additional concerns about Nebraska's proposed method, but we do not have a clear understanding of them. Can you please clarify what Kansas's additional concerns are and how they fit in with solving the original problem? We would be happy to schedule a time for further discussion.

Carol J. Myers Flaute
INTEGRATED WATER MANAGEMENT COORDINATOR

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From: Beightel, Chris [KDA] <Chris.Beightel@ks.gov>
Sent: Wednesday, February 5, 2020 1:58 PM
To: Flaute, Carol <carol.flaute@nebraska.gov>; Ivan.Franco@state.co.us
Cc: Bradley, Jesse <Jesse.Bradley@nebraska.gov>; Barfield, David [KDA] <David.Barfield@ks.gov>; Willem Schreuder <willem@prinmath.com>
Subject: KS work on NE's flood flows/Table 5C issue

Carol and Ivan,

Attached is an Excel workbook file that Kansas has developed to analyze proposed methods for dealing with the Flood Flows in WSY test issue.

Kansas has observed that Nebraska's 6 December 2019 proposed method could potentially increase Nebraska's Above Guide Rock allocation in a flood flow year if that flood flow year was part of the Table 5C test.

We have also observed that Kansas' 16 January 2020 proposed method does partially address

Nebraska's original concern.

We also recognize that in a flood flow year, there could be a level of flow in the Guide Rock to Hardy reach that is reasonably unusable to Nebraska and that should be adjusted for. Kansas' 3 February 2020 proposed method is based on Kansas' 16 January method but adds a cap to the Computed Water Supply of the Guide Rock to Hardy reach. The cap in the proposal is set at the largest Computed Water Supply in the Guide Rock to Hardy reach in the record for a non-flood flow year.

Please review this work and let me know if you have any questions about it or would like to discuss it further.

Chris

Nebraska's Latest Proposal

Nebraska's April 3, 2020 proposal (4/3 Proposal) still appears to create accounting disparities for Kansas water users by working against the fundamental purposes of both: 1) the Water Short Year provisions and specifically the test in Table 5C which requires that Nebraska forgo the use of the two-year average of its allocation below Guide Rock, and 2) the Flood Flow provisions whose purpose is to adjust the accounting for unusable water, not to potentially relax Nebraska's compliance obligations in future years. Although your intent to fix the stated problem is clear, your proposal has the potential to hurt Kansas water users directly.

As a starting point, can you please provide us with more information justifying a Flood Flow year allocation of 0 AF for the Guide Rock to Hardy reach as your 4/3 Proposal would require in 2019?

In order to provide some perspective about why this proposal causes us concern, please consider that the Table 5C test limits Nebraska's use in a dry year by removing Nebraska's access to the 2-year average of its Guide Rock to Hardy allocation. In a wetter, but non-Flood Flow year, Nebraska's Guide Rock to Hardy allocation might be 20,000-25,000 AF. See 2001, 2010, 2011, 2015 (33,482 AF), 2018. But Nebraska proposes that in 2019, its Guide Rock to Hardy allocation should be adjusted to 0 AF. If the 20,000-25,000 AF year is not included in the two-year average, the average is going to be much smaller, resulting in less allocation for Kansas despite the intent of the Water Short Year provisions.

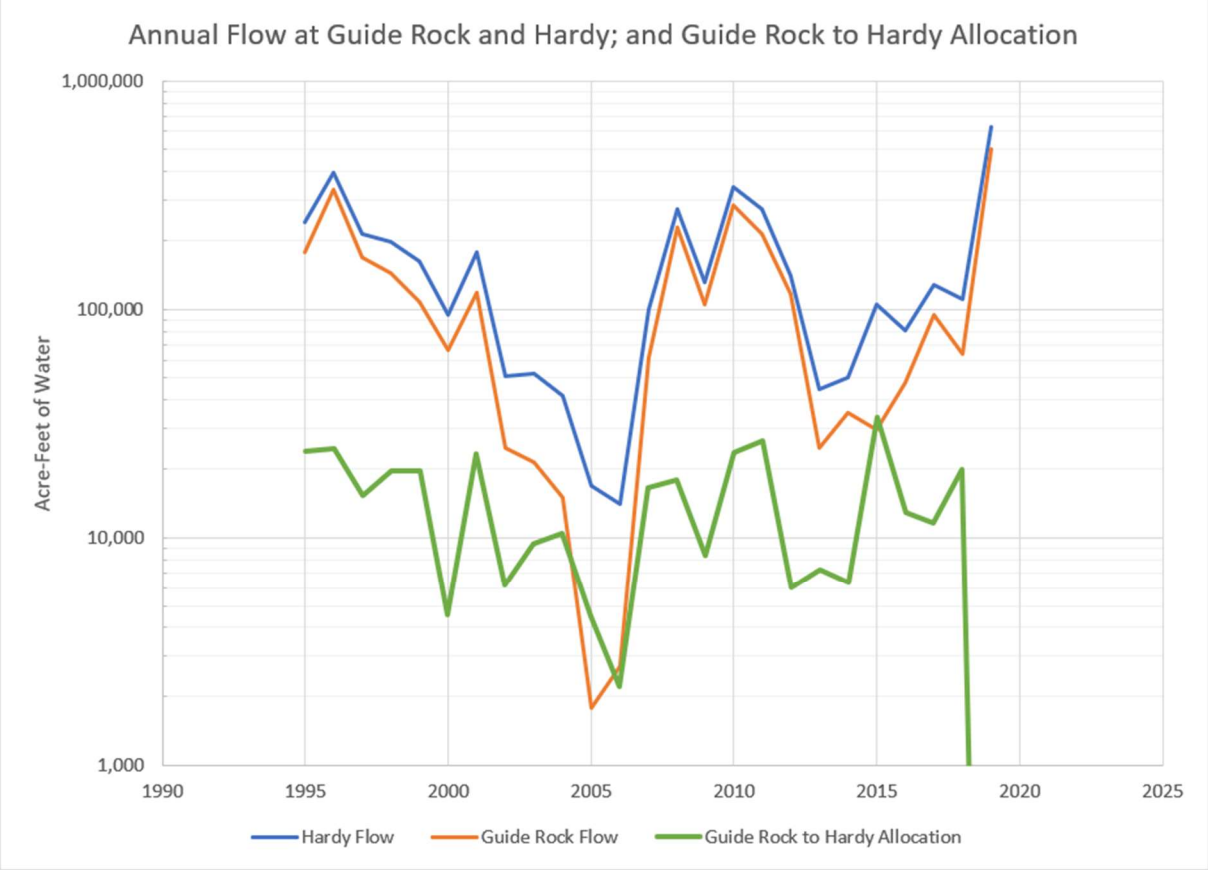

Figure 1 data from republicanrivercompact.org/restricted, except 2019 Guide Rock to Hardy allocation from Nebraska 4/3 Proposal

The table below is based on historical Guide Rock to Hardy allocations as documented on Willem's site here.

Nebraska allocation below Guide Rock from wetter to drier years and illustration of the effects of Nebaska's 4/3/20 proposal assuming Year 1 of the 2-year Table 5C test is a flood flow year and the NE proposal sets the Year 1 allocation to zero as would happen in 2019					
(1)	(2)	(3)	(4)	(5)	(6)
Year	Alloc difference	current Table 5c NE would have to forgo	Alloc Year 2	NE 4/3/2020 proposal table 5c Nebraska would have to forgo if flood flow year(1) results in no GR2Hdy Alloc	increase to NE's Table 5c statewide alloc if flood flow year(1) has no alloc
2015-2016	-20602	23181	12880	6440	16741
2011-2012	-20480	16230	5990	2995	13235
2001-2002	-17247	14820	6196	3098	11722
1999-2000	-15071	12074	4538	2269	9805
2008-2009	-9418	13086	8377	4189	8898
1996-1997	-9257	19993	15364	7682	12311
2004-2005	-6015	7492	4484	2242	5250
2005-2006	-2269	3350	2215	1108	2243
2016-2017	-1335	12213	11545	5773	6441
2013-2014	-954	6785	6308	3154	3631
1998-1999	-83	19651	19609	9805	9847

The table is sorted in order of the largest decreases in Guide Rock to Hardy allocation from year to year.

Column 2 shows the difference in Guide Rock to Hardy allocation from one year to the next.

Column 3 is the historical calculation of Guide Rock to Hardy allocation that Nebraska would have to forgo if the second year in Column 1 was a Water Short Year.

Column 4 is the historical calculation of the Guide Rock to Hardy allocation for the second of the two years in Column 1.

Column 5 is the amount of allocation that Nebraska would have to forgo under its 4/3 Proposal if the first year in Column 1 was a Flood Flow year and its allocation was set to zero (as would happen in 2019).

Column 6 is the effective increase to Nebraska's statewide allocation in a Water Short Year under Nebraska's 4/3 Proposal if the first year in Column 1 was a Flood Flow year and its allocation was set to zero (as would happen in 2019).

Summary and Future Talking Points

Kansas has repeatedly acknowledged that the inclusion of a Flood Flow year in a Water Short Year Test was probably not contemplated when the Accounting Procedures were developed and that because of this omission, there should be an adjustment for Flood Flows in the Table 5C test in the RRCA APs. However, Kansas does not completely agree with Nebraska's characterization of the problem, namely

"the behavior of decreasing Guide Rock supply with increasing streamflow between Guide Rock and Hardy when the Flood Flow Adjustment is in effect."

Kansas continues to hold that the problem is that there are no defined flood flow provisions for the Guide Rock to Hardy subbasin – a subbasin that only exists in the Accounting Procedures in the context of the Table 5C test. With no such provisions, Nebraska has proposed, first; subtracting all of the Mainstem Flood Flows out of the subbasin, and now proposes subtracting the Mainstem Flood Flows or the subbasin Virgin Water Supply, whichever is less. These proposed measures seem arbitrary and don't address the root problem that the Accounting Procedures don't contemplate a Flood Flow adjustment for the Guide Rock to Hardy subbasin.

Nebraska seems focused on ensuring that Flood Flows will not reduce its allocation in Water Short Years. Kansas is focused on ensuring that Flood Flows don't reduce its allocation in Water Short Years either. Nebraska's 4/3 Proposal passes Nebraska's test but fails Kansas' test.

Kansas remains open to any proposed solutions, including some modified version of our previously suggested limitations, but we'll need some clarification as to why Nebraska thinks it is reasonable to ever adjust its Guide Rock to Hardy allocation to anything less than a wet-year level.

Regards,

Chris Beightel

Engineering Committee Report August 21, 2020 - Signature Page

Final Audit Report 2020-08-21

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