Engineering Committee Report
Republican River Compact Administration

August 21, 2018

EXECUTIVE SUMMARY

The Engineering Committee (EC) met four times since the August 22, 2017, 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 2017 accounting; 4) assign responsibility among the States to collect certain accounting data; 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) develop and publish an administrative website that would be an informational page for the public; 8) continue work and provide updates on improving accounting tools developed by the Engineering Committee; 9) work on improving the understanding of/operation of the inputs to the accounting from the Lovewell Ops worksheet; and 10) prepare the RRCA meeting reports for the following dates for approval by the RRCA at the 2018 annual meeting: November, 24, 2015, special meeting; August 24, 2016, annual meeting (CO); May 25, 2017, special meeting (CO); and August 22, 2017 annual meeting (CO).

Ongoing assignments include: 1) create a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures; 2) provide updates on the progress of new and ongoing management strategies for maintaining compact compliance; 3) work on maintaining and enhancing the RRCA public website; 4) continue work and provide future updates on improving accounting tools developed by the Engineering Committee; 5) work on improving the understanding of/operation of the inputs to the accounting from the Lovewell Ops worksheet; and 6) summarize and document the status of Table 4 (a) in the RRCA accounting procedures and recommend how said document should be memorialized.

The EC recommends discussion by the RRCA on the exchange of data and documentation and the modeling runs completed by Principia Mathematica for 2017, on the proposed 2017 accounting, on the status of the administrative website, on the documentation of Table 4a of the RRCA Accounting, 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 as attachments, the EC meeting notes.

Attachments 1-4: Minutes of the quarterly meetings of the EC
Attachment 5: Accounting Inputs and Accounting Tables from the RRCA Accounting for 2017 recommended by the EC for approval by the RRCA

COMMITTEE ASSIGNMENTS AND WORK ACTIVITIES RELATED TO THESE ASSIGNMENTS

1. Meet quarterly to review the tasks assigned to the committee.
    a. The EC met November 16, 2017; February 15, 2018; May 10, 2018; and July 26, 2018. See Attachments 1-4 for minutes of these meetings.
    b. The EC met August 13, 2018 to finalize the annual EC report for the 2018 RRCA annual meeting.
2. Exchange by April 15, 2018, 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, 2018, the states will exchange any updates to these data.
    a. Nebraska posted its data on April 12, 2018 and provided an update on July 25, 2018.
    b. Kansas posted its preliminary data on April 13, 2018, and made several updates to the data, declaring it final on July 6, 2018.
    c. Colorado reported that its accounting data were posted April 13. Colorado provided its Crop Irrigation Requirement analysis on August 17.
3. Finalize the 2017 accounting and recommend it for approval by the RRCA.
    a. Colorado, Kansas, and Nebraska accounting data for 2017 is final and the EC hereby recommends its approval by the RRCA.
    b. The applicable summary accounting tables are presented in Attachment 5.
4. When possible, continue efforts to resolve concerns related to varying methods of estimating ground and surface water irrigation recharge and return flows within the Republican River Basin and related issues.
    a. No progress was made on this assignment.
5. Continue work to assign responsibility for collecting specific fields of data collected for the annual data exchange by determining who has the best available data and assigning them the responsibility of populating those fields to avoid confusion between multiple datasets.
    a. This task was completed as documented in the minutes of the November 16, 2017, EC meeting. EC members and staff developed a color-coded spreadsheet to clarify which state is responsible for providing what data, including data fields related to the Courtland Canal, to be used as part of the annual data exchange.
    b. The spreadsheet is called “SWInputs.xls” and is available on the RRCA restricted website.
6. 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 and is currently being refined by Kansas after which the other states will review.

b. The EC recommends that this task continue.

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

    a. Nebraska provided updates on the N-CORPE and Rock Creek augmentation projects, and on the status of the proposed Platte River diversion project.

    b. Colorado provided updates on the operations of the Colorado Compact Compliance Pipeline project.

    c. The EC recommends that this task continue.

8. Continue efforts to develop and publish an administrative website that would be an informational page for the public.

    a. State staff have completed several parts of the website which is accessible to the public.

    b. The EC, after consulting with their commissioners, has published to the website to the public on August 15.

    c. The EC recommends that this task continue as a recurring assignment to maintain the website and provide regular updates to the EC.

9. 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 and the accounting spreadsheet to compare results. The comparisons continue to be favorable.

    b. The EC recommends that this task continue.

10. Work on improving the understanding of/operation of the inputs to the accounting from the Lovewell Ops worksheet.

    a. Kansas has proposed to return to a simplified version of Lovewell calculations for evaporation charged to the Republican River, and to Republican River water diversions to the district below Lovewell. The method was previously used in accountings 1995-2002.

    b. The EC agrees that it is appropriate to use the results of the proposed method in Kansas's final 2017 accounting data submission.

    c. Future use of Kansas's proposed method is still being reviewed and considered by Nebraska and Colorado.

    d. The EC recommends this task continue.

11. Prepare the RRCA meeting reports for the following dates for approval by the RRCA at the 2018 annual meeting: August 24, 2016, annual meeting (CO); May 25, 2017, special meeting (CO), and 2017 annual meeting (CO).

   a. These reports have been finalized and approved by the EC and are hereby recommended for approval by the RRCA.

12. Summarize and document the status of Table 4 (a) in the RRCA accounting procedures and recommend how said document should be memorialized.
    a. Kansas provided the EC with a proposal to document the status Table 4(a) on February 15, 2018.
    b. The EC discussed the proposal at the May 10, 2018, and July 26, 2018, EC meetings. The states are still reviewing the proposal.
    c. The EC recommends that this task continue and requests additional guidance from the RRCA.

ITEMS FOR RRCA DISCUSSION & ACTION

1. Data exchange and modeling results for 2017. The EC recommends the proposed 2017 accounting presented in Attachment 5 and in the spreadsheet titled "RRCA Accounting 2017 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 2018. The EC recommends that Principia Mathematica continue to perform periodic model and accounting updates at the same level of service as in 2017.
3. During 2017-2018, at the direction of the RRCA, the EC continued work on the RRCA website. The website's purpose is to provide public information – history of the compact and the administration, 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 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 list of ten items in this report as recommended assignments to report on, at the 2019 annual meeting of the RRCA.
5. The EC seeks further guidance from the RRCA on the documentation of Table 4a.

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, 2019, 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, 2019, the states will exchange any updates to these data.

3. Finalize the 2018 accounting and recommend it for approval by the RRCA.
4. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
5. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
6. 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.
7. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee.
8. Work on improving the Lovewell Ops worksheet.
9. Continue work to summarize and document the status of Table 4 (a) in the RRCA accounting procedures and recommend how said document should be memorialized.
10. Prepare the 2018 RRCA annual meeting (KS) report.

The Engineering Committee Report and the exchanged data will be posted on the web at www.republicanrivercompact.org.

SIGNED BY

Ivan Franco
Engineering Committee Member for Colorado

Jennifer J. Schellpeper
Engineering Committee Member for Nebraska

Chris Beightel
Chair, Engineering Committee Member for Kansas

Meeting Notes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
16 November 2017, 2:00 PM CST
Meeting was held telephonically

Attendees:

Chris Beightel, Kansas
Chelsea Erickson, Kansas
Ginger Pugh, Kansas
Hongsheng Cao, Kansas
Ivan Franco, Colorado
Willem Schreüder, Principia Mathematica
Jennifer Schellpeper, Nebraska
Brian Harmon, Nebraska
Kari Burgert, Nebraska
Carol Flaute, Nebraska

Agenda Items and Notes:

1. Introductions
2. Review/Modify Agenda
    a. There was one modification to agenda item #4 changing "2018 accounting status" to "2017 accounting status". No other modifications were identified.
3. Publication of RRCA Annual Reports
    a. 2016 Reports (Colorado)
        i. 24 November 2015 special meeting –Franco announced that this report is completed.
        ii. 24 August 2016 Annual – Franco also announced that this report is 95% ready for review by the EC.
    b. 2017 Reports (Colorado)
        i. 25 May 2017 special meeting – This report is currently being reviewed by Colorado staff.
        ii. Draft transcript for 2017 annual meeting- Comments from Kansas and Nebraska on the draft transcript are being processed by the court reporter.
4. Exchange by April 15, 2018, 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 15 July 2018, the states will exchange any updates to these data.
    a. 2017 accounting status.

i. Schreüder reported that he had generated recent 2017 model runs and accounting using updated gage data, 2016 pumping data, and preliminary Federal canal data from USBR supplied by Burgert. The preliminary run for 2018 looks almost identical to the 2017 run. Schreüder will do another model run in early December.
ii. Beightel asked for an update on Nebraska's compact call year (CCY) status. Burgert replied that their team has met with NRDs and are currently forecasting 2018 to a CCY. She also mentioned that actual flows to-date past Guide Rock & Hardy showed improvement over estimated and that the early projection of 2017-2018 Compliance Period CCV (forecast) is about -14,000 acre-feet.
iii. Beightel asked if there was an update on the Colorado Compact Compliance Pipeline (CCP) amount pumped for 2017. Franco confirmed that the CCP volume remains at 11,500 acre-feet for 2017. Schreüder also replied that the project may deliver a bit more this year because the wells have been running at full capacity all year.

5. Finalize the 2017 accounting and recommend for approval by the RRCA.
    a. 2017 accounting status –
        i. Nothing to report yet.
        ii. Beightel asked for general comments on the format of the Engineering Committee agenda to help streamline the meetings and reports.
6. When possible, continue efforts to resolve concerns related to varying methods of estimating Ground and Surface Water Irrigation Recharge and Return Flows.
    a. Draft scope and needs document regarding changes in irrigation efficiency.
    b. Beightel noted that the Kansas team has not focused on this issue yet, but still plans to move forward.
7. Continue work to assign responsibility for collecting specific fields of data collected for the annual data exchange by determining who has the best available data and assigning them the responsibility of populating those fields to avoid confusion between multiple datasets.
    a. Beightel asked the EC for suggestions about completing this task.
    b. Schreüder mentioned that the purpose of this task is to determine who is responsible for putting numbers into the spreadsheet fields, noting that everyone cross checks the numbers too.
    c. Who provides the initial values? Schellpeper noted that right now the spreadsheet color coding says who will complete the specific fields. Schreüder also noted that the latest version added a column to be explicit as to where data comes from especially (based on Kari Burgert and Sam Perkins' work)

d. Franco felt that this task is now complete and noted that the assignment came up before color coding was in place and the current spreadsheet worked well last year.
e. Beightel concurred and suggested the EC is done with this task and it will continue as part of data exchange (item #4) only and this agenda item (#7) will not continue.
f. Schellpeper asked if the EC should document this agreed resolution.
    i. Beightel offered to draft language for the EC report that the states agree on the color-coded report and then attach a copy of spreadsheet as a visual.
    ii. Schellpeper noted that this documentation and an example of the color-coded spreadsheet would be helpful to transition through staff turnover.
    iii. Franco concurred with attaching the current spreadsheet version to the EC annual report to the RRCA.

8. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
    a. Chelsea Erickson provided a brief status update on the draft document.
9. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance.
    a. Placeholder to discuss upcoming projects for compact compliance.
    b. Kansas – nothing to report.
    c. Nebraska – Schellpeper noted that there is currently no application for a permit for the Platte Diversion project. Beightel asked for a brief overview of the N-CORPE land issue and Schellpeper mentioned news stories about local landowners struggling over the land's tax status.
    d. Colorado – Franco mentioned that the CCP is operating as planned. Beightel asked about hearing talk of expanding the wellfield. Schreüder noted that there is some consideration for expansion as originally planned, but no progress for new wells yet.
10. Continue efforts to develop and publish an administrative website that would be an informational page for the public. The commissioners authorized the Engineering Committee to develop the website by consensus.
    a. Erickson will send an email with links to each state's pages as they currently exist on the draft website.
    b. To move this issue forward Kansas has asked each state for a detailed outline of their preferred state page content, preferably with details about the content by 8 December 2017.

c. Then Erickson will set up a call via email for the 15 December, 2017 to review the website design with the state representatives.

11. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee. Work product will remain an internal resource which can be distributed to interested parties upon request.

    a. Beightel asked the committee what is to be done on this task?
    b. Should the EC review Schreüder's online accounting description? Or develop any new tools for the group?
    c. Schellpeper noted that this task is a reminder to touch base on the topic a few times a year.

12. Work on improving the understanding of/operation of the inputs to the accounting from the Lovewell Ops worksheet.

    a. Beightel noted that this spreadsheet is particularly complicated.
    b. Last year's approved accounting used a number for Lovewell evaporation that was different than calculated in the spreadsheet. Beightel noted that this issue pointed to fact that spreadsheet was convoluted and needed improvement. Beightel agreed that Kansas staff will provide an updated draft of the spreadsheet for the committee to review in the first few months of 2018.

13. Summarize and document the status of Table 4 (a) in the RRCA accounting procedures and recommend how said document should be memorialized.

    a. Table 4A is the Sub-basin non-impairment test for CO. Beightel suggested putting language into the Accounting Procedures section that would describe the background of the resolution and why the table is now left blank.
    b. While the 24 August 2016 resolution remains in effect, the table is not used as one of the measures of Colorado's compliance. If that resolution goes away, then the table will go back into effect.
    c. Kansas staff will develop draft language for the EC to review, especially Nebraska concerns.
    d. The EC will then provide the description to the Commissioners in advance of the annual meeting, so it can be decided how to finalize this assignment to their satisfaction.

14. Summary of Meeting Actions/Assignments

    a. Item #3: Colorado annual reports are in progress and will be circulated by Franco when appropriate.
    b. Item #7: The EC has completed this assignment. Beightel will document that agreement.
    c. Item #8: Draft will be sent from Kansas staff to the EC for consideration.

d. Item #10: Erickson will contact NE and CO staff about the website content for their respective states.
e. Item #11: the EC will continue to touch base in the future
f. Item #12: Kansas staff will provide an updated draft of the Lovewell Ops worksheet to the EC group.
g. Item #13: Beightel will draft language for the status of Table 4 (a). Upon review, that language will be presented to the Commissioners for recommended action.

15. Future Meeting Schedule

    a. 15 February 2018 2:00 PM CST. Call log in will be included on the future agenda.

16. Adjournment

    a. The EC meeting adjourned at 2:45 PM. Safe travels for the holidays.

Meeting Notes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
15 February 2018, 2:00 PM CST
Meeting was held telephonically

Attendees:

Chris Beightel, Kansas
Chelsea Erickson, Kansas
Sam Perkins, Kansas
Hongsheng Cao, Kansas
Ivan Franco, Colorado
Willem Schreüder, Principia Mathematica
Jennifer Schellpeper, Nebraska
Brian Harmon, Nebraska
Kari Burgert, Nebraska
Carol Flaute, Nebraska

Agenda Items and Notes:

1. Introductions
2. Review/Modify Agenda
    a. No changes were suggested.
3. Approval of minutes from Nov 16, 2017.
    a. All parties agreed the minutes were final for the November meeting. It was agreed that a vote of approval is not needed.
4. Publication of RRCA Annual Reports
    a. 2016 Reports (Colorado)
        i. 24 November 2015 special meeting – This report is completed.
        ii. 24 August 2016 Annual – This report is currently being prepared by Colorado.
    b. 2017 Reports (Colorado)
        i. 25 May 2017 special meeting – This report is currently being prepared by Colorado.
        ii. 2017 annual meeting- Final transcript was sent to KS and NE for review. The final report is currently being prepared by Colorado staff.
5. Exchange by April 15, 2018, 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 15 July 2018, the states will exchange any updates to these data.
    a. 2017 accounting status.

i. Schreüder reported that he is waiting on 2017 final streamgage data, but had sent the states preliminary accounting. Schreüder anticipates sending a new update by mid-March with final 2017 data and preliminary 2018 data.
ii. Burgert reported that the U.S. Bureau of Reclamation sent canal and reservoir data to the states. Beightel mentioned that Kansas only received a PDF copy and would like to see the Excel Spreadsheet. Burgert offered to share those files with KS staff and Schreüder.
iii. Beightel reported that Kansas Bostwick projected to have 59,000 AF in Harlan County reservoir. Burgert mentioned that NE staff had not seen those numbers and Beightel offered to talk to the Bureau about who gets those reports.

6. Finalize the 2017 accounting and recommend for approval by the RRCA.
    a. 2017 accounting status –
        i. Nothing to report yet.
7. When possible, continue efforts to resolve concerns related to varying methods of estimating Ground and Surface Water Irrigation Recharge and Return Flows.
    a. Draft scope and needs document regarding changes in irrigation efficiency.
    b. Beightel noted that the Kansas team has not focused on this issue yet, but still plans to move forward.
8. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
    a. Erickson provided a brief status update on the draft document.
9. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance (placeholder to discuss upcoming projects for compact compliance)
    a. Kansas – nothing to report.
    b. Nebraska – Flaute noted that there is still no application filed for a permit for the Platte Diversion project. She noted that the NRD purchased land required to build the project.
    c. Colorado – Franco mentioned that the CCP is operating as planned. Schreüder reported that the CCP cut-off date is not known yet but expects the project to operate to the end of March 2018.
    d. Schellpeper noted that the Nebraska NRDs were working with KBID on buying Warren Act water. Her question was what kind of credit might NE get for the

Compact? Beightel mentioned that discussions are ongoing in KS about the topic. A draft contract is presently being reviewed.

10. Continue efforts to develop and publish an administrative website that would be an informational page for the public. The commissioners authorized the Engineering Committee to develop the website by consensus.
    a. Erickson met with Franco and Harmon regarding edits to the RRCA website. They will work to finalize the website for public viewing.
11. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee. Work product will remain an internal resource which can be distributed to interested parties upon request.
    a. Beightel noted that this task was related to discussions about the accounting format that Schreüder built for the RRCA. There may be future accounting tools developed to help distribute information, so keep this task as a reminder.
12. Work on improving the understanding of/operation of the inputs to the accounting from the Lovewell Ops worksheet.
    a. Perkins is working on a draft spreadsheet to send to CO & NE staff.
13. Summarize and document the status of Table 4 (a) in the RRCA accounting procedures and recommend how said document should be memorialized.
    a. Beightel sent a draft document to the EC on February 15, 2018. The states will react to the draft and provide feedback.
14. Summary of Meeting Actions/Assignments
    a. Item #3: Colorado annual reports are in progress and will be circulated by Franco when appropriate.
    b. Item #8: Draft will be sent from Kansas staff to the EC for consideration.
    c. Item #9: KS reviewing Warren Act credit issue.
    d. Item #10: Erickson will continue work on the RRCA website.
    e. Item #12: Kansas staff will provide an updated draft of the Lovewell Ops worksheet to the EC group.
    f. Item #13: The states will review Beightel's draft document sent February 15, 2018 and provide feedback.
15. Future Meeting Schedule
    a. 10 May 2018 2:00 PM CST. Call log in will be included on the future agenda.
16. Adjournment
    a. The EC meeting adjourned at 2:33 PM.

Meeting Notes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
10 May 2018, 2:00 PM CST
Meeting was held telephonically

Attendees:

Chris Beightel, Kansas
Chelsea Erickson, Kansas
Ginger Pugh, Kansas
Jennifer Schellpeper, Nebraska
Kari Burgert, Nebraska
Elise Jarrett, Nebraska
Ivan Franco, Colorado
Willem Schreüder, Principia Mathematica

Agenda Items and Notes:

1. Introductions
2. Review/Modify Agenda
    a. No changes were suggested.
3. Approval of minutes from Feb 15th, 2018
    a. All parties agreed the minutes were final for the February meeting.
4. Publication of RRCA Annual Reports
    a. 2016 Reports (Colorado)
        i. 24 November 2015 special meeting – This report is completed.
        ii. 24 August 2016 Annual – Franco sent the final draft report to the other states and is now waiting for reviews. Schellpeper stated that Nebraska staff has started an internal review of the documents.
    b. 2017 Reports (Colorado)
        i. 25 May 2017 special meeting – Franco sent the final draft report to the other states and is now waiting for reviews. Erickson stated that Kansas staff is in the process of reviewing the documents.
        ii. 2017 annual meeting- Franco sent the final draft report to the other states and is now waiting for reviews. Schellpeper stated that Nebraska staff has started an internal review of the documents.
5. Exchange by April 15, 2018, 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 15 July 2018, the states will exchange any updates to these data.

a. 2017 accounting status.

i. Beightel noted that Kansas staff exchanged data and considered the data about 90% complete and will do a final update by late June. Nebraska staff asked specifically what was outstanding from the final data and Beightel explained that pumping records are still being reviewed for accuracy.

ii. Franco asked Schreüder for an update on the Colorado accounting status. Schreüder noted that all Colorado meter and diversion records are final for 2017, but there are a few outstanding items such as the CIR comparison and NCRC report to complete that data exchange. Beightel asked if there is an internal review of the Colorado data and Schreüder replied that Colorado Division 1 staff is the responsible party.

iii. Schellpeper noted that all Nebraska data was posted. Burgert is not expecting any further updates.

iv. Schreüder noted that November and December precipitation data is still preliminary, but does not expect significant changes to that data or diversion records. Schreüder expressed uncertainty on the finality of surface water inputs for the Courtland Canal, which has been problematic in the past.

6. Finalize the 2017 accounting and recommend for approval by the RRCA.

a. 2017 accounting status –

i. Nothing to report yet.

7. When possible, continue efforts to resolve concerns related to varying methods of estimating Ground and Surface Water Irrigation Recharge and Return Flows.

a. Draft scope and needs document regarding changes in irrigation efficiency.
b. Beightel noted that the Kansas team has not focused on this issue yet, but still plans to move forward.

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

a. Erickson provided a brief status update on the draft document and a goal to have a document to review by the next committee meeting.

9. Provide updates on the progress of new and ongoing management strategies for maintaining compact compliance (placeholder to discuss upcoming projects for compact compliance)

a. Beightel asked for an update on the Platte River Diversion project. Schellpeper replied that a petition was successfully filed and approved to move forward. The

water permit was filed and is currently being reviewed. If the applicants have not provided everything required by statue, then there is a period of 60 days to remedy. If the permit is approved, then public notice is issued to seek public comments. Finally, there is a public hearing regarding the permit.

b. Beightel asked for an update on the Colorado Compliance Pipeline. Schreüder replied that the CCP ran through the end of April and pumped 7000+ AF. Schreüder asked if Nebraska will still be water short and Schellpeper replied "yes". Schreüder stated that the CCP will probably turn on again in October based on current projections unless there is additional streamflow. Schreüder stated that the CCP will probably be close to the max authorized 13,000 AF for 2018.

c. Beightel mentioned the Kansas Lower Republican access district. With the opportunity for a more consistent water supply from NE, there is a chance for relief to Kansas water users that are affected by minimum desirable streamflow restrictions. However, forming such a district takes state legislation and possibly next year that legislation could be a reality. The district would then secure water through a Warren Act contract.

   Schellpeper asked how water users apply to be part of such a district? Beightel noted that there are many interested parties, but coordination is still lacking on how to form the district itself. The water user will need a contract with the district, KBID and the Bureau possibly.

10. Continue efforts to develop and publish an administrative website that would be an informational page for the public. The commissioners authorized the Engineering Committee to develop the website by consensus.

    a. Erickson sent recent changes to the website to Harmon and Franco for review. Franco stated that the reviewed pages looked good, but there are many more pages to review yet. Erickson suggested meeting every other week to finalize the website by the June committee meeting, so that the website can be available for promoting the August annual meeting. Franco agreed that such meetings would be helpful in bringing this task to a close. Erickson will send out a meeting notice to Harmon and Franco.

11. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee. Work product will remain an internal resource which can be distributed to interested parties upon request.

    a. Beightel noted that this task was related to discussions about the accounting format that Schreüder built for the RRCA. There may be future accounting tools developed to help distribute information, so keep this task as a reminder.

12. Work on improving the understanding of/operation of the inputs to the accounting from the Lovewell Ops worksheet.
    a. Perkins is working on a draft spreadsheet to send to CO & NE staff.
    b. Schreüder noted that he was not certain the 2017 Lovewell Ops spreadsheet is correct and would like review by all parties to confirm the numbers. Beightel agreed that the spreadsheet numbers are a challenge to verify and will leave this issue on the agenda for further review.
13. Summarize and document the status of Table 4 (a) in the RRCA accounting procedures and recommend how said document should be memorialized.
    a. Beightel sent a draft document to the EC on February 15, 2018.
    b. Schellpeper provided an email response to the Kansas draft and Beightel asked Schellpeper to elaborate. Schellpeper had reviewed the issue with Commissioner Fassett, who had made the original request and Fassett wanted details about both Kansas and Colorado positions that resulted in no values in Table 4 (a). Fassett was looking for a summary of the legal language that could be used in the future as a quick reference. Beightel said Kansas would review those documents and provide a draft to the other states.
14. Summary of Meeting Actions/Assignments
    a. Item #4: Kansas and Nebraska staff will review the annual reports provided by Franco.
    b. Item #5: Kansas will update the 2017 data exchange by late June. Colorado will share any accounting information as it becomes available, such as the CIR data.
    c. Item #8: A draft document memorializing changes to the RRCA Accounting Procedures will be sent from Kansas staff to the EC for consideration.
    d. Item #10: Erickson will continue work on the RRCA website with assistance from Harmon and Franco.
    e. Item #12: Kansas staff will provide an updated draft of the Lovewell Ops worksheet to the EC group.
    f. Item #13: Kansas will review legal language for the Table 4 (a) discussions and provide draft language to Colorado and Nebraska for review.
15. Final comments
    a. Franco asked about the Kansas review of the Warren Act issue. Beightel commented that the issue was tentatively resolved by the Bureau pursuing a change from KBID's Warren Act water to project water. All parties are awaiting an amended MOA document from the Bureau.
    b. Beightel mentioned that Kansas renewed the RRCA website domain name for 3 more years.
    c. Beightel also mentioned that a final date and time was set now for the 2018 RRCA annual meeting on Aug 21st at KDA headquarters in Manhattan with the

work session at 8:00 A.M, central time followed by the annual meeting at 10:00. Beightel anticipates having the EC report completed at least a week in advance of the annual meeting. Schellpeper commented that a final draft would be helpful by the July 26, 2018 EC meeting and Beightel agreed to provide a final draft by the week after the July EC meeting. Schellpeper suggested a conference call before the annual meeting to provide comments on the draft EC report and Beightel committed to providing a meeting notice.

16. Future Meeting Schedule
    a. 26 July 2018 2:00 PM central standard. Call log in will be included on the future agenda.
17. Adjournment
    a. The EC meeting adjourned at 2:38 p.m.

Meeting Notes for the
QUARTERLY MEETING of the
ENGINEERING COMMITTEE of the
REPUBLICAN RIVER COMPACT ADMINISTRATION
26 July 2018, 2:00 PM CST
Meeting was held telephonically

Attendees:

Chris Beightel, Kansas
Chelsea Erickson, Kansas
Ginger Pugh, Kansas
Sam Perkins, Kansas
Carol Myers Flaute, Nebraska
Kari Burgert, Nebraska
Ivan Franco, Colorado
Willem Schreüder, Principia Mathematica

Agenda Items and Notes:

1. Introductions
2. Review/Modify Agenda
    - Flaute suggested adding the RRCA agenda as a discussion topic for the EC meeting.
3. Approval of minutes from the 10 May 2018 meeting
    - All parties agreed the minutes were final for the May meeting.
4. Review and Update Progress on Engineering Committee Task List

    1. Publication of RRCA Annual Reports

        - 2016 Reports (Colorado)

            - 24 November 2015 special meeting – This report is completed.
            - 24 August 2016 Annual – The 2016 annual report has been reviewed by Nebraska and provided to Kansas for final review.

        - 2017 Reports (Colorado)

            - 25 May 2017 special meeting – The May 2017 special meeting report has been reviewed by Nebraska and provided to Kansas for final review.
            - 2017 annual meeting- The 2017 annual report has been reviewed by Nebraska and provided to Kansas for final review.

    2. Exchange by April 15, 2018, 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 15 July 2018, the states will exchange any updates to these data.

- 2017 accounting status.
    - Beightel noted that Kansas data exchange is final.
    - Burgert noted that Nebraska data exchange is final.
    - Schreüder noted that Colorado is waiting on finalizing CIR data, otherwise all other data has been exchanged and final. There was a precipitation issue with the Wray weather station, but it seems to have been resolved.

3. When possible, continue efforts to resolve concerns related to varying methods of estimating Ground and Surface Water Irrigation Recharge and Return Flows.
    - Draft scope and needs document regarding changes in irrigation efficiency.
        - Beightel noted that the Kansas team has not focused on this issue yet, but still plans to move forward.
4. Finalize the 2017 accounting and recommend for approval by the RRCA.
    - 2017 accounting status –
        - Except for the Colorado CIR data, all states agreed the 2017 accounting was final.
        - Burgert asked how the final 2017 accounting would be referenced in the Engineering Committee report. Beightel committed to researching past reports for accounting approval and will re-create the necessary documents for the 2017 accounting. The final Engineering Committee report draft will include those documents.
5. Continue work to assign responsibility for collecting specific fields of data collected for the annual data exchange by determining who has the best available data and assigning them the responsibility of populating those fields to avoid confusion between multiple datasets.
    - Schreüder noted that some fields for the Courtland Canal were updated, and now all the fields have been assigned to either the states or Principia Mathematica. The task can be considered complete.
6. Continue work on creating a document memorializing when RRCA Accounting Procedures have changed over the years and incorporate it into the Accounting Procedures.
    - Erickson provided a brief status update on the draft document. There has been no action taken since the last committee meeting.

- Beightel will update draft EC report to state that this document is currently being revised by Kansas, after which the other states will review it

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

   - Beightel asked for an update on the Platte River Diversion project. Flaute replied that there was nothing to report on the project at this time.
   - Beightel asked for an update on the Colorado Compliance Pipeline. Schreüder replied that the CCP pumped about 7,500 acre-feet and the plan is to review the upcoming 1 September 2018 forecast to determine how much will be pumped in October through December with the number likely to be an additional 6,000 acre-feet or so.
   - Burgert reported that Nebraska will try to have an early forecast for 2019 available at the RRCA annual meeting or 3-States meeting August 21 to help facilitate the October 1 decision on what Kansas will request for June 2019. Burgert asked whether there was anything more Kansas would expect to hear from Nebraska in August related to their upcoming request for June 2019 delivery. Beightel replied that the issue will be discussed at 3-States meetings in the coming months. Schreüder asked if Nebraska needed a 2019 model run for their early forecast. Burgert replied that a 2019 model run was not necessary at this time.
   - Schreuder plans to do the season's first forecast model run in late August or early September.
   - Beightel mentioned that Kansas has no further update on the Lower Republican Access District discussions.

8. Continue efforts to develop and publish an administrative website that would be an informational page for the public. The commissioners authorized the Engineering Committee to develop the website by consensus.

   - Erickson sent recent changes to the website to Harmon and Franco for review.
   - The website team will meet 2 August 2018 to finalize edits to the site and then solicit the Commissioners' approval to proceed with taking the site live. The group will update the Engineering Committee at the upcoming 13 August 2018 meeting.

9. Continue work and provide future updates on improving accounting tools developed by the Engineering Committee. Work product will remain an internal resource which can be distributed to interested parties upon request.

   - Beightel noted that this task was related to discussions about the accounting format that Schreüder built for the RRCA. There may be future accounting tools developed to help distribute information, so keep this task as a reminder.

- Schreüder noted that he continues to use the two accounting tools (i.e., the website and the spreadsheet) to test against each other, and that this year's comparison came out very favorable.

10. Work on improving the understanding of/operation of the inputs to the accounting from the Lovewell Ops worksheet.

    - Perkins sent a proposal to CO & NE staff via email on July 6th, 2018. The proposal detailed how inputs have been done in the past. Perkins also mentioned that one line of text was out of place and he will send an update.
    - Franco and Beightel agreed that results for 2017 Lovewell Ops worksheet are agreed on, but that the committee needs to revisit the issue for 2018. Burgert committed to seeking input from Jennifer Schellpeper on this, and she will try to let the other states know Nebraska's position for 2017 and future years at the August 13 EC meeting.

11. Summarize and document the status of Table 4 (a) in the RRCA accounting procedures and recommend how said document should be memorialized.

    - Beightel mentioned Kari Burgert's email request from July 17th for clarification of the issues with Table 4 (a). Beightel and Franco noted that their legal teams are currently reviewing this request. Flaute clarified that Nebraska does not think it is necessary to provide each state's specific numbers, nor to identify each state's individual interpretation, and that what Nebraska thinks it is important to document is which parts of Table 4 (a) Kansas and Colorado disagree about and which parts of the Accounting Procedures each disputed value relates to. Beightel mentioned that there is a footnote in the accounting as to why the table is not filled out. The 24 August 2016 RRCA resolution is the basis for not populating Table 4 (a).

5. Summary of Meeting Actions/Assignments

- Item #1: Kansas staff will review the annual reports provided by Franco, who will prepare the final reports for signature at the annual meeting.
- Item #2: Colorado will provide the CIR data as it becomes available.
- Item #3: Beightel will provide the 2017 accounting approval documents with the final Engineering Committee report for the next Engineering Committee meeting on August 13th.
- Item #5: Beightel will update the Engineering Committee report with the Courtland Canal fields assignments resolution.
- Item #6: A draft document memorializing changes to the RRCA Accounting Procedures will be sent from Kansas staff to the EC for consideration.
- Item #8: Erickson will continue work on the RRCA website with assistance from Harmon and Franco.
- Item #10: Kansas staff will provide an updated draft of the Lovewell Ops worksheet to the EC group.
- 24

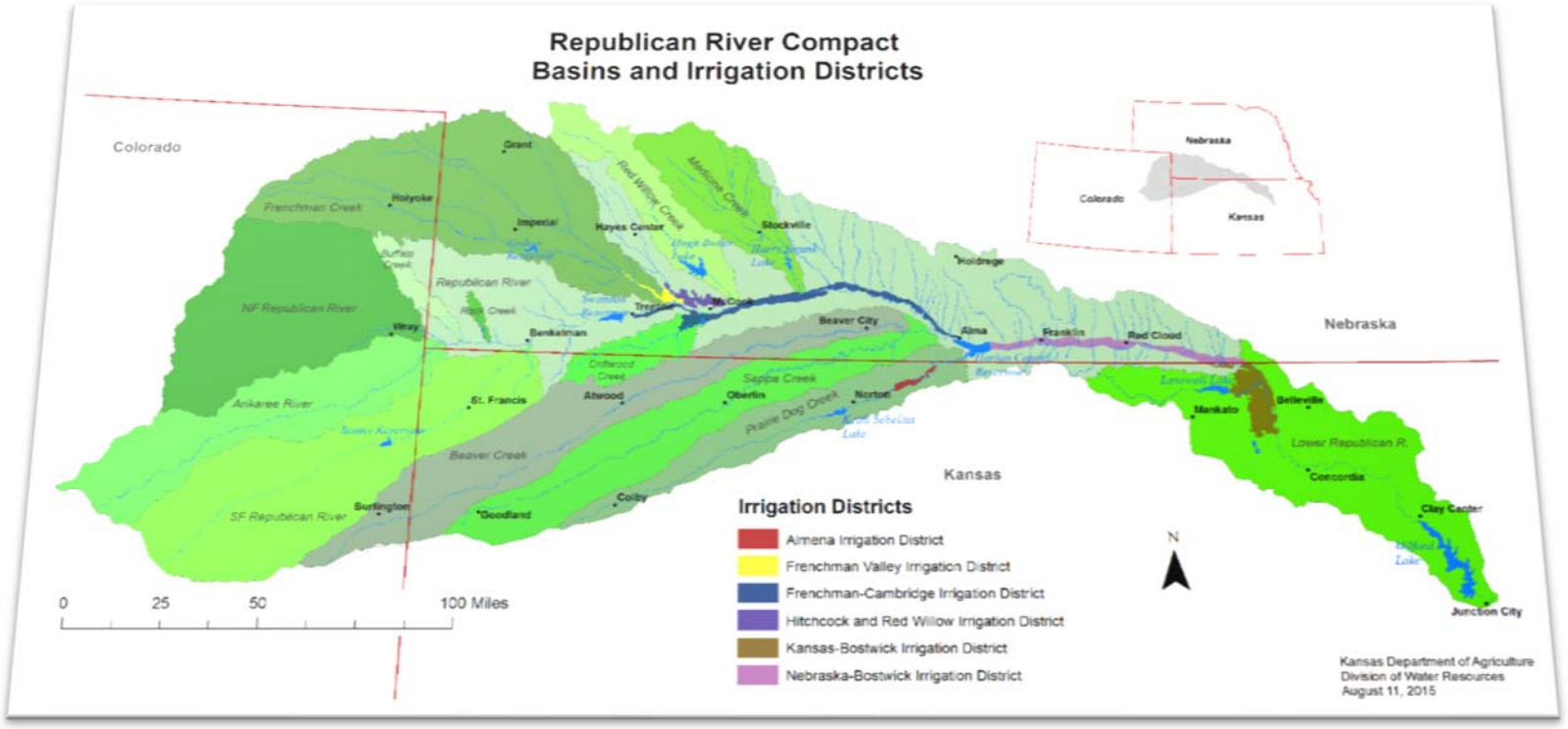
- Item #11: Kansas and Colorado will provide draft language related to the Table 4 (a) discussions to Nebraska for review.

6. Future Meetings
    - Beightel reminded everyone that there will be an EC report review/finalization call on 13 August 2018 9:00 AM central standard using the same call information as this meeting.
    - RRCA Annual Meeting Agenda
        - Flaute mentioned that Nebraska proposes adding an agenda item for Bureau to make a presentation at the annual meeting about the MOA between Kansas Bostwick and Nebraska Bostwick districts. Beightel will add this to the agenda.
        - Erickson mentioned that the public is interested in the status of Bonny Reservoir. Beightel will follow up with the Commissioners to see whether they would want to include this topic.

7. Adjournment

    The EC meeting adjourned at 2:51 p.m.

Republican River Compact
Accounting Inputs and Tables
Summarized for
Accounting Year 2017



August 21, 2018

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ACCOUNTING INPUTS

Calendar Year		2017
Groundwater Data		
North Fork Subbasin	GW CBCU Colorado	16,906
	GW CBCU Kansas	0
	GW CBCU Nebraska	1,174
Arikaree Subbasin	GW CBCU Colorado	2,102
	GW CBCU Kansas	157
	GW CBCU Nebraska	77
Buffalo Subbasin	GW CBCU Colorado	502
	GW CBCU Kansas	0
	GW CBCU Nebraska	3,544
Rock Subbasin	GW CBCU Colorado	112
	GW CBCU Kansas	0
	GW CBCU Nebraska	5,064
South Fork Subbasin	GW CBCU Colorado	13,537
	GW CBCU Kansas	4,637
	GW CBCU Nebraska	699
Frenchman Subbasin	GW CBCU Colorado	1,218
	GW CBCU Kansas	0
	GW CBCU Nebraska	79,918
Driftwood Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	891
Red Willow Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	8,247
Medicine Creek Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	0
	GW CBCU Nebraska	20,695
Beaver Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	6,391
	GW CBCU Nebraska	4,451
Sappa Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	2,305
	GW CBCU Nebraska	2,183
Prairie Dog Subbasin	GW CBCU Colorado	0
	GW CBCU Kansas	7,551
	GW CBCU Nebraska	0
Mainstem Subbasin	GW CBCU Colorado	(3,316)
	GW CBCU Kansas Above Guide Rock	(26)
	GW CBCU Kansas Below Guide Rock	53
	GW CBCU Nebraska Above Guide Rock	64,732
	GW CBCU Nebraska Below Guide Rock	2,546

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	0
Driftwood Subbasin	Imported Water Nebraska	0
Red Willow Subbasin	Imported Water Nebraska	37
Medicine Creek Subbasin	Imported Water Nebraska	10,337
Beaver Subbasin	Imported Water Nebraska	0
Sappa Subbasin	Imported Water Nebraska	62
Prairie Dog Subbasin	Imported Water Nebraska	0
Mainstem Subbasin	Imported Water Nebraska Above Guide Rock	9,015
	Imported Water Nebraska Below Guide Rock	(12)
	Total	**19,439**

Calendar Year		2017
SW Pumping Data		
North Fork Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	406
	SW Diversions - Irrigation - Small Pumps - Colorado	26
	SW Diversions - M&I - Colorado	0
Arikaree Subbasin	SW Diversions - Irrigation -Non-Federal Canals- Colorado	20
	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	400
	SW Diversions - Irrigation - Small Pumps - Nebraska	2
	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	0
	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	49
	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	58
	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	56
	SW Diversions - M&I - Nebraska - Below Gage	0

Calendar Year		2017
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	11
	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	412
	SW Diversions - M&I - Kansas	369
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska -Below Gage	0
	SW Diversions - Irrigation - Small Pumps -Nebraska - Below Gage	97
	SW Diversions - M&I - Nebraska - Below Gage	0
Mainstem Subbasin	SW Diversions - Irrigation - Non-Federal Canals- Kansas	0
	SW Diversions - Irrigation - Small Pumps - Kansas	969
	SW Diversions - M&I - Kansas	0
	SW Diversions - Irrigation - Non-Federal Canals - Nebraska	2,268
	SW Diversions - Irrigation - Small Pumps - Nebraska	1,688
	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	1,261
	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		2017

Non-Federal Reservoir Evaporation Data

North Fork Subbasin	Non-Federal Reservoir Evaporation - Colorado	38
Arikaree Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	11
	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	98
South Fork Subbasin	Non-Federal Reservoir Evaporation - Colorado	14
	Non-Federal Reservoir Evaporation - Kansas	96
	Non-Federal Reservoir Evaporation - Nebraska	0
Frenchman Subbasin	Non-Federal Reservoir Evaporation - Nebraska	43
Driftwood Subbasin	Non-Federal Reservoir Evaporation - Kansas	9
	Non-Federal Reservoir Evaporation - Nebraska	0
Red Willow Subbasin	Non-Federal Reservoir Evaporation - Nebraska	215
Medicine Creek Subbasin	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	258
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	2
Beaver Subbasin	Non-Federal Reservoir Evaporation - Colorado	0
	Non-Federal Reservoir Evaporation - Kansas	213
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	84
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	0
Sappa Subbasin	Non-Federal Reservoir Evaporation - Kansas	228
	Non-Federal Reservoir Evaporation - Nebraska - Above Gage	37
	Non-Federal Reservoir Evaporation - Nebraska - Below Gage	2
Prairie Dog Subbasin	Non-Federal Reservoir Evaporation - Kansas	227
	Non-Federal Reservoir Evaporation - Nebraska	10
Mainstem Subbasin	Non-Federal Reservoir Evaporation - Kansas	70
	Non-Federal Reservoir Evaporation - Nebraska - Above Guide Rock Gage - Whole Basin Value:	917
	Non-Federal Reservoir Evaporation - Nebraska - Below Guide Rock Gage - Whole Basin Value:	93

Stream Gage Data		
North Fork Subbasin	North Fork Republican River At Colorado-Nebraska State Line	26,046
Arikaree Subbasin	Arikaree River At Haigler	646
Buffalo Subbasin	Buffalo Creek Near Haigler	1,282
Rock Subbasin	Rock Creek At Parks	8,686
South Fork Subbasin	South Fork Republican River Near Benkelman	2,385
Frenchman Subbasin	Frenchman Creek At Culbertson	27,490
Driftwood Subbasin	Driftwood Creek Near McCook	2,392
Red Willow Subbasin	Red Willow Creek Near Red Willow	4,346
Medicine Creek Subbasin	Medicine Creek Below Harry Strunk	41,207
Beaver Subbasin	Beaver Creek Near Beaver City	1,082
Sappa Subbasin	Sappa Creek Near Stamford	8,238
Prairie Dog Subbasin	Prairie Dog Creek Near Woodruff	2,181
Mainstem Subbasin	Republican River At Guide Rock	94,437
	Republican River Near Hardy	127,121

Hardy Gage Data	USGS Gage 06853500 Republican River Near Hardy, NE	
Mainstem Subbasin	January	11,315
	February	6,369
	March	6,420
	April	6,933
	May	33,286
	June	11,956
	July	24,712
	August	5,874
	September	3,532
	October	8,752
	November	2,399
	December	5,575
	ANNUAL	127,121

Calendar Year		2017
Reservoir Data		
South Fork Subbasin	Bonny Reservoir Evaporation	0
	Bonny Reservoir Change In Storage	0
Frenchman Subbasin	Enders Reservoir Evaporation	1,263
	Enders Reservoir Change In Storage	(1,669)
Red Willow Subbasin	Hugh Butler Lake Evaporation	2,068
	Hugh Butler Lake Change In Storage	957
Medicine Creek Subbasin	Harry Strunk Lake Evaporation	2,513
	Harry Strunk Lake Change In Storage	(5,538)
Prairie Dog Subbasin	Keith Sebelius Lake Evaporation	2,203
	Keith Sebelius Lake Change In Storage	340
Mainstem Subbasin	Swanson Lake Evaporation	3,382
	Swanson Lake Change In Storage	5,370
	Harlan County Evaporation Subject to Nebraska/Kansas Split	8,753
	Harlan County Evaporation Charged to Kansas	2,011
	Harlan County Change In Storage	30,044
	Lovewell Reservoir Ev charged to the Republican River	2,595
Canal Data		
North Fork Subbasin	Haigler Canal Diversions - Colorado	0
	Haigler Canal Diversions - Nebraska	4,732
	Haigler Canal Diversions	***4,732***
South Fork Subbasin	Hale Ditch Diversions	716
Frenchman Subbasin	~~Champion Canal Diversions~~	~~0~~
	Riverside Canal Diversions	0
	Culbertson Canal Diversions	0
	Culbertson Canal Extension Diversions	0
	Culbertson Canal % Return Flow	100%
	Culbertson Canal Extension % Return Flow	100%
Driftwood Subbasin	Meeker-Driftwood Canal Diversions	16,692
	Meeker-Driftwood Canal % Return Flow	66.4%
Red Willow Subbasin	Red Willow Canal Diversions	0
	Red Willow Canal % Return Flow	100%
Prairie Dog Subbasin	Almena Canal Diversions	771
	Almena Canal % Return Flow	60.6%
Mainstem Subbasin	Bartley Canal Diversion	7,437
	Bartley Canal % Return Flow	65%
	Cambridge Canal Diversion	25,406
	Cambridge Canal % Return Flow	63.1%
	Naponee Canal Diversion	954
	Naponee Canal % Return Flow	68%
	Franklin Canal Diversion	17,134
	Franklin Canal % Return Flow	64%
	Franklin Pump Canal Diversions	798
	Franklin Pump Canal % Return Flow	52%
	Superior Canal Diversions	7,493
	Superior Canal % Return Flow	65%
	Courtland Canal Diversions At Headgate	*62,438*
	Diversions to Nebraska Courtland	471
	Nebraska Courtland % Return Flow	27%
	Courtland Canal, Loss in NE assigned to upper Courtland KS	3,484
	Courtland Canal, Loss in NE assigned to delivery to Lovewell	5,903
	Courtland Canal At Kansas-Nebraska State Line	*52,599*
	Courtland Canal Diversions to the Upper Courtland District	24,094
	Courtland Canal Above Lovewell % Return Flow	*58.4%*
	Courtland Canal, Loss assigned to deliveries of water to Lovewell, Stateline to Lovewell	*3,866*
	Courtland Canal Deliveries To Lovewell Reservoir	*28,120*
	Diversions of Republican River water from Lovewell Reservoir to the Courtland Canal below Lovewell	25,525
	Courtland Canal Below Lovewell % Return Flow	*42.0%*
	To allocate Harlan County evaporation:	
	Kansas Bostwick Diversions During Irrigation Season (actual, or 3-year average)	38,785
	Nebraska Bostwick Diversions During Irrigation Season (actual or 3-year average)	26,807

ACCOUNTING TABLES

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

2017	Virgin Water	Computed	Allocations				Computed Beneficial Consumptive Use		
Basin	Supply	Water Supply	Colorado	Kansas	Nebraska	Unallocated	Colorado	Kansas	Nebraska
North Fork	37,830	37,830	8,470	0	9,310	20,050	17,210	0	4,010
Arikaree	3,010	3,010	2,360	150	510	(10)	2,110	170	80
Buffalo	5,570	5,570	0	0	1,840	3,730	500	0	3,790
Rock	9,390	9,390	0	0	3,760	5,630	110	0	5,160
South Fork	21,800	21,800	9,680	8,760	310	3,050	13,980	4,730	700
Frenchman	108,260	109,930	0	0	58,920	51,010	1,220	0	81,220
Driftwood	630	630	0	40	100	490	0	10	890
Red Willow	15,840	14,880	0	0	2,860	12,020	0	0	8,710
Medicine	37,740	43,280	0	0	3,940	39,340	0	0	21,040
Beaver	12,230	12,230	2,450	4,750	4,970	60	0	6,610	4,540
Sappa	11,840	11,840	0	4,870	4,870	2,100	0	2,530	2,220
Prairie Dog	13,300	12,960	0	5,920	980	6,060	0	10,780	80
Main Stem	193,030	155,380	0	79,400	75,980	0	(3,320)	37,210	109,700
Total All Basins	470,470	438,730	22,960	103,890	168,350	143,530	31,810	62,040	242,140
Main Stem Including Unallocated		298,910	0	152,740	146,170				
Total	470,470	438,730	22,960	177,230	238,540	0	31,810	62,040	242,140

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

	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)
2013	18,690	28,640	0	(9,950)
2014	21,900	32,100	7,448	(2,752)
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
Avg 2013-2017	22,700	32,050	7,930	(1,420)

Table 3B: Table to Be Used to Calculate Kansas's Five-Year Running Average Allocation and Computed

	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)
2013	137,140	60,920	NA	76,220
2014	102,760	60,060	NA	42,700
2015	163,420	50,890	NA	112,530
2016	156,760	51,320	NA	105,440
2017	177,230	62,040	NA	115,190
Avg 2013-2017	147,460	57,050	NA	90,420

Table 3C: Table to Be Used to Calculate Nebraska's Five-Year Running Average Allocation and Computed

	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)
2013	200,480	216,850	28,229	11,859
2014	168,970	206,010	75,136	38,096
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
Avg 2013-2017	209,950	232,930	48,160	25,170

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.

2017

	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

2017

	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	124	(10)	106	N/A	220	202	18
South Fork	9,152	3,184	0	N/A	12,336	5,968	6,368
Driftwood	66	734	0	N/A	800	10	790
Beaver	3,640	54	1,878	N/A	5,572	5,270	302
Sappa	2,362	1,020	0	N/A	3,382	728	2,654
Prairie Dog	4,176	4,266	0	N/A	8,442	7,054	1,388

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)
2013	Yes	18,690	1,054	17,636	28,640	0	(11,004)
2014	Yes	21,900	1,228	20,672	32,100	7,448	(3,980)
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
Avg 2013-2017	Yes	22,700	1,070	21,630	32,050	7,930	(2,490)

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 Beaver Creek Allocations
	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

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

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)
2015	20,320	4,640	1,088	26,048	18,730	N/A	7,318
2016	23,100	5,529	1,247	29,876	21,750	N/A	8,126
2017	24,490	6,004	1,380	31,874	24,830	N/A	7,044
Avg 2016-2017	23,795	5,767	1,313	30,875	23,290	N/A	7,585

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)
2015	223,860	33,485	190,375	1,042	243,530	2,941	240,590	36,195	(12,977)
2016	217,880	12,878	205,002	1,193	256,120	2,758	253,362	61,841	14,675
2017	238,540	11,539	227,001	1,320	242,140	3,585	238,555	39,466	29,232
Avg 2016-2017	228,210	12,210	216,000	1,260	249,130	3,170	245,960	50,650	21,950

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 Allocation	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock	Credits Above Guide Rock	Col 3 + Col 4 - (Col 7 - Col 8)
2014	168,970	6,305	162,665	631	206,010	2,335	203,675	75,161	34,782
2015	223,860	33,485	190,375	1,042	243,530	2,941	240,590	36,195	(12,977)
2016	217,880	12,878	205,002	1,193	256,120	2,758	253,362	61,841	14,675
2017	238,540	11,539	227,001	1,320	242,140	3,585	238,555	39,466	29,232
Avg 2015-2017	226,760	19,300	207,460	1,190	247,260	3,090	244,170	45,830	10,310

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			
2015	86,920	67,609	154,529	132,710	29,223	51,042
2016	89,960	71,096	161,056	136,720	52,742	77,078
2017	92,370	70,186	162,556	132,440	30,481	60,597
Avg 2016-2017	91,165	70,641	161,806	134,580	41,612	68,837

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 in reservoir storage.

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

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
2013	105,610	44,745	24,835	70,402	6,161	5,048	3,679	8,727	3,000	673	3,673	11,183	14,855	90,755	44,379	46,376	7,264	7,591
2014	57,010	50,362	35,041	59,654	0	5,278	0	5,278	2,335	515	2,850	10,043	12,893	44,117	21,573	22,544	6,305	6,588
2015	141,780	104,931	29,772	57,452	6,571	5,792	4,414	10,206	2,941	582	3,523	64,953	68,476	73,304	35,846	37,459	33,485	34,991
2016	116,190	80,515	47,639	44,129	6,308	5,619	4,259	9,877	2,758	578	3,336	22,999	26,335	89,855	43,939	45,916	12,878	13,457
2017	155,380	127,121	94,437	44,129	7,493	8,574	4,877	13,451	3,585	780	4,365	19,233	23,598	131,782	64,442	67,341	11,539	12,058

COURTLAND CANAL					
	2013	2014	2015	2016	2017
Return Flow From Courtland Canal To Republican River Above Lovewell From Kansas	975	813	764	563	789
Return Flow From Courtland Canal To Republican River Above Hardy From Nebraska	4,073	4,465	5,027	5,055	7,785
Courtland Canal Diversions At Headgate	70,402	59,654	57,452	44,129	62,438
Courtland Canal At Kansas-Nebraska State Line	65,021	54,209	50,960	37,548	52,599
NE Courtland Canal CBCU (includes transportation loss)	414	0	361	416	345
Superior Canal CBCU	2,482	0	2,157	2,049	2,616

NEBRASKA					
	2013	2014	2015	2016	2017
SW Diversions - Irrigation - Small Pumps - Nebraska Below Guide Rock	850	476	786	655	1,261
SW Diversions - M&I - Nebraska - Below Guide Rock	0	0	0	0	0
SW Non-Federal Reservoir Evaporation - Below Guide Rock	50	67	14	34	93
SW Return - Irrigation	213	119	197	164	315
SW Return - M&I	0	0	0	0	0
GW CBCU Nebraska Below Guide Rock	2,312	1,911	2,337	2,233	2,546

KANSAS					
	2013	2014	2015	2016	2017
SW CBCU - Irrigation - Small Pumps	582	484	554	535	727
SW CBCU - M&I	0	0	0	0	0
GW CBCU Kansas Below Guide Rock	91	31	28	43	53

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	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
∑ Irrigation Season											
∑ Non- Irrigation Season											
Culbertson	0	0	0	0	0	30%	0	0	82%	0	100%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
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	16,692	1,585	15,107	5,024	10,083	30%	1,507	11,590	82%	11,089	66.4%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Red Willow	0	0	0	0	0	30%	0	0	82%	0	100.0%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Bartley	7,437	509	6,928	2,425	4,503	30%	728	5,231	82%	4,798	64.5%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Cambridge	25,406	2,561	22,845	9,152	13,693	30%	2,746	16,439	82%	16,041	63.1%
	0	0	0	0	0	30%	0	0	92%	0	100.0%
Naponee	954	118	836	287	549	35%	100	649	82%	651	68.2%
	0	0	0	0	0	35%	0	0	92%	0	100.0%
Franklin	17,134	1,182	15,952	6,244	9,708	35%	2,185	11,893	82%	10,935	63.8%
	0	0	0	0	0	35%	0	0	92%	0	100.0%
Franklin Pump	798	44	754	462	292	35%	162	454	82%	416	52.1%
	0	0	0	0	0	35%	0	0	92%	0	100.0%
Almena	771	0	771	288	483	30%	86	569	82%	467	60.6%
Superior	7,493	316	7,177	2,340	4,837	31%	725	5,562	82%	4,877	65.1%
	0	0	0	0	0	31%	0	0	92%	0	100.0%
Nebraska Courtland	471	0	471	412	59	23%	95	154	82%	126	26.8%
Courtland Canal Above Lovewell (KS)	24,094	1,787	22,307	9,530	12,777	23%	2,192	14,969	82%	14,061	58.4%
Courtland Canal Below Lovewell	38,000	3,147	34,853	24,996	9,857	23%	5,749	15,606	82%	15,944	42.0%

Attachment 8

CCV and RCCV Tracking[a]												
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
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
	=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
2008	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
2010	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
2012	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
2014	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	8332	0	8332	8332	0	0	8332	8332	0
2016	0	0	41,935	24752	0	24752	33084	5084	4321	23679	15347	9,300
2017	9300	0	20,000	20,000	0	20000	43679	20000	2241	21438	-2241	9,300

APV and RWS					RCCV Calc
Colorado		Nebraska			
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)
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	15,766	0	15,766	0
7,448	7,448	19,397	42,758	62,155	0
10,760	10,760	1,098	25,932	18,698	8332
10,130	10,130	499	22,803	41,935	449
11,330	11,330	4,563	11,106	20,000	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)					
	2013	2014	2015	2016	2017
January	1,926	1,704	1,390	5,429	11,315
February	1,829	4,733	2,093	6,532	6,369
March	1,993	4,560	2,027	6,415	6,420
April	4,479	1,638	2,364	6,625	6,933
May	8,376	2,138	34,054	13,501	33,286
June	3,215	5,818	36,781	5,901	11,956
July	2,648	5,726	7,906	4,844	24,712
August	9,386	6,893	7,712	6,153	5,874
September	3,588	4,491	2,180	9,868	3,532
October	2,523	4,717	1,690	5,278	8,752
November	3,771	4,167	1,944	5,286	2,399
December	1,012	3,779	4,790	4,685	5,575
ANNUAL	44,746	50,364	104,931	80,515	127,122
Over 400K	0	0	0	0	0

Sub-basin Flows Above Attachment 1 Flood Flow Thresholds					
	2013	2014	2015	2016	2017
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	0
Prairie Dog	0	0	0	0	0
Sub-basin Sum	0	0	0	0	0

5-month Consecutive Period Flows (acre-feet)					
	2013	2014	2015	2016	2017
Jan-May	18,603	14,773	41,928	38,501	64,322
Feb-Jun	19,892	18,887	77,319	38,973	64,964
Mar-Jul	20,711	19,880	83,132	37,285	83,307
Apr-Aug	28,104	22,213	88,817	37,023	82,760
May-Sep	27,213	25,066	88,633	40,266	79,359
Jun-Oct	21,360	27,645	56,269	32,043	54,825
Jul-Nov	21,916	25,994	21,432	31,428	45,268
Aug-Dec	20,280	24,047	18,316	31,269	26,132

5-month Consecutive Period Test					
	2013	2014	2015	2016	2017
Jan-May	0	0	0	0	0
Feb-Jun	0	0	0	0	0
Mar-Jul	0	0	0	0	0
Apr-Aug	0	0	0	0	0
May-Sep	0	0	0	0	0
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	0

2-month Consecutive Period Flows (acre-feet)					
	2013	2014	2015	2016	2017
Jan-Feb	3,755	6,437	3,483	11,960	17,683
Feb-Mar	3,822	9,293	4,120	12,946	12,789
Mar-Apr	6,472	6,198	4,391	13,039	13,353
Apr-May	12,855	3,776	36,418	20,126	40,219
May-Jun	11,591	7,956	70,835	19,402	45,242
Jun-Jul	5,863	11,544	44,687	10,744	36,668
Jul-Aug	12,034	12,619	15,618	10,996	30,586
Aug-Sep	12,974	11,384	9,892	16,020	9,406
Sep-Oct	6,111	9,208	3,870	15,146	12,283
Oct-Nov	6,294	8,884	3,634	10,564	11,151
Nov-Dec	4,783	7,946	6,734	9,971	7,974

2-month Consecutive Period Test					
	2013	2014	2015	2016	2017
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	0
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	0

Final Sub-basin Flood Flows					
	2013	2014	2015	2016	2017
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	0
Prairie Dog Flood Flow	0	0	0	0	0
Mainstem Flood Flow	0	0	0	0	0

Combined Test					
	2013	2014	2015	2016	2017
FINAL TOTAL	0	0	0	0	0