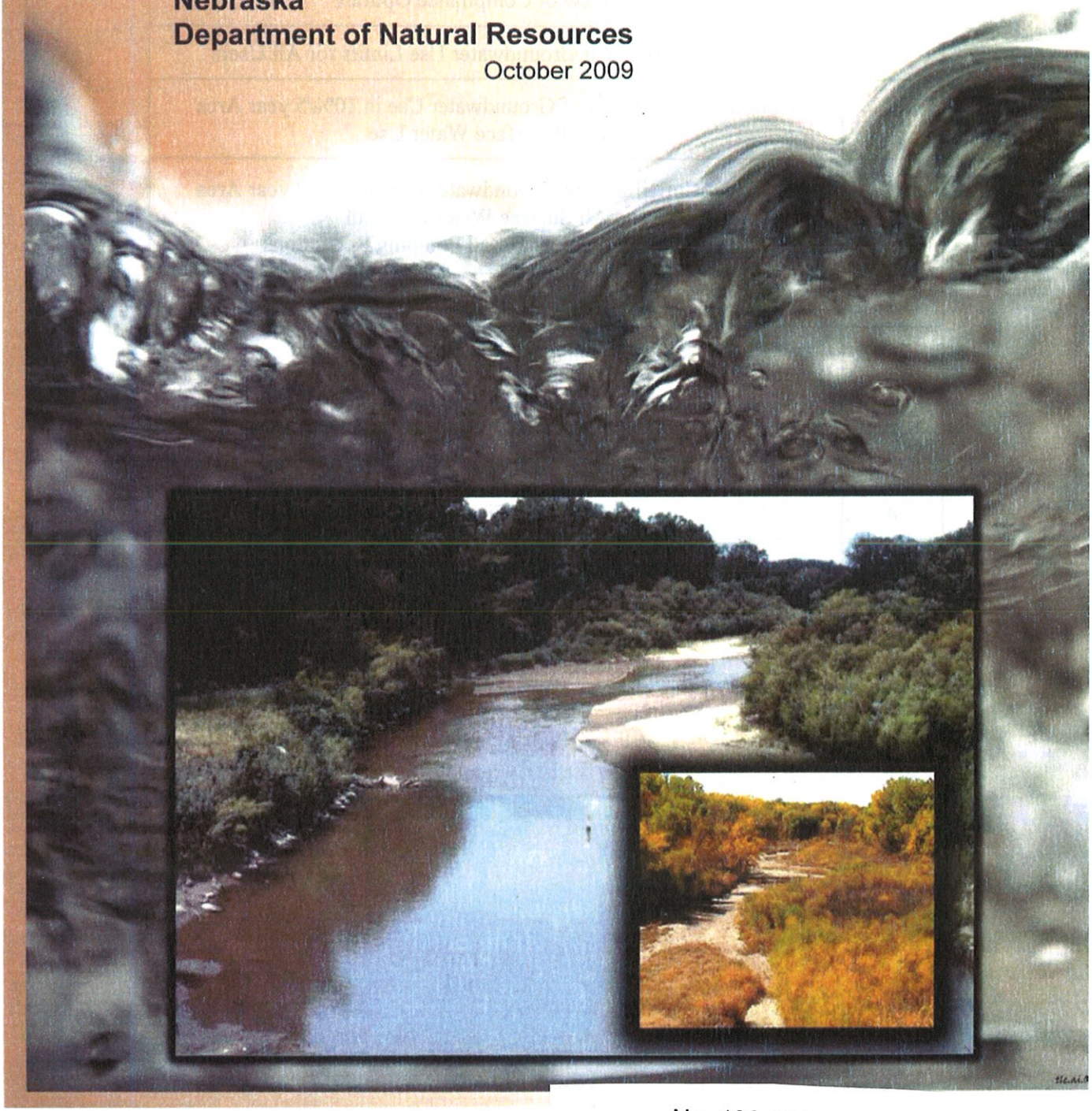
Compliance Options During Dry Years for Integrated Management Planning in the Republican River Basin

Nebraska
Department of Natural Resources
October 2009



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Compliance Options During Dry Years
for
Integrated Management Planning in the Republican River Basin

Nebraska Department of Natural Resources
October, 2009

Tab	Description
	Overview of Compliance Options
1	Option 1: Permanent Groundwater Use Limits for All Users
2	Option 2: Curtailment of Groundwater Use in 10%/5 year Area and All Surface Water Use
3	Option 3: Curtailment of Groundwater Use in 10%/2 year Area and All Surface Water Use with Additional Incentive-Based Pumping Reductions
4	PowerPoint Presentation
5	Quarterly Newsletter
6	Nebraska Compliance Report
7	Arbitrator's Final Decision on Legal Issues
8	Arbitrator's Final Decision
9	Kansas Letter of December 19, 2007

Compliance Options During Dry Years

For Integrated Management Planning in the Republican River Basin

Nebraska Department of Natural Resources
October 2009

The current integrated management plans (IMPs) in the Republican Basin, effective 2008 through 2012, contain allowable irrigation depths per acre or overall NRD pumping volumes designed to keep Nebraska in compliance during normal and wet years. In addition, the IMPs call for each natural resources district (NRD) to limit their stream depletions to stay within their share of the state's allowable depletions to the Republican River during all precipitation conditions. However, there are no details in the IMPs outlining the necessary steps to be taken to ensure compliance during dry years. This binder contains details of three options for staying in compliance during dry years, along with supporting material regarding Republican River issues.

Option 1

Option 1 (see tab 1) calls for setting pumping volumes in an NRD low enough that the NRD will remain within its share of the state's allowable depletions during all years. This allows the NRD to treat all groundwater users equally during all years (see figure 1). Under this option surface water use would be curtailed if needed to ensure compliance during potential dry years.

Option 2

Option 2 allows groundwater users to continue pumping volumes as listed in the individual IMPs. However, under certain conditions it *may* be necessary to leave additional water in the streams and tributaries. Therefore Option 2 includes curtailment of surface water use and curtailment of groundwater pumping in a 10% - 5 year rapid response area if needed to ensure compliance during potential dry years. This area is defined as the area within which pumping of a well for five years will deplete the river or a baseflow tributary thereof by at least 10% of the amount pumped over a five-year period.

Option 3

Option 3 is similar to Option 2, but differs in that it uses a smaller rapid response area in which pumping would be curtailed. Option 3 includes curtailment of surface water use as well as curtailment of groundwater pumping in a 10% - 2 year rapid response area if needed to ensure compliance during potential dry years. This area is defined as the area within which pumping of a well for two years will deplete the river or a baseflow tributary thereof by at least 10% of the amount pumped over a two-year period. In order for this smaller rapid response area to sufficiently reduce depletions when needed, additional pumping decreases would be necessary during future years. Pumping decreases over the life of the current IMPs should be on the order of one percent per year. These pumping reductions can be accomplished through voluntary reduction of acres through incentive programs.

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The total irrigated acres for Options 2 and 3 are listed in table 1 and depicted on figure 2. The areas available for contracts under the Conservation Reserve Enhancement Program (CREP) are also listed for comparison.

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Figure 1. Compliance Options

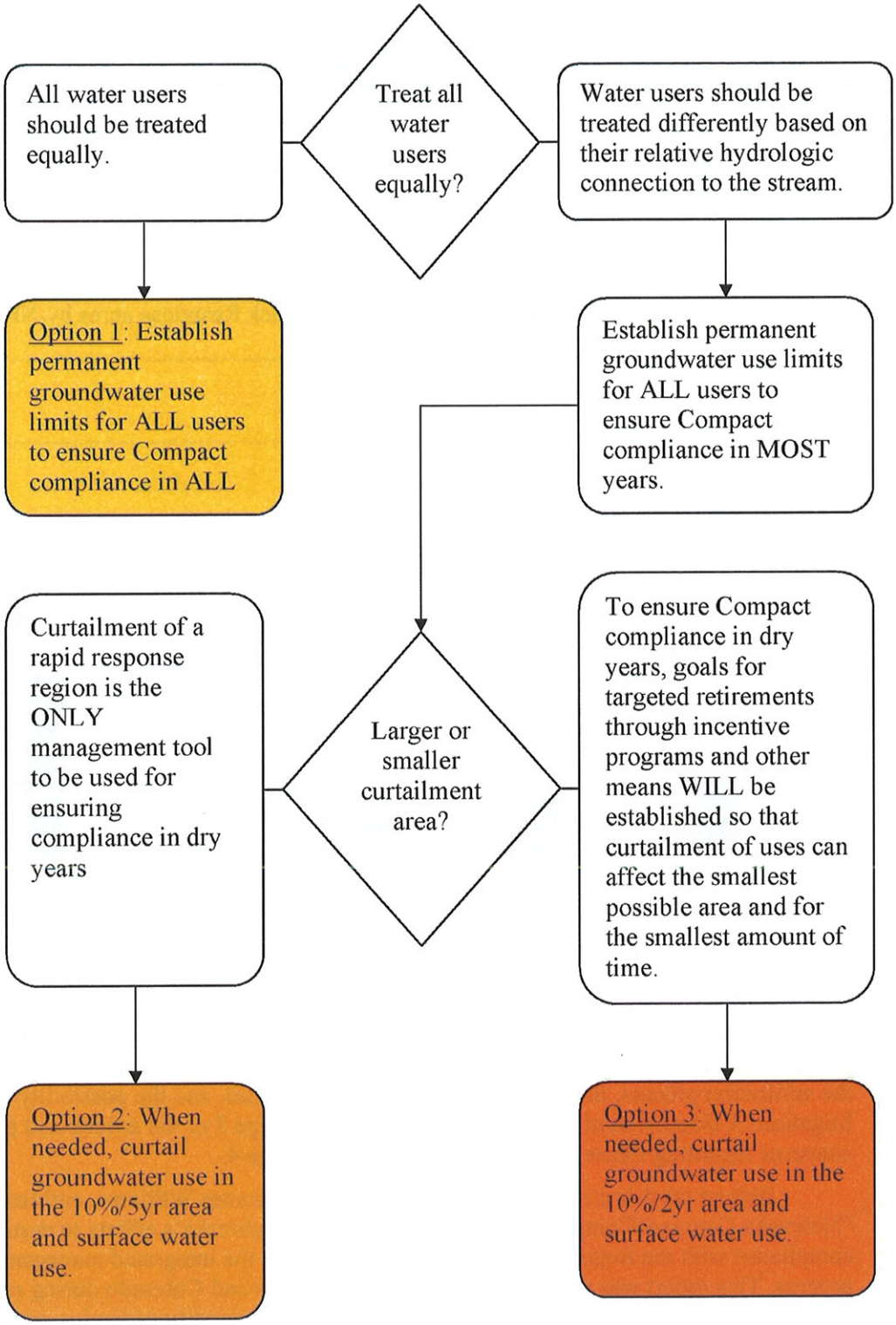
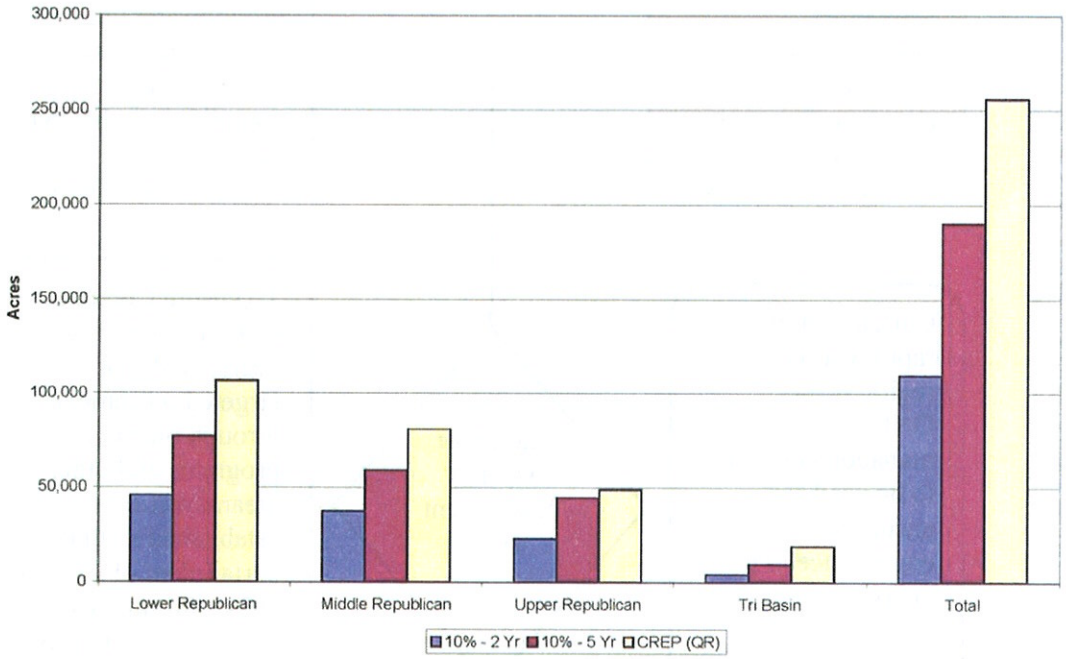


Table 1. Acreage in proposed Rapid Response areas compared with CREP (Quick Response) area.

	10% - 2 Year Rapid Response Area (Acres)	10% - 5 Year Rapid Response Area (Acres)	CREP (Quick Response) Area (Acres)
Lower Republican	45,800	76,900	107,000
Middle Republican	37,300	59,100	81,000
Tri Basin	4,200	9,600	19,100
Upper Republican	22,700	44,500	49,000
Total	110,000	190,100	256,100

Figure 2. Rapid Response acres vs. original Quick Response acres by NRD



A copy of the PowerPoint presentation can be found behind tab 4.

Background Materials

Behind tab 5 is the August 2009 edition of the NDNR's quarterly newsletter. This edition features an article summarizing issues related to the Republican River Compact, the arbitration process, the issues brought forth by the states, and the possibility of future litigation. A discussion of Nebraska compliance is on Page 3 of the article, and potential concerns regarding future litigation are described on Page 4.

Behind tab 6 is a report by James Schneider and James Williams, entitled, "Nebraska Compact Compliance," which summarizes Nebraska's efforts to ensure compliance with the Republican River Compact through the integrated management process. This report was written and submitted to Kansas and Colorado during recent arbitration. A discussion of compliance under all climatic conditions begins on page 6

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and potential dry-year shortfalls under the current IMPs are discussed on page 9 of the report. The preferred methods of maintaining compact compliance are described in the section titled "Closing the Gap," which begins on page 10.

Behind tab 7 is a report detailing the arbitrator's final decision on legal issues. This report was issued on January 22, 2009, and provides answers to arguments put forth by both Kansas and Nebraska.

A report of the arbitrator's final decision, issued on June 30, 2009, is included behind Tab 8. The arbitrator made a number of conclusions regarding future compliance. These conclusions begin on page 67 of his final decision. Dry-year compliance is directly noted in his eighth recommendation on Page 72.

The State of Kansas has requested that Nebraska permanently cease irrigation on approximately 515,000 acres. Details of their request are found in their letter dated December 19, 2007, which is included behind Tab 9.

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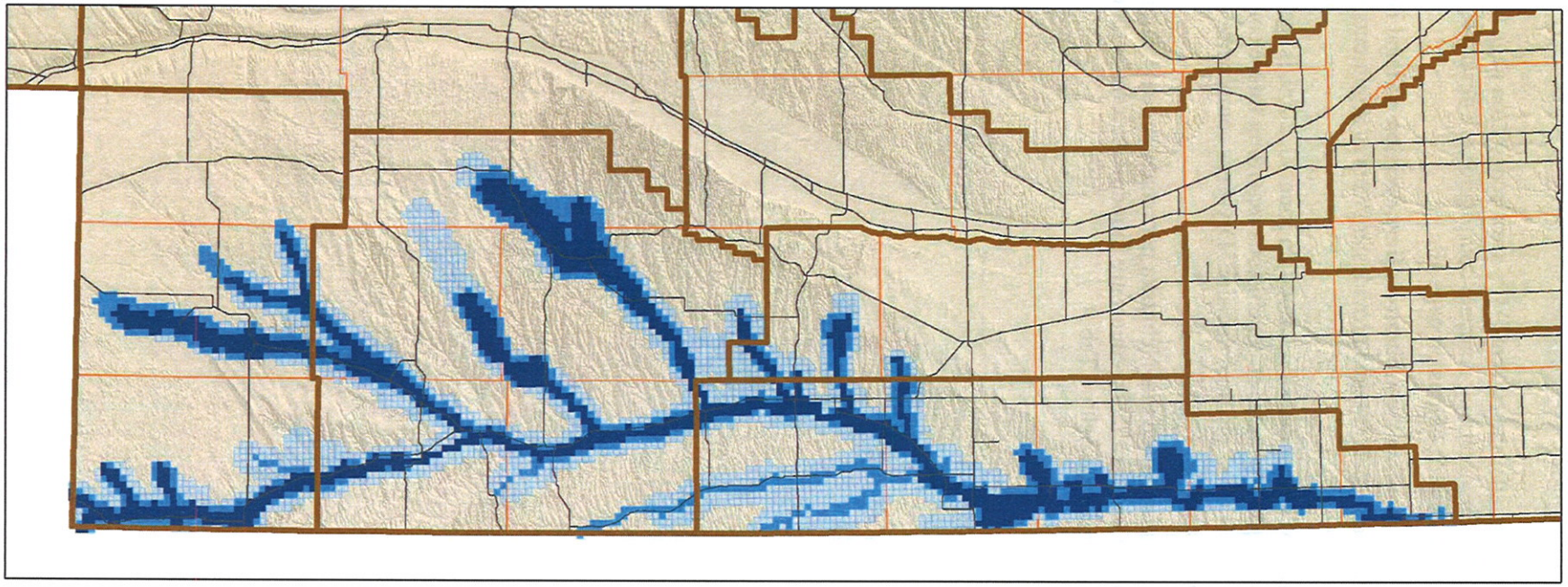
Compliance Options During Dry Years

In the Republican River Basin



Legend

- NRD Boundaries
- Highways
- Stream Depletion of 10% in 2 Years
- Stream Depletion of 10% in 5 Years
- CREP (Quick Respons) Area
- County Boundaries

N

0 10 20 40 60 80 Miles

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This map is a graphical depiction of groundwater model results and other analyses. The information is not final, and is for discussion purposes only.

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Department of Natural Resources

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TAB 1

OPTION 1

Option 1: Establish permanent groundwater use limits for ALL users to ensure Compact compliance in ALL years.

Required Management Objectives:

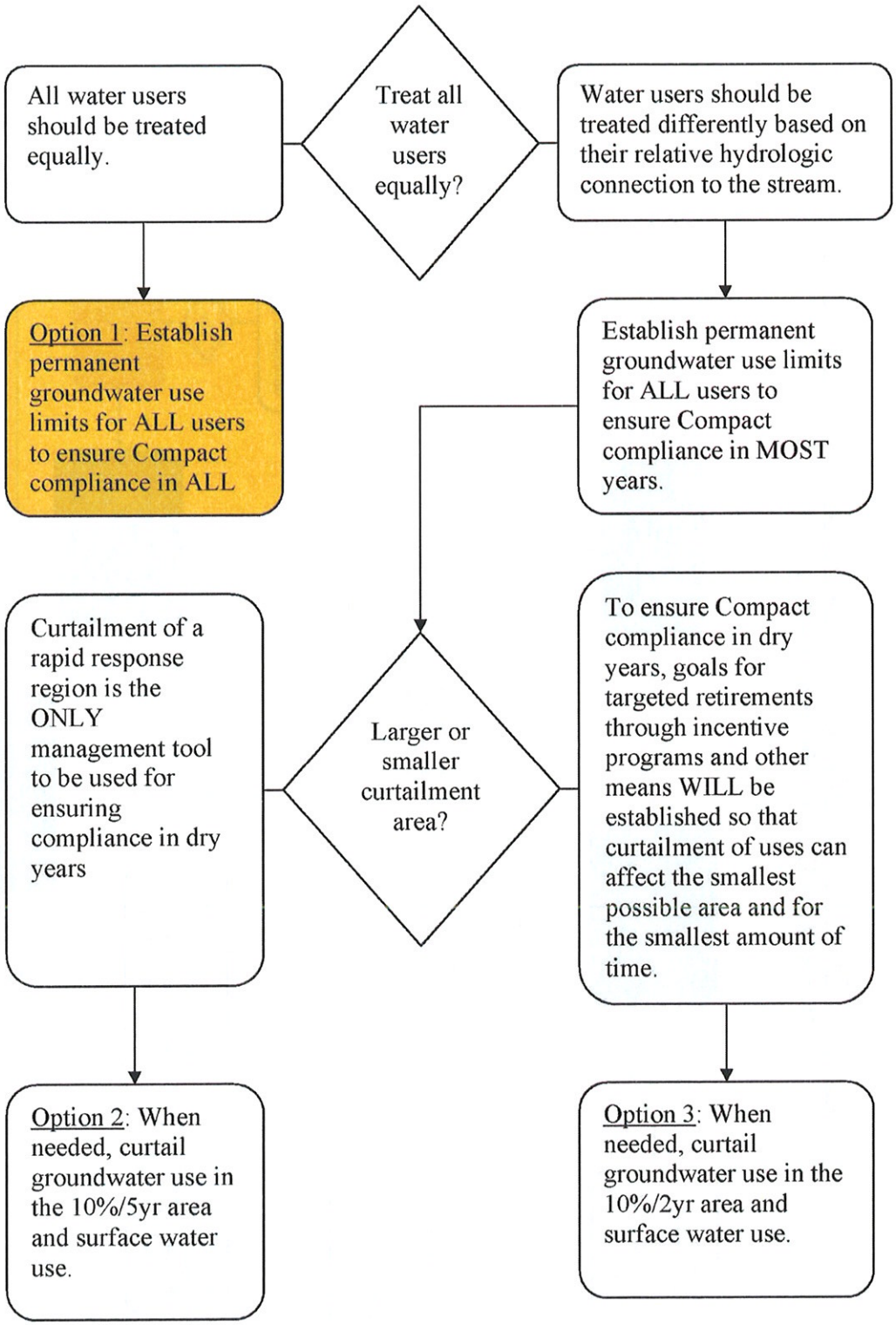
1. Provide for a sixty percent (60%) reduction in pumping from the 1998-2002 pumping volume using a combination of regulation and supplemental programs.

2. When needed, as outlined in the following flowcharts and checklists, curtail surface water users to ensure Compact compliance in dry years.

Pumping Limits by NRD with sixty percent reduction in pumping:

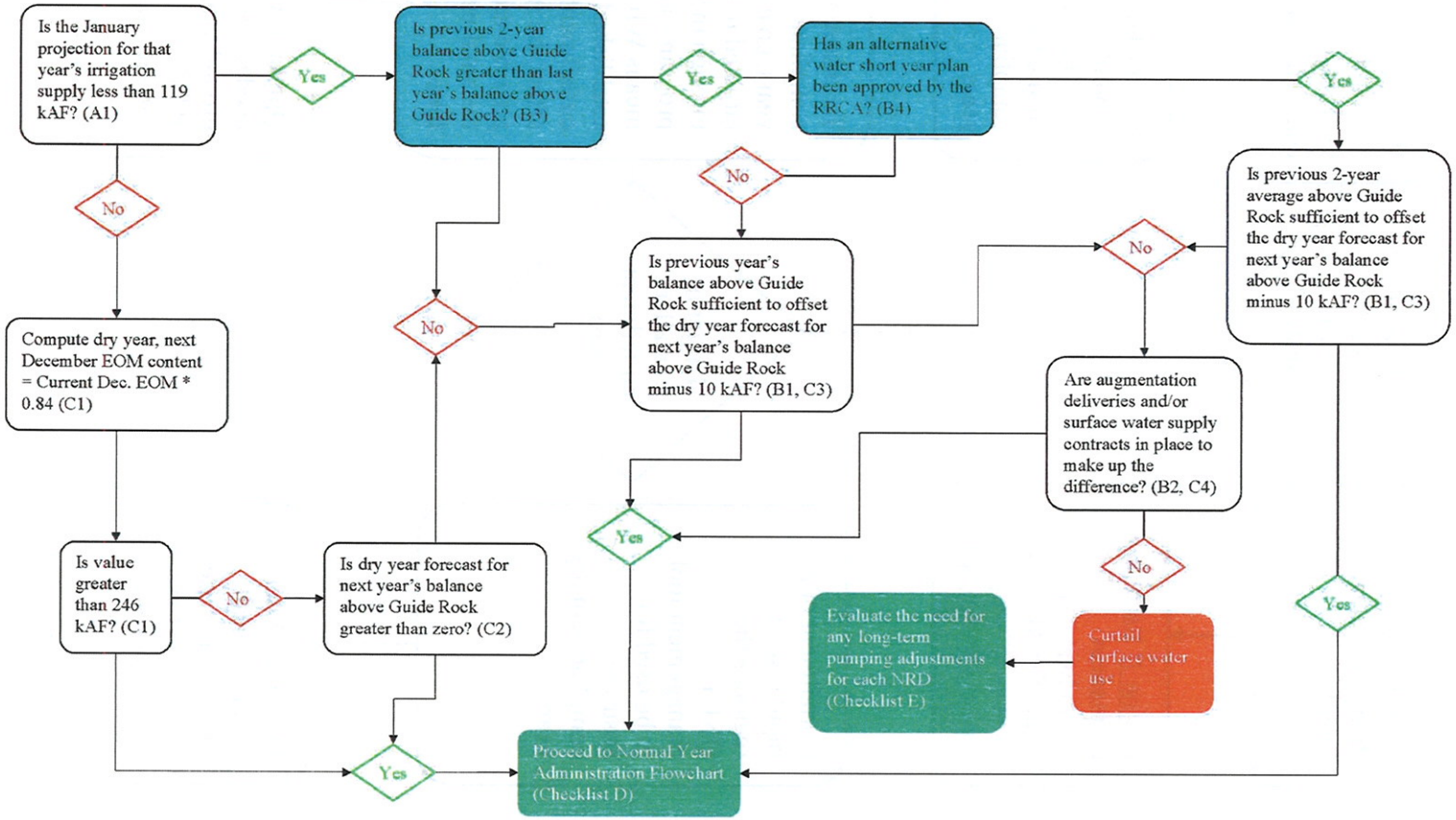
	2008 Certified Acres	Allowable Pumping Volume (acre-feet)	Approximate Allowable Allocation (inches)
Lower Republican	326,931.50	96,900	3.6
Middle Republican	310,644.40	123,800	4.8
Upper Republican	435,489.70	212,700	5.9
Total	1,073,065.60	433,400	N/A

Compliance Options During Dry Years



Republican River Water Supply Evaluation and Required Actions—Option 1

Water Short Year Administration—Checklists A, B, and C



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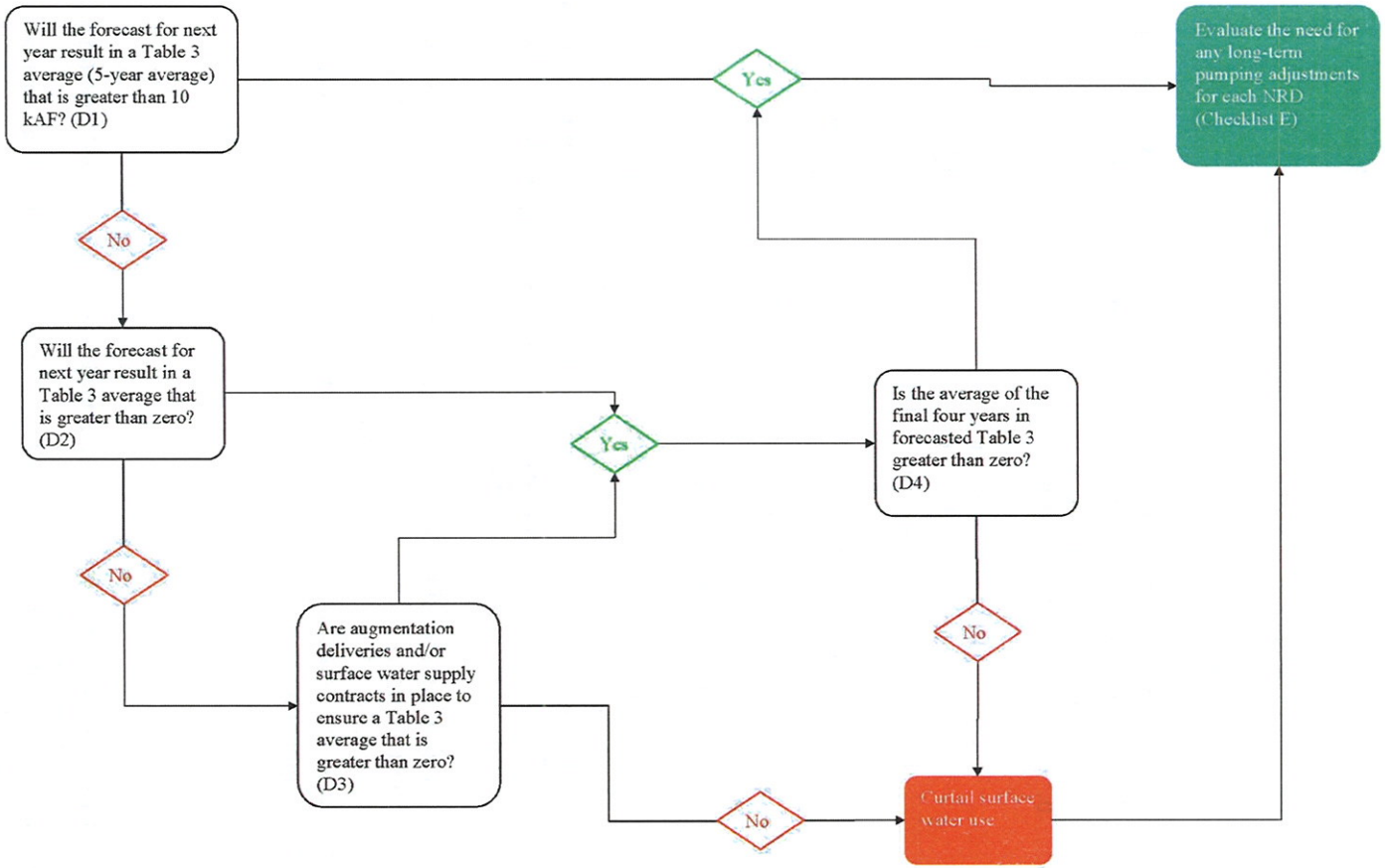
Republican River Water Supply Evaluation and Required Actions—Option 1

Normal Year Administration—Checklist D



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Option 1
Republican River Water Supply Evaluation and Required Actions

A. Water Short Year Test.

1) Is the January projection for that year's irrigation supply less than 119 kAF?
   a. Yes. Proceed to Checklist B.
   b. No. Proceed to Checklist C.

B. Water Short Year Checklist.

1) Is the previous year's balance[1] above Guide Rock (Table 3C[2]) sufficient to offset the dry year forecast for next year's balance above Guide Rock minus 10 kAF?
   a. Yes. Proceed to Checklist D.
   b. No. Advance to question 2.

   Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -5 kAF. Last year would not be sufficient to offset the forecast for next year minus 10 kAF (No).

2) Are augmentation deliveries and/or surface water supply contracts in place to offset the combined balance of last year's balance above Guide Rock and next year's forecast above Guide Rock minus 10 kAF?
   a. Yes. Proceed to Checklist D.
   b. No. Curtail surface water use for the next year.

   Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -15 kAF. If a contract for surface water supplies is in place that will provide 10 kAF, this would not be sufficient (No). If a contract for surface water supplies is in place that will provide 20 kAF, this would be just enough to pass this test (Yes).

3) Note: If it is beneficial to utilize the Alternative Water Short Year provisions from the FSS (the previous two years have a greater balance than last year alone), and
4) An Alternative Water Short Year Plan has been approved by the RRCA, then the previous two-year balance will be substituted for the previous year's balance in these questions.

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[1] The term "balance" is used in this document to refer to the state's allocation and imported water supply credit, less its consumptive use during a single year.
[2] Table numbers refer to tables in the Republican River Compact Administration accounting worksheet, based on current accounting procedures.

C. Early Warning System for Water Short Year Compliance.

1) When Harlan County Lake declines from one year to the next, the December end-of-month (EOM) content is generally about 84% of what it was last year. A December EOM of 246 kAF provides a high level of confidence that the year will not be water short. Based on the current year's Harlan County Lake December EOM content, compute a dry-year projection for next year based on this relationship. Is the value greater than 246 kAF?
   a. Yes. Proceed to Checklist D.
   b. No. Advance to question 2.

   Example: The current year's December EOM is 300 kAF. The computed dry-year projection for next year would be 252 kAF (Yes).

2) Is the dry year forecast for next year's balance above Guide Rock greater than zero?
   a. Yes. Proceed to Checklist D.
   b. No. Advance to question 3.

3) Is the previous year's balance above Guide Rock sufficient to offset the dry year forecast for next year's balance above Guide Rock minus 10 kAF?
   a. Yes. Proceed to Checklist D.
   b. No. Advance to question 4.

   Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -5 kAF. Last year would not be sufficient to offset the forecast for next year minus 10 kAF (No).

4) Are augmentation deliveries and/or surface water supply contracts in place to offset the combined balance of last year's balance above Guide Rock and next year's forecast above Guide Rock minus 10 kAF?
   a. Yes. Proceed to Checklist D.
   b. No. Curtail surface water use for the next year.

   Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -15 kAF. If a contract for surface water supplies is in place that will provide 10 kAF, this would not be sufficient (No). If a contract for surface water supplies is in place that will provide 20 kAF, this would be sufficient (Yes).

D. Normal Year Administration Checklist.

1) Will the forecast for next year result in a Table 3 average (5-year average) that is greater than 10 kAF?
   a. Yes—no action
   b. No. Advance to question 2.

   Example: The annual balance for the last four years is 10 kAF, -15 kAF, 20 kAF, and 5 kAF. The forecast for next year is -5 kAF. The Table 3 average is 3 kAF (No). The annual balance for the last four years is 20 kAF, -5 kAF, 30 kAF, and 25 kAF. The forecast for next year is 5 kAF. The Table 3 average is 15 kAF (Yes).

2) Will the forecast for next year result in a Table 3 average that is greater than zero?
   a. Yes. Advance to question 4.
   b. No. Advance to question 3.

   Example: The annual balance for the last four years is -10 kAF, -15 kAF, 20 kAF, and 5 kAF. The forecast for next year is -5 kAF. The Table 3 average is -1 kAF (No). The annual balance for the last four years is 20 kAF, -5 kAF, 30 kAF, and 25 kAF. The forecast for next year is 5 kAF. The Table 3 average is 15 kAF (Yes).

3) Are augmentation deliveries and/or surface water supply contracts in place to ensure a Table 3 average that is greater than zero, based on forecasted conditions for the coming year?
   a. Yes. Advance to question 4.
   b. No. Curtail surface water use.

   Example: The annual balance for the last four years is -10 kAF, -25 kAF, 20 kAF, and 5 kAF. The forecast for next year is -5 kAF. If no augmentation supplies and/or surface water contracts were in place, the Table 3 average would be -3 kAF (No). If augmentation supplies and/or surface water contracts could supply 20 kAF, the Table 3 average would be 1 kAF (Yes).

4) Is the average of the most recent four years in forecasted Table 3 (most recent three years plus the forecast for the coming year) greater than zero?
   a. Yes—No action.
   b. No. Curtail surface water use.

TAB 2

OPTION 2

Option 2: When needed, curtail groundwater use in the 10%/5yr area and surface water use.

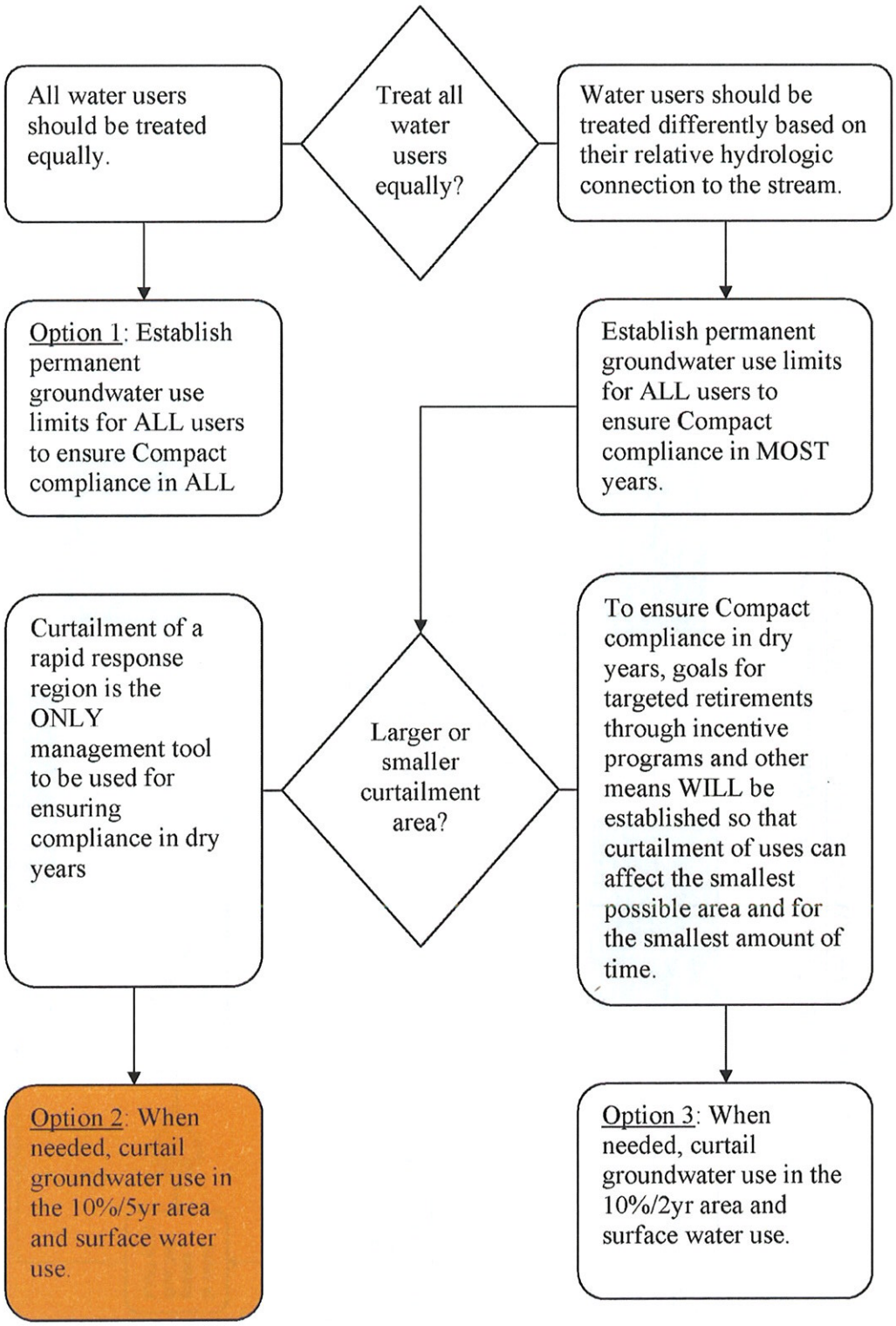
Required Management Objectives:

1. When needed, as outlined in the following flowcharts and checklists, curtail groundwater pumping in a 10% - 5 year rapid response area.
2. When needed, as outlined in the following flowcharts and checklists, curtail surface water users to ensure Compact compliance in dry years.

Acres affected by 10% - 5 Year Rapid Response Area:

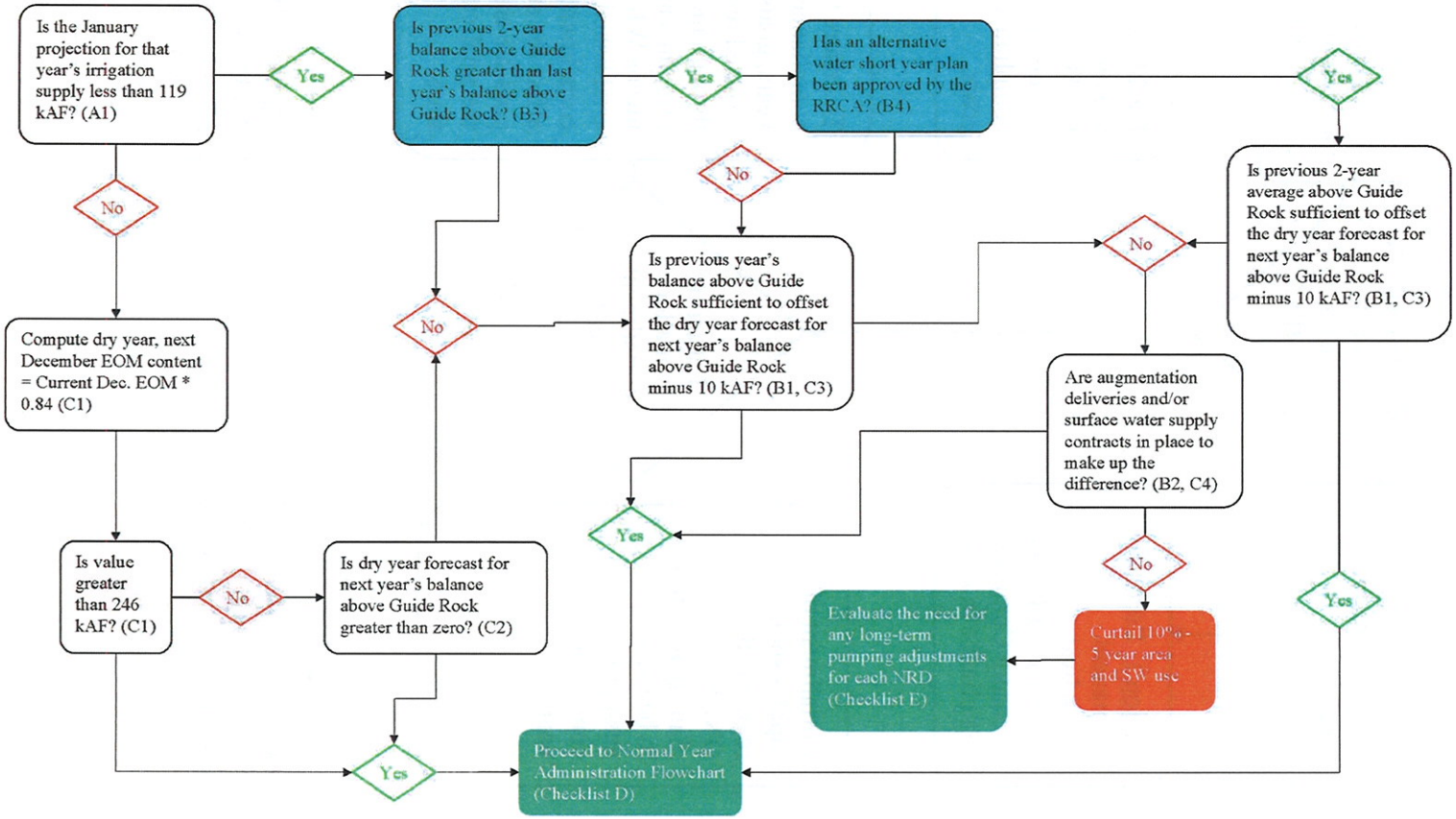
	10% - 5 Year Rapid Response Area (Acres)
LOWER REPUBLICAN	76,900
MIDDLE REPUBLICAN	59,100
TRI BASIN	9,600
UPPER REPUBLICAN	44,500
TOTAL	190,100

Compliance Options During Dry Years



Republican River Water Supply Evaluation and Required Actions—Option 2

Water Short Year Administration—Checklists A, B, and C



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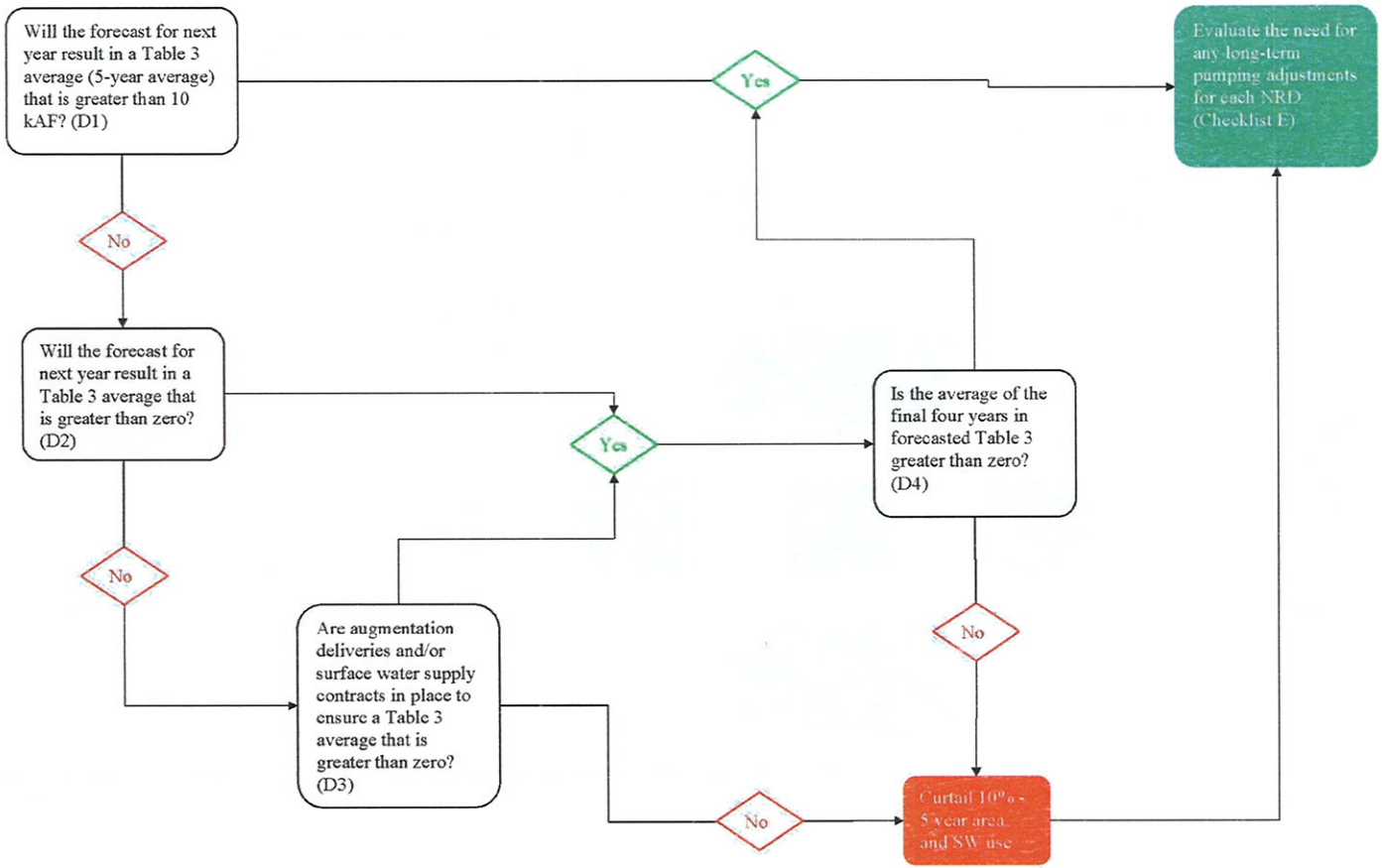
Republican River Water Supply Evaluation and Required Actions—Option 2

Normal Year Administration—Checklist D



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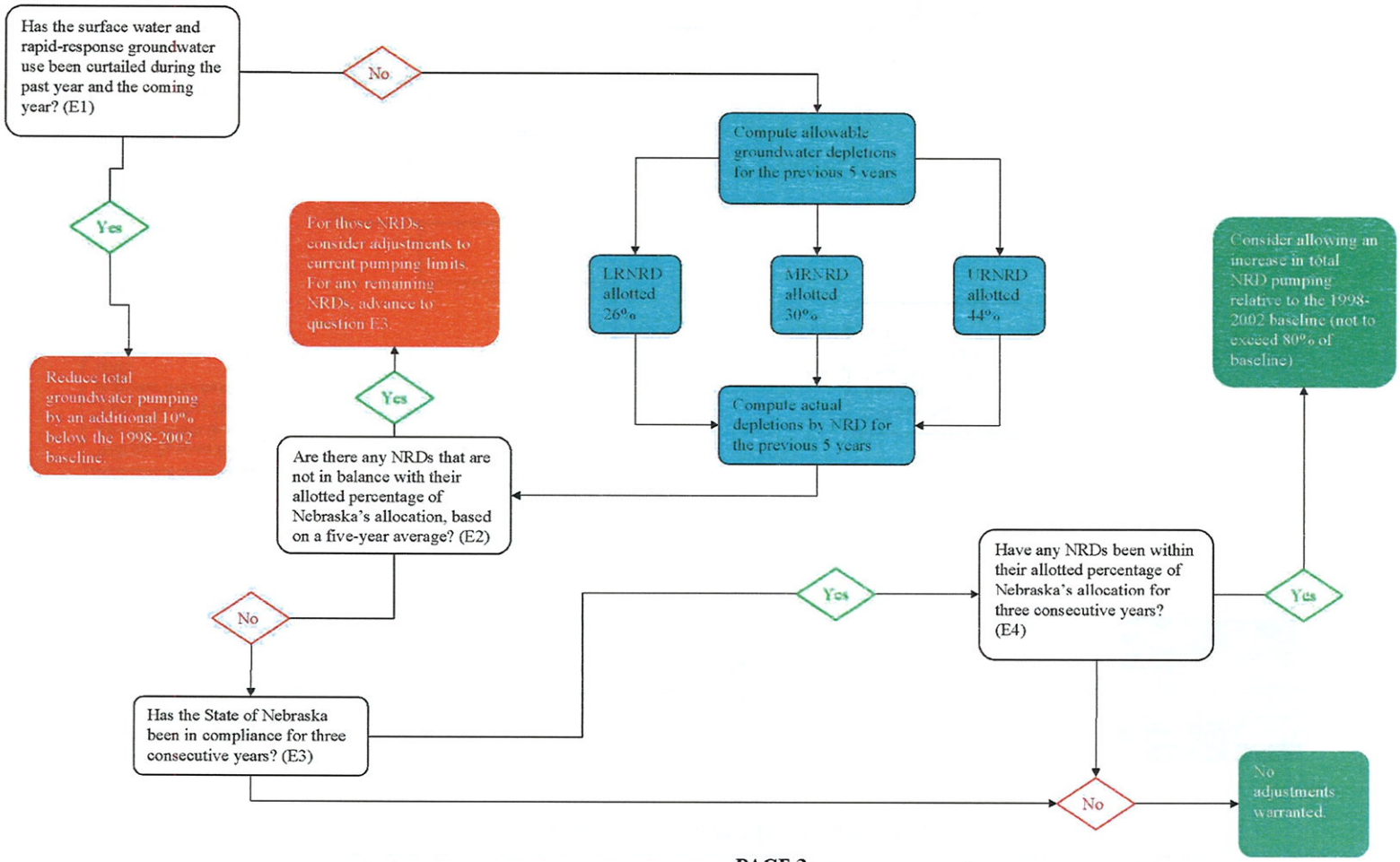
Republican River Water Supply Evaluation and Required Actions—Option 2

Additional adjustments related to long-term trends—Checklist E



October 6, 2009

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Option 2
Republican River Water Supply Evaluation and Required Actions

A. Water Short Year Test.

1) Is the January projection for that year's irrigation supply less than 119 kAF?
   a. Yes. Proceed to Checklist B.
   b. No. Proceed to Checklist C.

B. Water Short Year Checklist.

1) Is the previous year's balance[1] above Guide Rock (Table 3C[2]) sufficient to offset the dry year forecast for next year's balance above Guide Rock minus 10 kAF?
   a. Yes. Proceed to Checklist D.
   b. No. Advance to question 2.

   Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -5 kAF. Last year would not be sufficient to offset the forecast for next year minus 10 kAF (No).

2) Are augmentation deliveries and/or surface water supply contracts in place to offset the combined balance of last year's balance above Guide Rock and next year's forecast above Guide Rock minus 10 kAF?
   a. Yes. Proceed to Checklist D.
   b. No. Curtail surface water and 10% - 5 year rapid-response area groundwater use for the next year and proceed to Checklist E.

   Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -15 kAF. If a contract for surface water supplies is in place that will provide 10 kAF, this would not be sufficient (No). If a contract for surface water supplies is in place that will provide 20 kAF, this would be just enough to pass this test (Yes).

3) Note: If it is beneficial to utilize the Alternative Water Short Year provisions from the FSS (the previous two years have a greater balance than last year alone), and
4) An Alternative Water Short Year Plan has been approved by the RRCA, then the previous two-year balance will be substituted for the previous year's balance in these questions.

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C. Early Warning System for Water Short Year Compliance.

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    a. Yes. Proceed to Checklist D.
    b. No. Advance to question 2.

    Example: The current year's December EOM is 300 kAF. The computed dry-year projection for next year would be 252 kAF (Yes).

2) Is the dry year forecast for next year's balance above Guide Rock greater than zero?
    a. Yes. Proceed to Checklist D.
    b. No. Advance to question 3.

3) Is the previous year's balance above Guide Rock sufficient to offset the dry year forecast for next year's balance above Guide Rock minus 10 kAF?
    a. Yes. Proceed to Checklist D.
    b. No. Advance to question 4.

    Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -5 kAF. Last year would not be sufficient to offset the forecast for next year minus 10 kAF (No).

4) Are augmentation deliveries and/or surface water supply contracts in place to offset the combined balance of last year's balance above Guide Rock and next year's forecast above Guide Rock minus 10 kAF?
    a. Yes. Proceed to Checklist D.
    b. No. Curtail surface water and 10% - 5 year rapid-response area groundwater use for the next year and proceed to Checklist E.

    Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -15 kAF. If a contract for surface water supplies is in place that will provide 10 kAF, this would not be sufficient (No). If a contract for surface water supplies is in place that will provide 20 kAF, this would be sufficient (Yes).

D. Normal Year Administration Checklist.

1) Will the forecast for next year result in a Table 3 average (5-year average) that is greater than 10 kAF?
   a. Yes. Proceed to Checklist E.
   b. No. Advance to question 2.

   Example: The annual balance for the last four years is 10 kAF, -15 kAF, 20 kAF, and 5 kAF. The forecast for next year is -5 kAF. The Table 3 average is 3 kAF (No). The annual balance for the last four years is 20 kAF, -5 kAF, 30 kAF, and 25 kAF. The forecast for next year is 5 kAF. The Table 3 average is 15 kAF (Yes).

2) Will the forecast for next year result in a Table 3 average that is greater than zero?
   a. Yes. Advance to question 4.
   b. No. Advance to question 3.

   Example: The annual balance for the last four years is -10 kAF, -15 kAF, 20 kAF, and 5 kAF. The forecast for next year is -5 kAF. The Table 3 average is -1 kAF (No). The annual balance for the last four years is 20 kAF, -5 kAF, 30 kAF, and 25 kAF. The forecast for next year is 5 kAF. The Table 3 average is 15 kAF (Yes).

3) Are augmentation deliveries and/or surface water supply contracts in place to ensure a Table 3 average that is greater than zero, based on forecasted conditions for the coming year?
   a. Yes. Advance to question 4.
   b. No. Curtail surface water and 10% - 5 year rapid-response area groundwater use and proceed to Checklist E.

   Example: The annual balance for the last four years is -10 kAF, -25 kAF, 20 kAF, and 5 kAF. The forecast for next year is -5 kAF. If no augmentation supplies and/or surface water contracts were in place, the Table 3 average would be -3 kAF (No). If augmentation supplies and/or surface water contracts could supply 20 kAF, the Table 3 average would be 1 kAF (Yes).

4) Is the average of the most recent four years in forecasted Table 3 (most recent three years plus the forecast for the coming year) greater than zero?
   a. Yes. Proceed to Checklist E.
   b. No. Curtail surface water and 10% - 5 year rapid-response area groundwater use and proceed to Checklist E.

E. Additional adjustments related to long-term trends.

1) Was surface water and rapid-response groundwater curtailed this past year, and will it again be curtailed during the coming year (two consecutive years)?
    a. Yes. Reduce total groundwater pumping by an additional 10% below the 1998-2002 baseline.
    b. No. Advance to question 2.

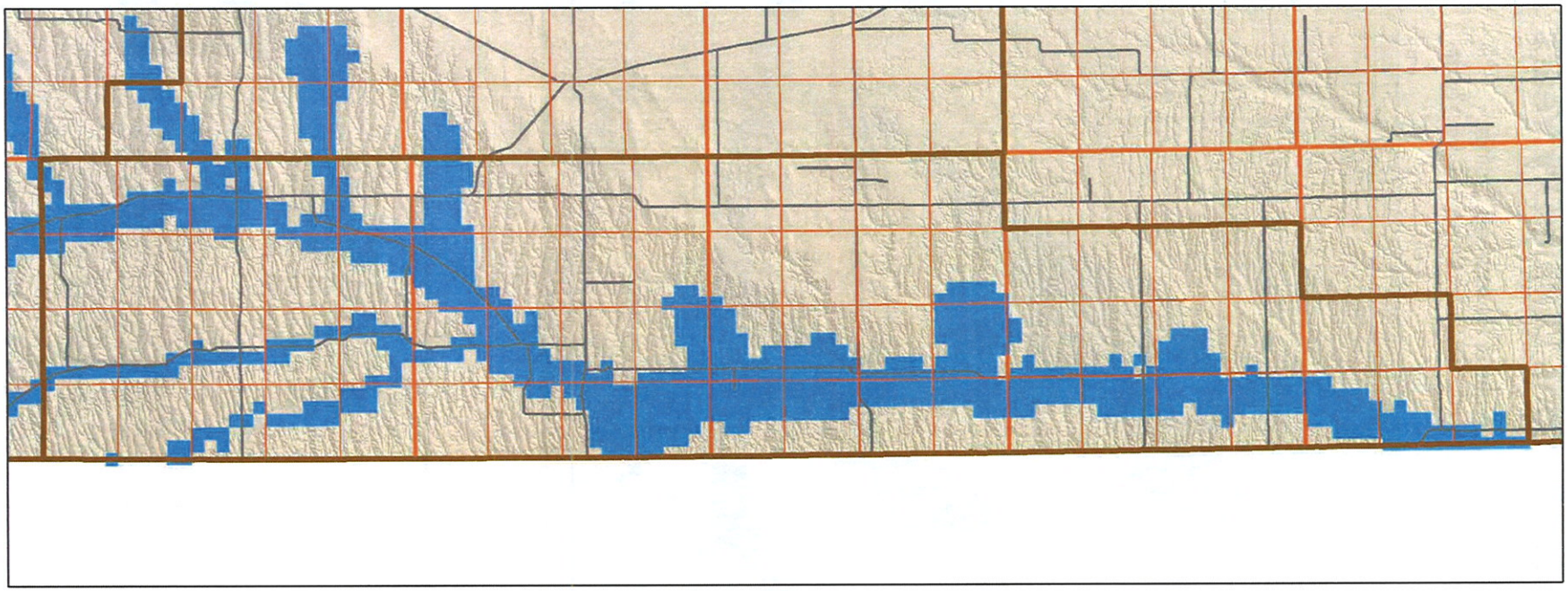
2) Are there any NRDs that are not in balance with their allotted percentage of Nebraska's allocation, based on a five-year average?
    a. Yes. For those NRDs, consider adjustments to current pumping limits. For any remaining NRDs, advance to question 3.
    b. No. Advance to question 3.

3) Has the State of Nebraska been in compliance for three consecutive years?
    a. Yes. Advance to question 4.
    b. No. No pumping increase is warranted.

4) Have any NRDs been within their allotted percentage of Nebraska's allocation for three consecutive years?
    a. Yes. For any NRD that has been within its allotted percentage of Nebraska's allocation for three consecutive years, consider allowing an increase in total NRD pumping relative to the 1998-2002 baseline (not to exceed 80% of baseline).
    b. No. No pumping increase is warranted.

Compliance Options During Dry Years

Lower Republican Natural Resources District
A Rapid Response Area With 10% Depletion in Five Years



Legend

- NRD Boundaries
- Townships
- Highways
- Stream Depletion of 10% in 5 Years
- County Boundaries

N

0 5 10 20 30 40 Miles

Draft Version October 8, 2009
This map is a graphical depiction of groundwater model results and other analyses. The information is not final, and is for discussion purposes only.

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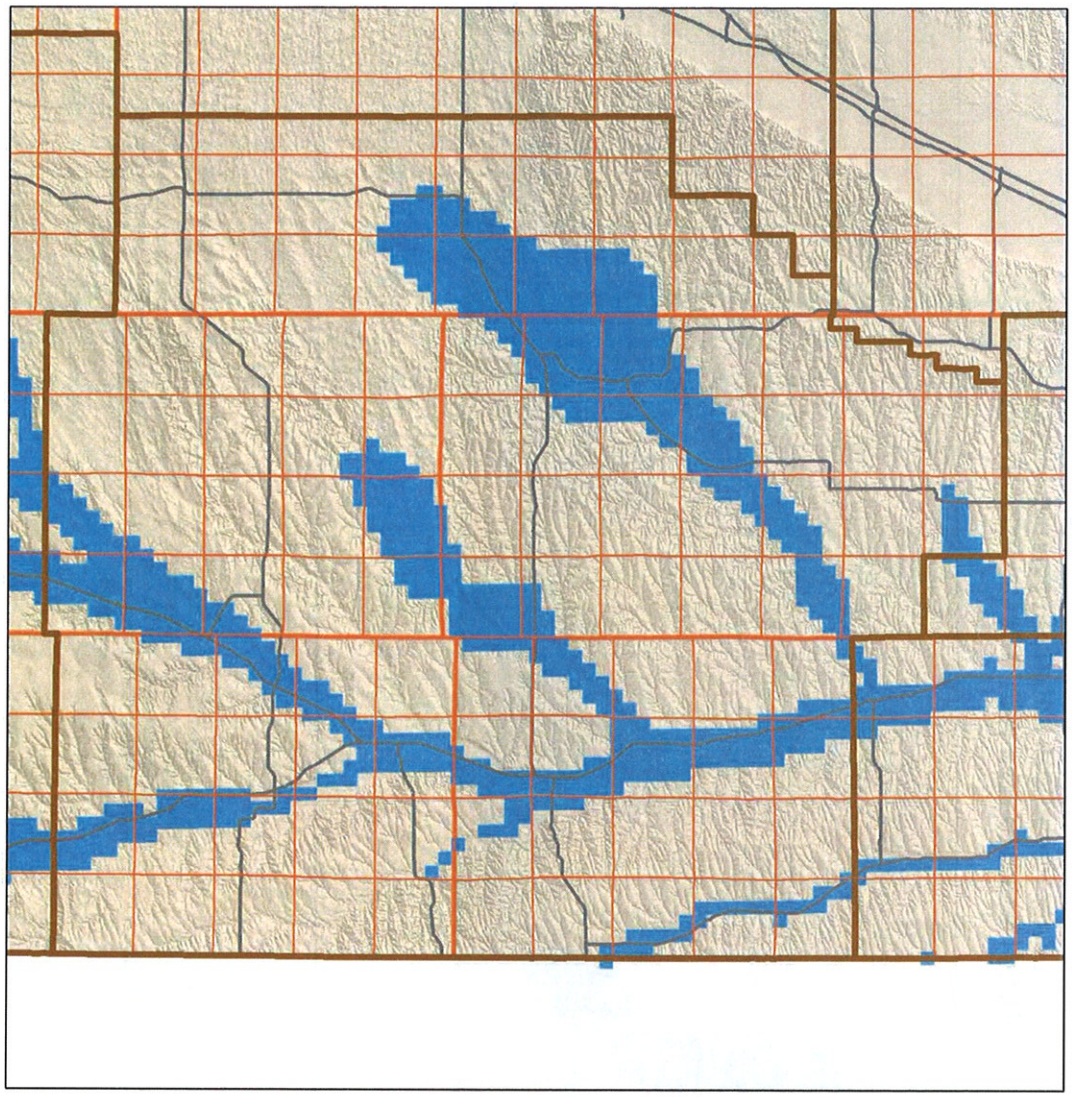
Compliance Options During Dry Years

Middle Republican Natural Resources District
A Rapid Response Area With 10% Depletion in Five Years



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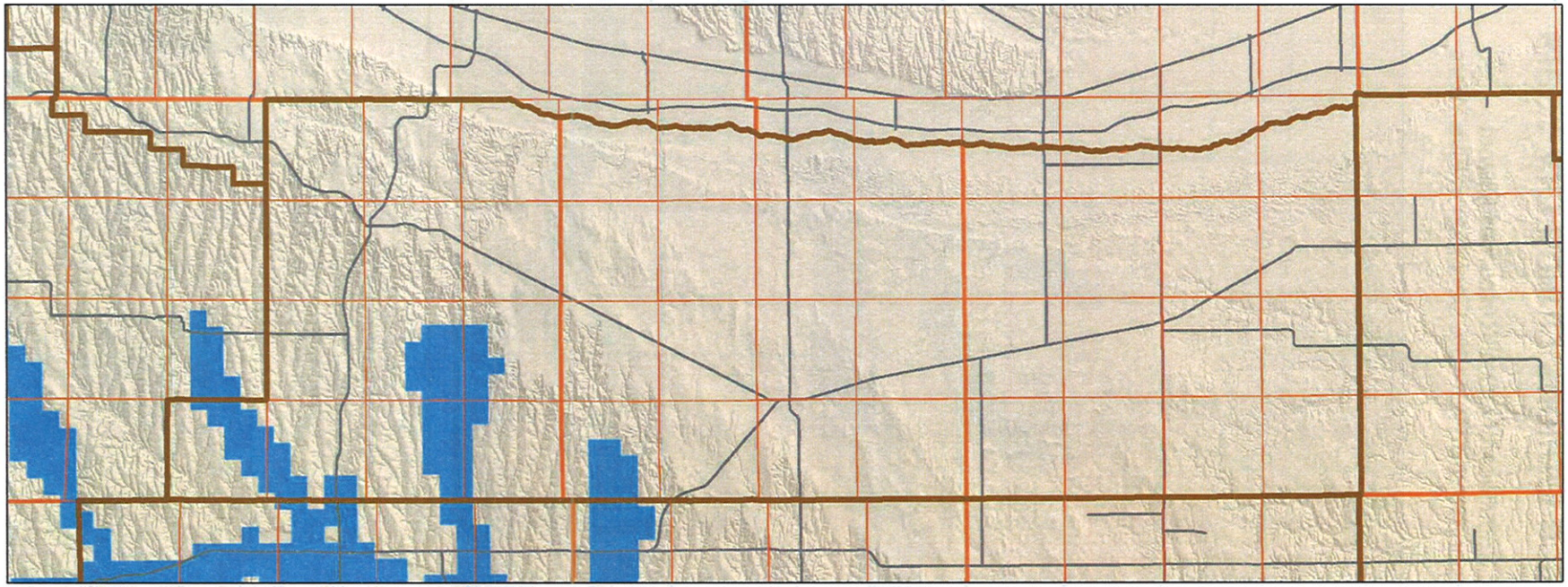
Compliance Options During Dry Years

Tri-Basin Natural Resources District

A Rapid Response Area With 10% Depletion in Five Years



Legend

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- Highways
- Stream Depletion of 10% in 5 Years
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N

0 4 8 16 24 32 Miles

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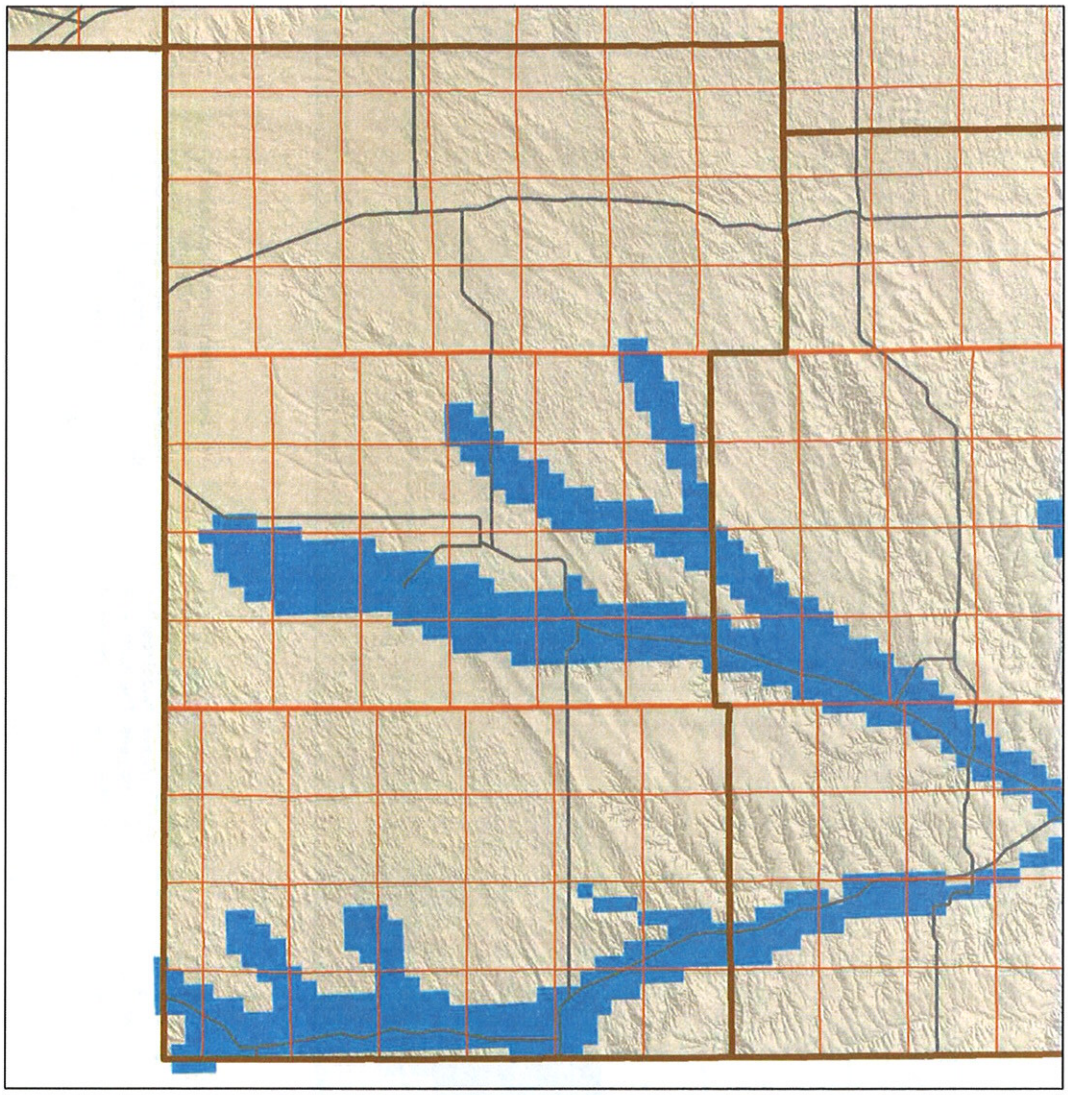
Compliance Options During Dry Years

Upper Republican Natural Resources District
A Rapid Response Area With 10% Depletion in Five Years



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Legend

- NRD Boundaries
- Townships
- Highways
- Stream Depletion of 10% in 5 Years
- County Boundaries

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0 3.75 7.5 15 22.5 30 Miles

NE0176062

TAB 3

OPTION 3

Option 3: When needed, curtail groundwater use in the 10%/2yr area and surface water use.

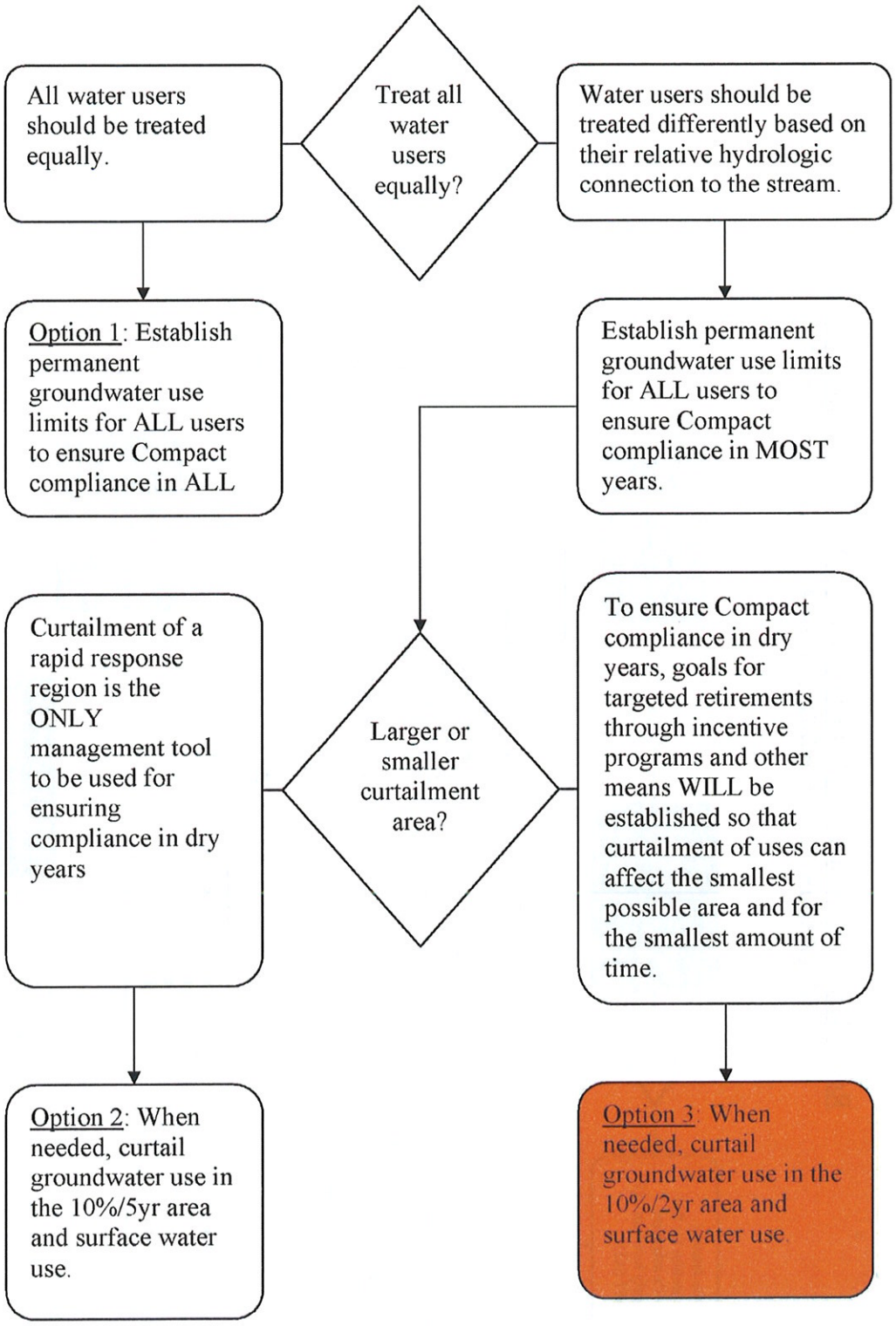
Required Management Objectives:

1. Provide for a one percent (1%) reduction in pumping over the life of the current IMPs using a combination of regulation and supplemental programs
2. When needed, as outlined in the following flowcharts and checklists, curtail groundwater pumping in a 10% - 2 year rapid response area.
3. When needed, as outlined in the following flowcharts and checklists, curtail surface water users to ensure Compact compliance in dry years.

Acres affected by 10% - 2 Year Rapid Response Area:

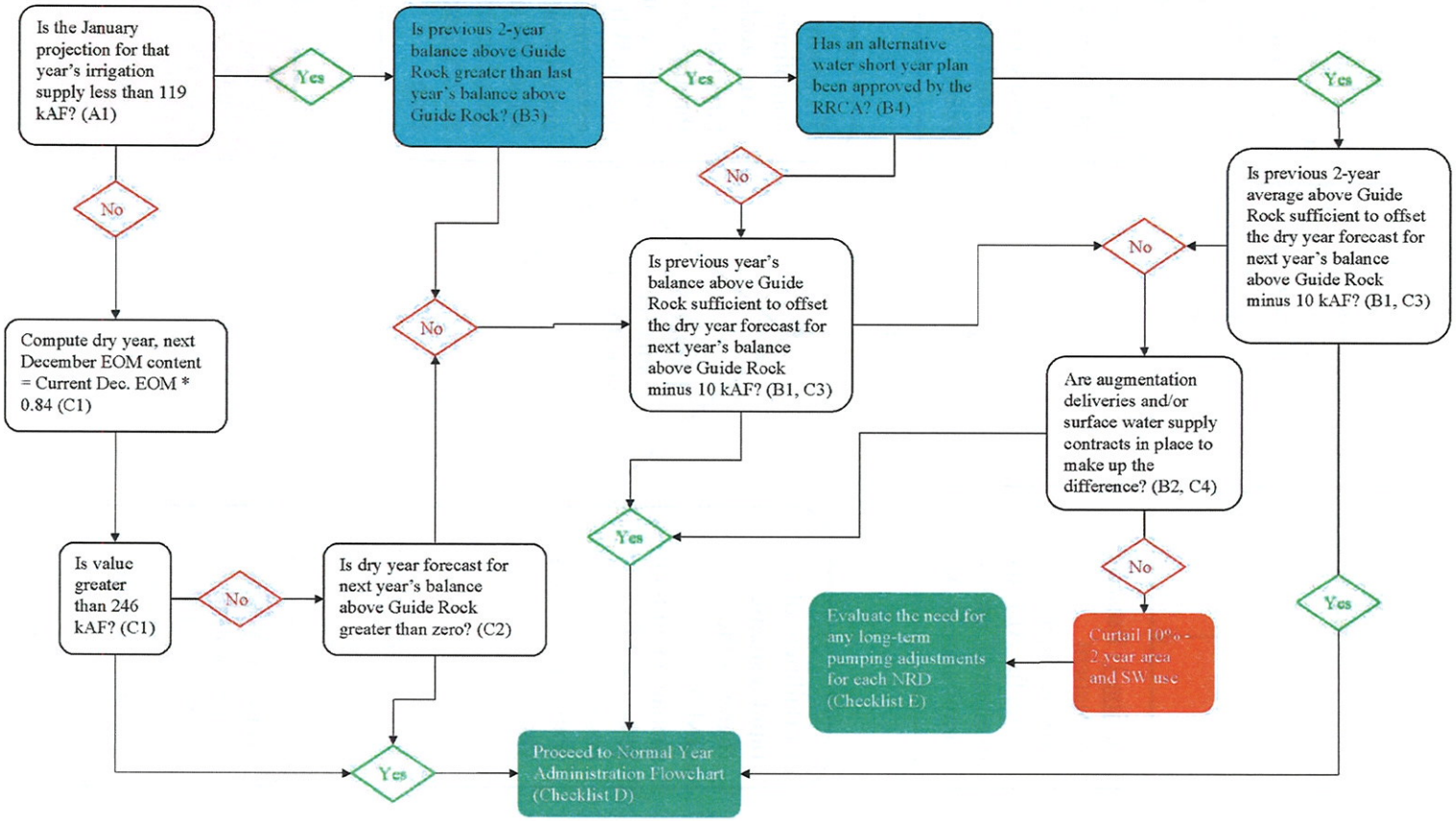
	10% - 2 Year Rapid Response Area (Acres)
LOWER REPUBLICAN	45,800
MIDDLE REPUBLICAN	37,300
TRI BASIN	4,200
UPPER REPUBLICAN	22,700
TOTAL	110,000

Compliance Options During Dry Years



Republican River Water Supply Evaluation and Required Actions—Option 3

Water Short Year Administration—Checklists A, B, and C



October 6, 2009

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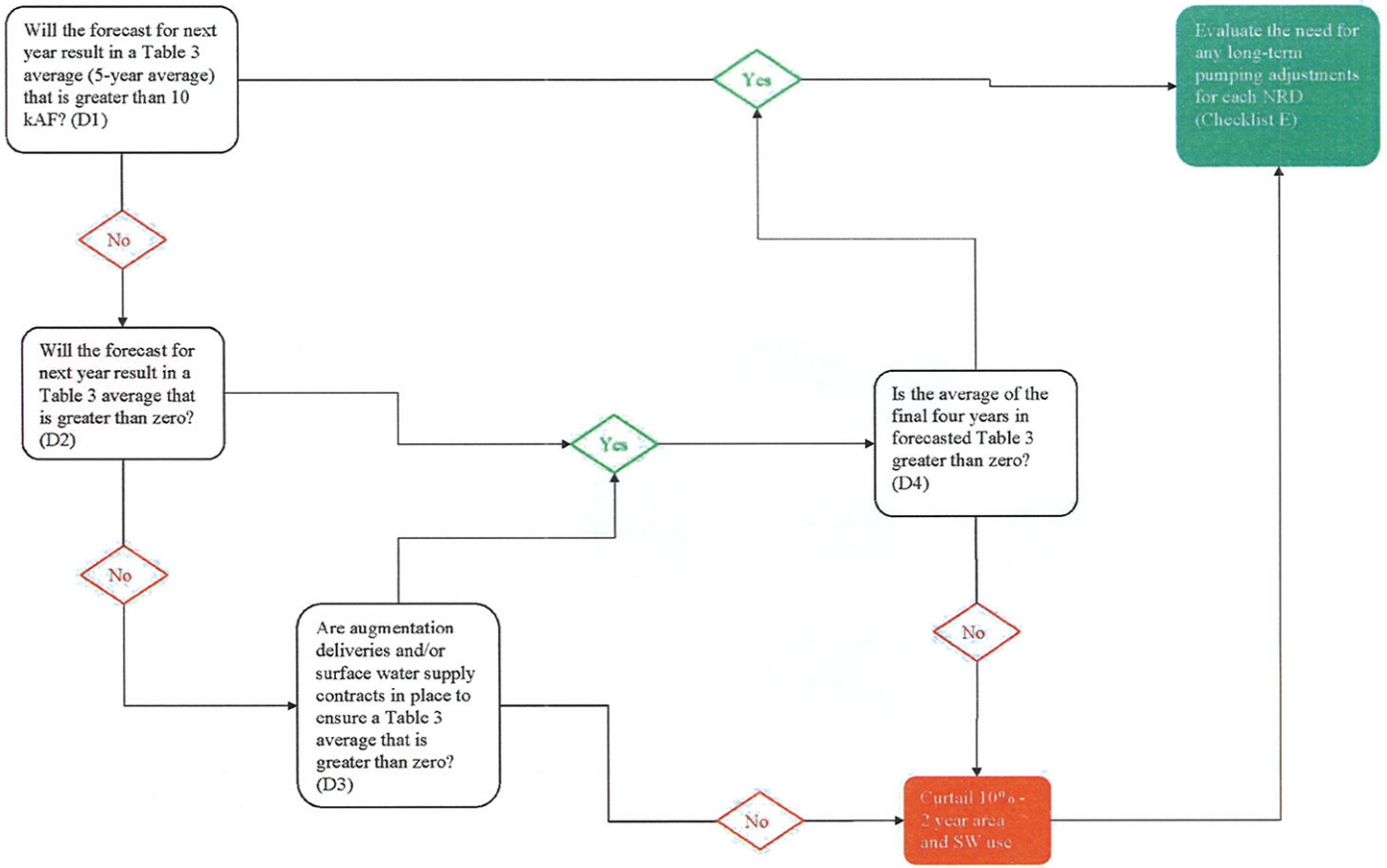
Republican River Water Supply Evaluation and Required Actions—Option 3

Normal Year Administration—Checklist D



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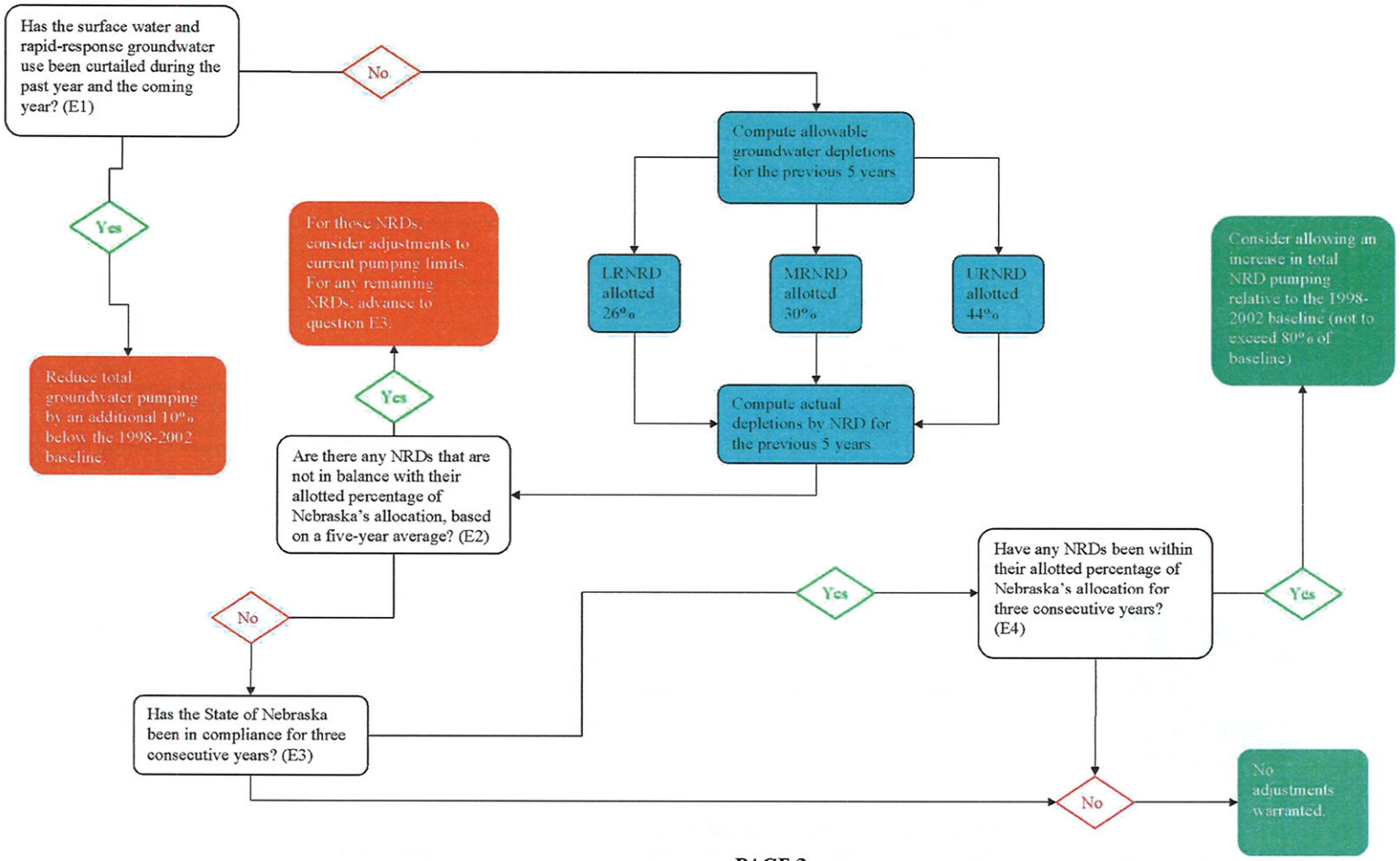
Republican River Water Supply Evaluation and Required Actions—Option 3

Additional adjustments related to long-term trends—Checklist E



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Option 3
Republican River Water Supply Evaluation and Required Actions

A. Water Short Year Test.

1) Is the January projection for that year's irrigation supply less than 119 kAF?
   a. Yes. Proceed to Checklist B.
   b. No. Proceed to Checklist C.

B. Water Short Year Checklist.

1) Is the previous year's balance[1] above Guide Rock (Table 3C[2]) sufficient to offset the dry year forecast for next year's balance above Guide Rock minus 10 kAF?
   a. Yes. Proceed to Checklist D.
   b. No. Advance to question 2.

   Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -5 kAF. Last year would not be sufficient to offset the forecast for next year minus 10 kAF (No).

2) Are augmentation deliveries and/or surface water supply contracts in place to offset the combined balance of last year's balance above Guide Rock and next year's forecast above Guide Rock minus 10 kAF?
   a. Yes. Proceed to Checklist D.
   b. No. Curtail surface water and 10% - 2 year rapid-response area groundwater use for the next year and proceed to Checklist E.

   Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -15 kAF. If a contract for surface water supplies is in place that will provide 10 kAF, this would not be sufficient (No). If a contract for surface water supplies is in place that will provide 20 kAF, this would be just enough to pass this test (Yes).

3) Note: If it is beneficial to utilize the Alternative Water Short Year provisions from the FSS (the previous two years have a greater balance than last year alone), and
4) An Alternative Water Short Year Plan has been approved by the RRCA, then the previous two-year balance will be substituted for the previous year's balance in these questions.

---

[1] The term "balance" is used in this document to refer to the state's allocation and imported water supply credit, less its consumptive use during a single year.
[2] Table numbers refer to tables in the Republican River Compact Administration accounting worksheet, based on current accounting procedures.

C. Early Warning System for Water Short Year Compliance.

1) When Harlan County Lake declines from one year to the next, the December end-of-month (EOM) content is generally about 84% of what it was last year. A December EOM of 246 kAF provides a high level of confidence that the year will not be water short. Based on the current year's Harlan County Lake December EOM content, compute a dry-year projection for next year based on this relationship. Is the value greater than 246 kAF?
    a. Yes. Proceed to Checklist D.
    b. No. Advance to question 2.

    Example: The current year's December EOM is 300 kAF. The computed dry-year projection for next year would be 252 kAF (Yes).

2) Is the dry year forecast for next year's balance above Guide Rock greater than zero?
    a. Yes. Proceed to Checklist D.
    b. No. Advance to question 3.

3) Is the previous year's balance above Guide Rock sufficient to offset the dry year forecast for next year's balance above Guide Rock minus 10 kAF?
    a. Yes. Proceed to Checklist D.
    b. No. Advance to question 4.

    Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -5 kAF. Last year would not be sufficient to offset the forecast for next year minus 10 kAF (No).

4) Are augmentation deliveries and/or surface water supply contracts in place to offset the combined balance of last year's balance above Guide Rock and next year's forecast above Guide Rock minus 10 kAF?
    a. Yes. Proceed to Checklist D.
    b. No. Curtail surface water and 10% - 2 year rapid-response area groundwater use for the next year and proceed to Checklist E.

    Example: Last year's balance above Guide Rock is 5 kAF. The forecast for next year is -15 kAF. If a contract for surface water supplies is in place that will provide 10 kAF, this would not be sufficient (No). If a contract for surface water supplies is in place that will provide 20 kAF, this would be sufficient (Yes).

D. Normal Year Administration Checklist.

1) Will the forecast for next year result in a Table 3 average (5-year average) that is greater than 10 kAF?
   a. Yes. Proceed to Checklist E.
   b. No. Advance to question 2.

   Example: The annual balance for the last four years is 10 kAF, -15 kAF, 20 kAF, and 5 kAF. The forecast for next year is -5 kAF. The Table 3 average is 3 kAF (No). The annual balance for the last four years is 20 kAF, -5 kAF, 30 kAF, and 25 kAF. The forecast for next year is 5 kAF. The Table 3 average is 15 kAF (Yes).

2) Will the forecast for next year result in a Table 3 average that is greater than zero?
   a. Yes. Advance to question 4.
   b. No. Advance to question 3.

   Example: The annual balance for the last four years is -10 kAF, -15 kAF, 20 kAF, and 5 kAF. The forecast for next year is -5 kAF. The Table 3 average is -1 kAF (No). The annual balance for the last four years is 20 kAF, -5 kAF, 30 kAF, and 25 kAF. The forecast for next year is 5 kAF. The Table 3 average is 15 kAF (Yes).

3) Are augmentation deliveries and/or surface water supply contracts in place to ensure a Table 3 average that is greater than zero, based on forecasted conditions for the coming year?
   a. Yes. Advance to question 4.
   b. No. Curtail surface water and 10% - 2 year rapid-response area groundwater use and proceed to Checklist E.

   Example: The annual balance for the last four years is -10 kAF, -25 kAF, 20 kAF, and 5 kAF. The forecast for next year is -5 kAF. If no augmentation supplies and/or surface water contracts were in place, the Table 3 average would be -3 kAF (No). If augmentation supplies and/or surface water contracts could supply 20 kAF, the Table 3 average would be 1 kAF (Yes).

4) Is the average of the most recent four years in forecasted Table 3 (most recent three years plus the forecast for the coming year) greater than zero?
   a. Yes. Proceed to Checklist E.
   b. No. Curtail surface water and 10% - 2 year rapid-response area groundwater use and proceed to Checklist E.

E. Additional adjustments related to long-term trends.

1) Was surface water and rapid-response groundwater curtailed this past year, and will it again be curtailed during the coming year (two consecutive years)?
    a. Yes. Reduce total groundwater pumping by an additional 10% below the 1998-2002 baseline.
    b. No. Advance to question 2.

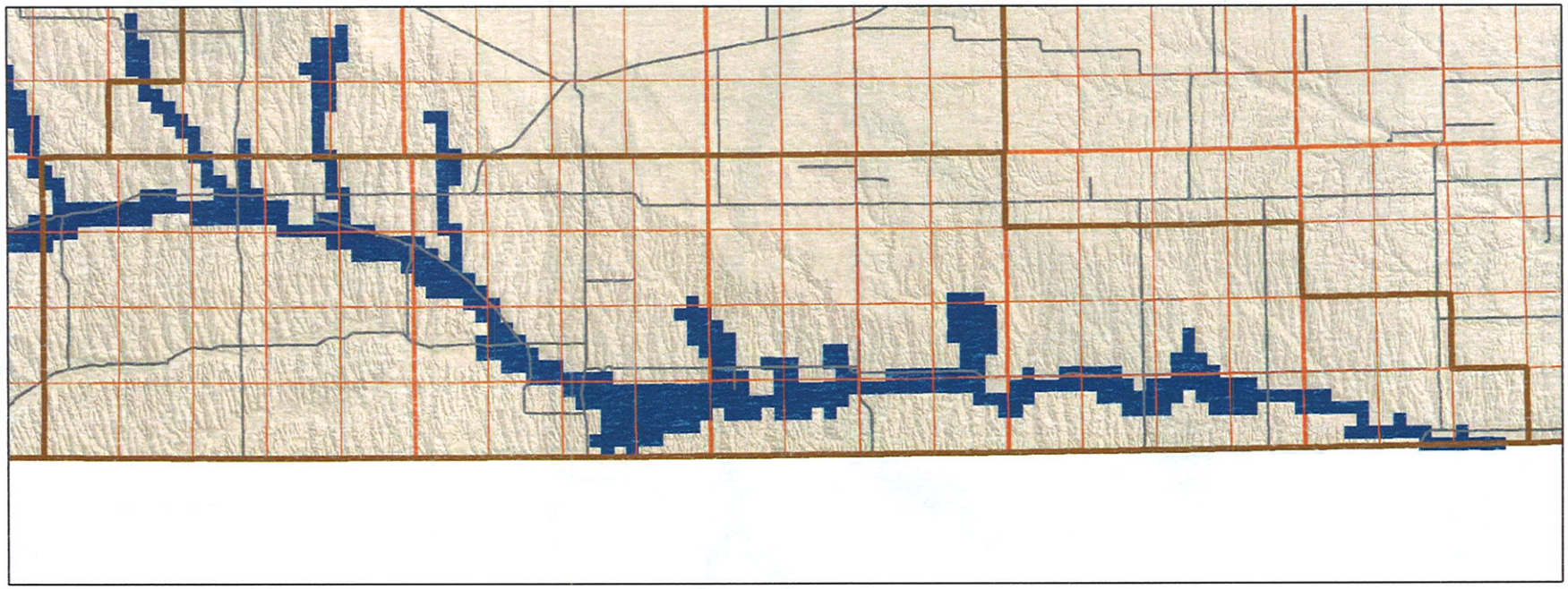
2) Are there any NRDs that are not in balance with their allotted percentage of Nebraska's allocation, based on a five-year average?
    a. Yes. For those NRDs, consider adjustments to current pumping limits. For any remaining NRDs, advance to question 3.
    b. No. Advance to question 3.

3) Has the State of Nebraska been in compliance for three consecutive years?
    a. Yes. Advance to question 4.
    b. No. No pumping increase is warranted.

4) Have any NRDs been within their allotted percentage of Nebraska's allocation for three consecutive years?
    a. Yes. For any NRD that has been within its allotted percentage of Nebraska's allocation for three consecutive years, consider allowing an increase in total NRD pumping relative to the 1998-2002 baseline (not to exceed 80% of baseline).
    b. No. No pumping increase is warranted.

Compliance Options During Dry Years

Lower Republican Natural Resources District
A Rapid Response Area With 10% Depletion in Two Years



Legend

- NRD Boundaries
- Townships
- Highways
- Stream Depletion of 10% in 2 Years
- County Boundaries

N

0 5 10 20 30 40 Miles

Draft Version October 8, 2009
This map is a graphical depiction of groundwater model results and other analyses. The information is not final, and is for discussion purposes only.

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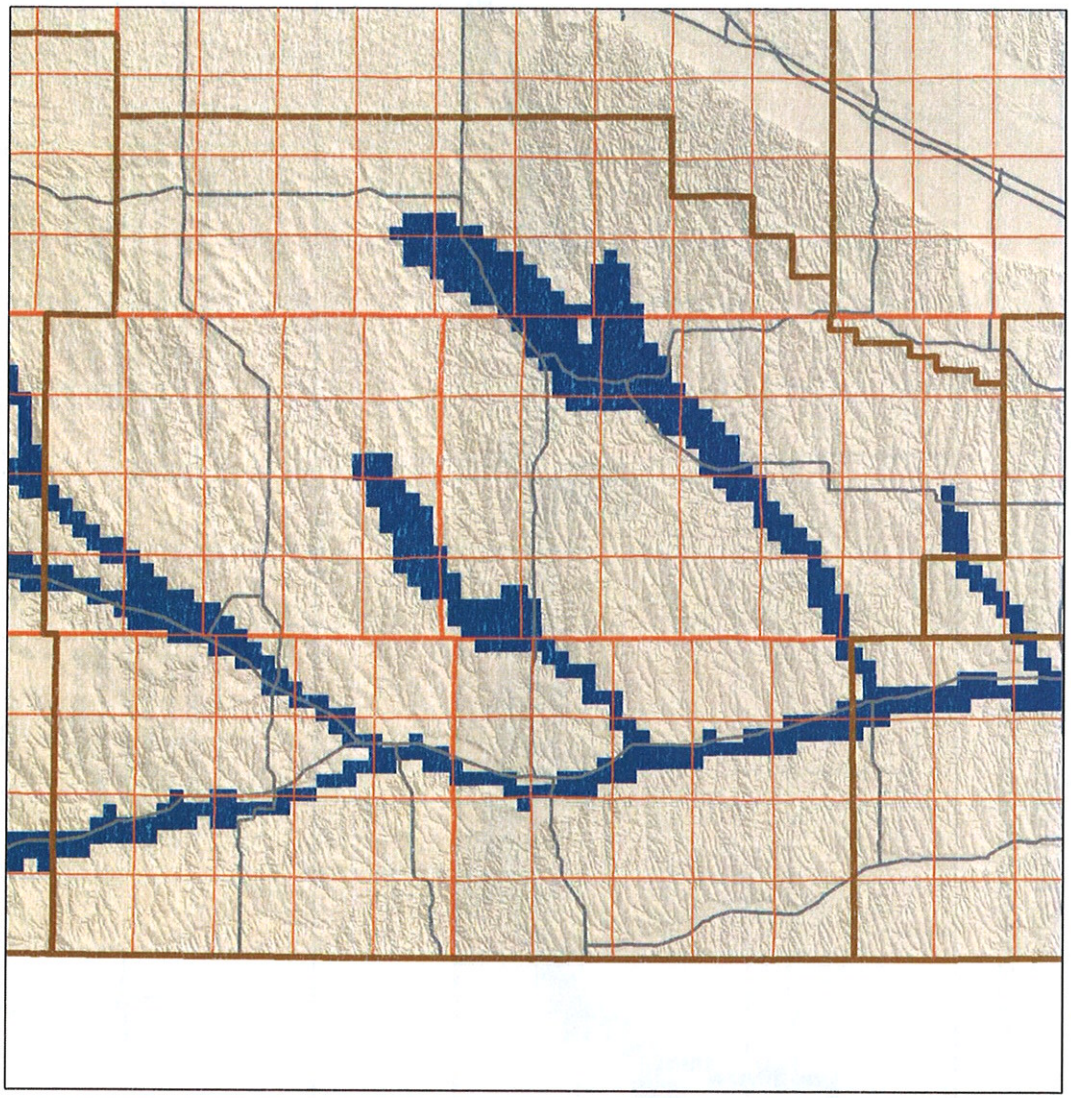
NE0176073

Compliance Options During Dry Years

Middle Republican Natural Resources District
A Rapid Response Area With 10% Depletion in Two Years



N

Draft Version October 8, 2009
This map is a graphical depiction of groundwater model results and other analyses. The information is not final, and is for discussion purposes only.

Legend

- NRD Boundaries
- Townships
- Highways
- Stream Depletion of 10% in 2 Years
- County Boundaries

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NEBRASKA
Department of Natural Resources

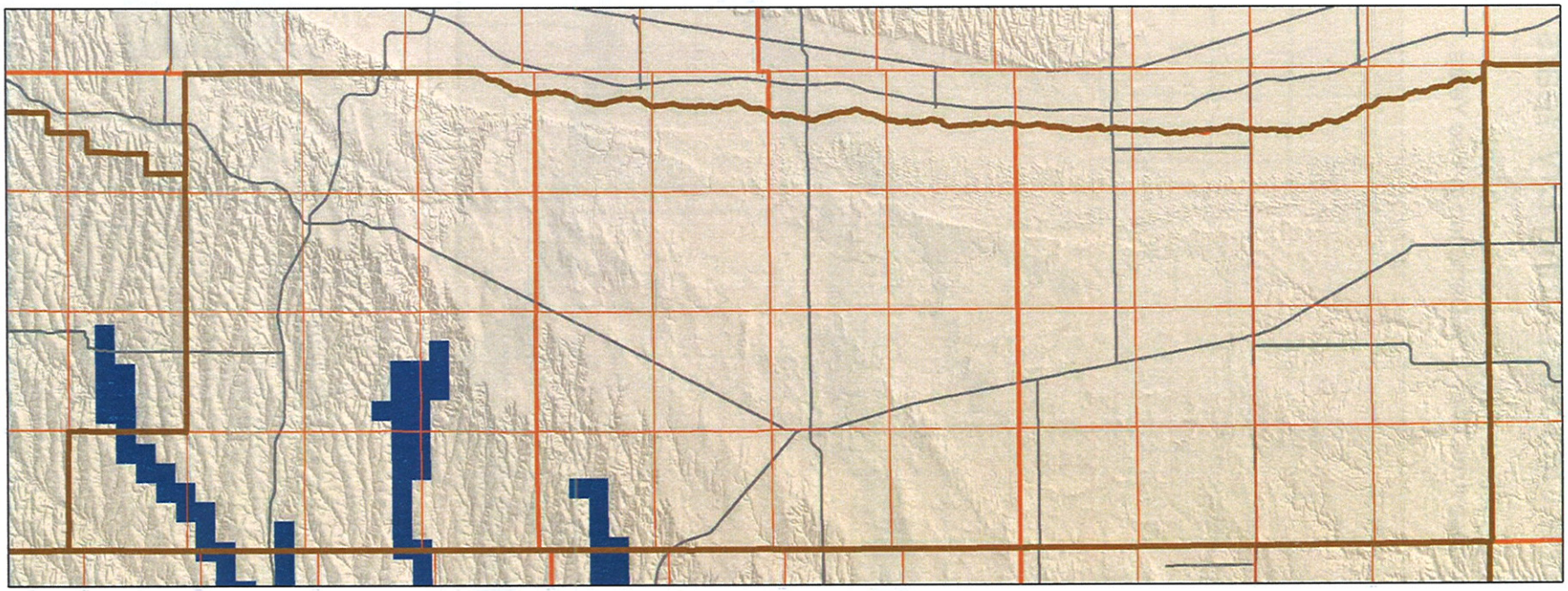
0 4 8 16 24 32 Miles

NE0176074

Compliance Options During Dry Years

Tri-Basin Natural Resources District

A Rapid Response Area With 10% Depletion in Two Years



Legend

- NRD Boundaries
- Townships
- Highways
- Stream Depletion of 10% in 2 Years
- County Boundaries

N

0 3.5 7 14 21 28 Miles

Draft Version October 8, 2009
This map is a graphical depiction of groundwater model results and other analyses. The information is not final, and is for discussion purposes only.

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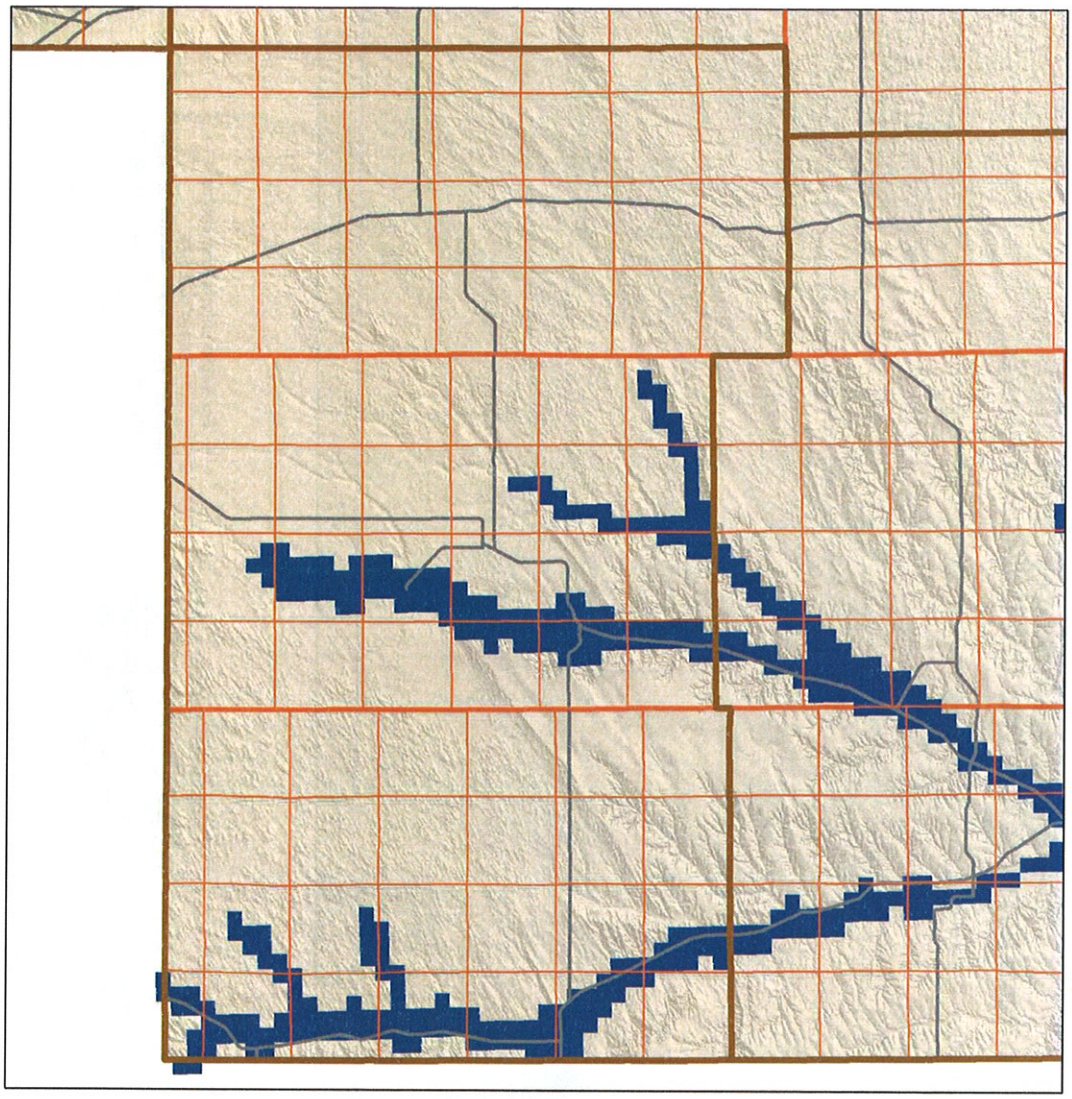
Compliance Options During Dry Years

Upper Republican Natural Resources District
A Rapid Response Area With 10% Depletion in Two Years



N

Draft Version October 8, 2009
This map is a graphical depiction of groundwater model results and other analyses. The information is not final, and is for discussion purposes only.

Legend

- NRD Boundaries
- Townships
- Highways
- Stream Depletion of 10% in 2 Years
- County Boundaries

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0 3.75 7.5 15 22.5 30
Miles

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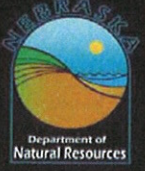
TAB 4

POWERPOINT PRESENTATION

Compliance Options During Dry Years

Integrated Management Planning
in the Republican River Basin



Overview

- Background
- Nebraska's integrated management plans (IMPs)
- Dry year considerations
- Dry Year Options
- Summary

Background—Arbitration

- Damages for non-compliance in 2005-2006
  - Kansas was not successful at proving damages and was awarded nominal damages of $10,000
- Accounting issues
  - Nebraska presented several accounting issues
  - Generally, these were not resolved in the arbitration
  - Nebraska is committed to ensuring the accounting is accurate and will continue to pursue these issues

Background—Arbitration (cont.)

- Future Compliance
  - Kansas demanded that Nebraska permanently shut down 515,000 irrigated acres
  - Nebraska argued that the current IMPs were adequate to ensure compliance with the Compact during average and wet years, and any shortfall in dry years could be made up with other tools (e.g., dry year leasing)
  - Arbitrator concluded that the Kansas remedy was not needed, but that Nebraska underestimated potential future shortfalls in dry years, and that a specific plan was needed to address this

Background—Purpose

- Nebraska's integrated management plans (IMPs) are adequate during most years
- Overall streamflow depletion limits for all years are in place in the IMPs
- Use of the annual forecast and specific actions to be taken in the event of a dry year are not spelled out
- The State of Nebraska has publicly stated that it is in the process of working with the natural resources districts (NRDs) to put additional details in the IMPs that address dry periods

Background—Timeline

- Public announcements—August and November 2008
- Discussion with NRD managers—Fall 2008
- Arbitration – October 2008 through April 2009
- Compliance meetings with boards—May and July 2009
- Managers' meeting—July 2009
- Board meetings—August 2009
- Public meeting—September 2009
- Maps and Public Discussion—October 2009

Compact Compliance

- Normal Year Administration (NYA)
  - 5-year average
  - Above Hardy
- Water Short Year Administration (WSYA)
  - 2-year average
  - Above Guide Rock
  - 3-year average (alternative)

Compliance Comments

- Nebraska's water supply increases and decreases with wet and dry cycles (primarily related to changes in gaged streamflow)
- Our water use is generally constant
- On average, use needs to be less than supply

Nebraska's IMPs

- Two overall requirements
  - Overall pumping limitations
  - Groundwater depletions in each NRD must not exceed the NRD's share of the state's allowable groundwater depletions

Nebraska's IMPs (cont.)

- Pumping limitations are designed to keep Nebraska in compliance during average and wet years with no further action required
- During dry years, additional actions may be required to maintain compliance with the IMPs and the Compact
  - Surface water leasing
  - Augmentation
  - Regulatory controls

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Dry year challenges

- Compact accounting is after the fact
- Water short year determination is made half way through year two of the two year averaging
- Very good years can drop off and change the 5-year average very quickly
- Surface water supplies and/or augmentation deliveries may not be available when they are needed

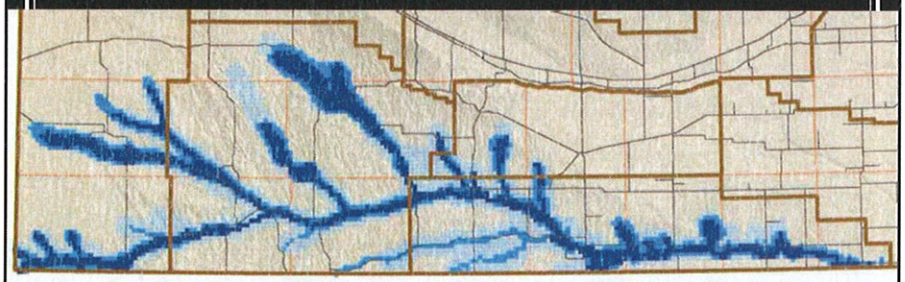
Dry year solutions

- Strengthening our forward-looking monitoring system
- Developing additional decision points to ensure that Nebraska is maintaining an adequate balance to stay in compliance during a dry year
- Working to put the needed surface water contracts and augmentation systems in place
- Implementing the necessary regulations when needed, but only as a measure of last resort

Three Dry Year Options

- Establish permanent groundwater use limits for ALL users to ensure Compact compliance in ALL years.
- Curtail pumping in larger Rapid Response Region when necessary
- Curtail pumping in smaller Rapid Response Region when necessary, and set goals of reducing overall pumping

Rapid Response Regions Map



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Option 1: Set Pumping Volumes to Fit Dry Year Conditions

- Treat All Groundwater Users Equally
  - Establish permanent groundwater use limits for ALL users to ensure Compact compliance in ALL years.
- Required Initial Management
  - Reduce allocations to 40% of baseline.
- Required Management in Dry Years
  - Curtail surface water use.

Option 2: SW and GW Curtailment in 10% - 5 Year Area

- Some groundwater users would be required to cease pumping during some years
- Required Initial Management
  - Overall pumping volume targets remain at 80% of baseline.
- Required Management in Dry Years
  - When necessary, curtail surface water use and groundwater use in the 10% - 5 year Rapid Response Region.
- Adjust pumping volume targets as necessary.

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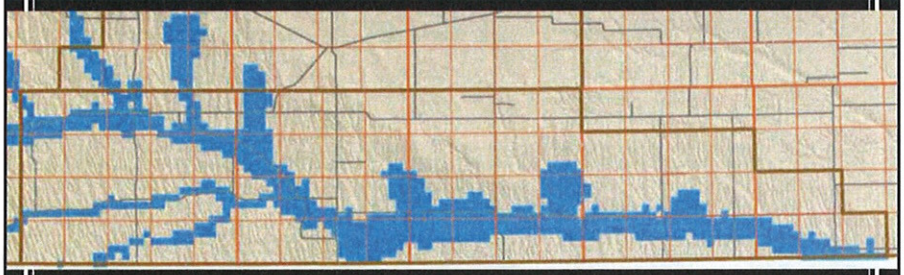
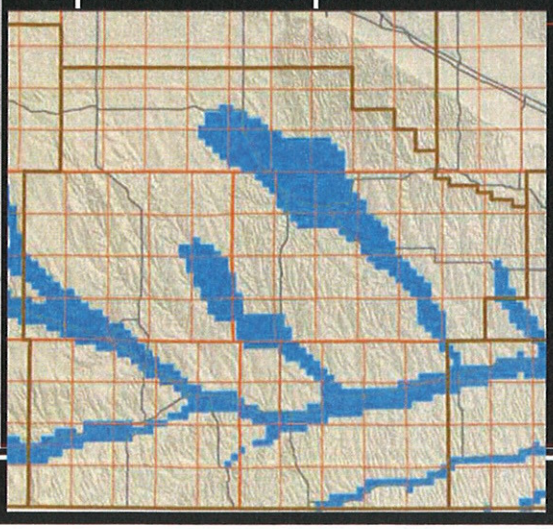
Option 2 Map: LRNRD



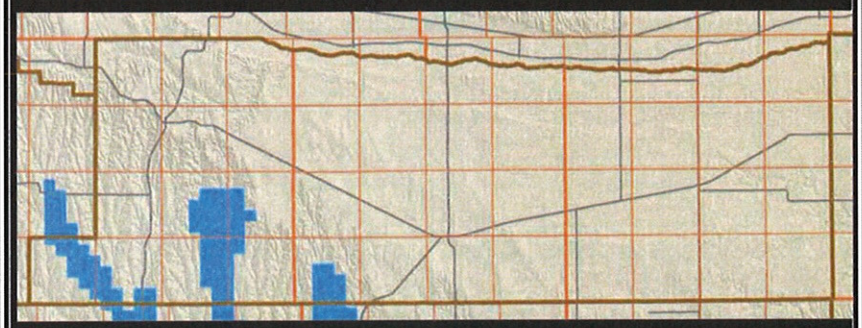
Affected acres in LRNRD = 76,900 based on 2007 irrigated acres
(CREP area in LRNRD is approximately 107,000 acres)

Option 2 Map: MRNRD



Affected acres in MRNRD = 59,100 based on 2007 irrigated acres (CREP area in MRNRD is approximately 81,000 acres)

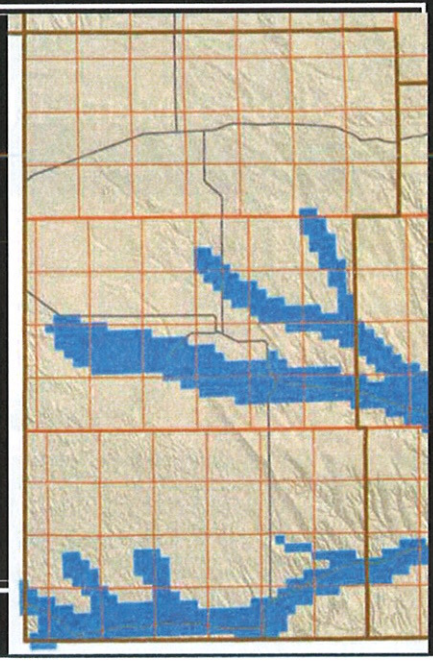
Option 2 Map: TBNRD



Affected acres in TBNRD = 9,600 based on 2007 irrigated acres
(CREP area in TBNRD is approximately 19,100 acres)

Option 2 Map: URNRD

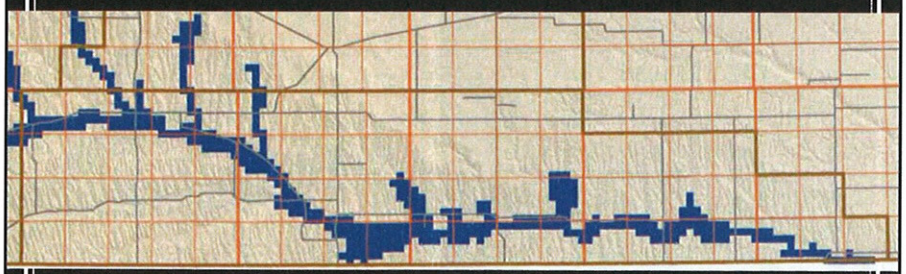
Affected acres in URNRD = 44,500 based on 2007 irrigated acres (CREP area in URNRD is approximately 49,000 acres)



Option 3: SW and GW Curtailment in 10% - 2 Year Area

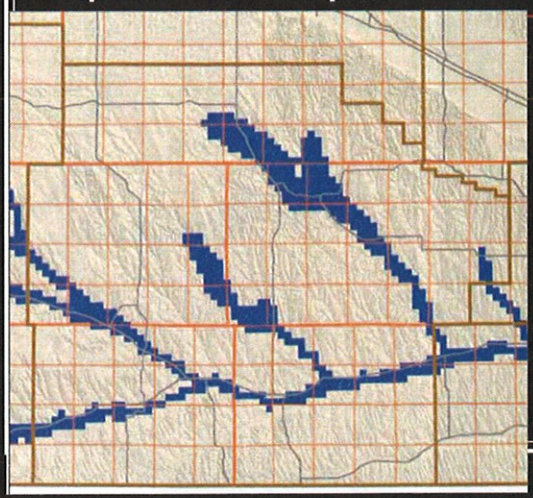
- Some groundwater users would be required to cease pumping during some years
- Required Initial Management
  - Overall pumping volume targets starting at 80% of baseline.
  - Overall pumping reductions of about 1% per year.
  - Expected to occur mostly through incentive-based programs
- Required Management in Dry Years
  - When necessary, curtail surface water use and groundwater use in the 10% - 2 year Rapid Response Region.
- Make additional adjustments to pumping volume targets as necessary.

Option 3 Map: LRNRD



Affected acres in LRNRD = 45,800 based on 2007 irrigated acres
(CREP area in LRNRD is approximately 107,000 acres)

Option 3 Map: MRNRD



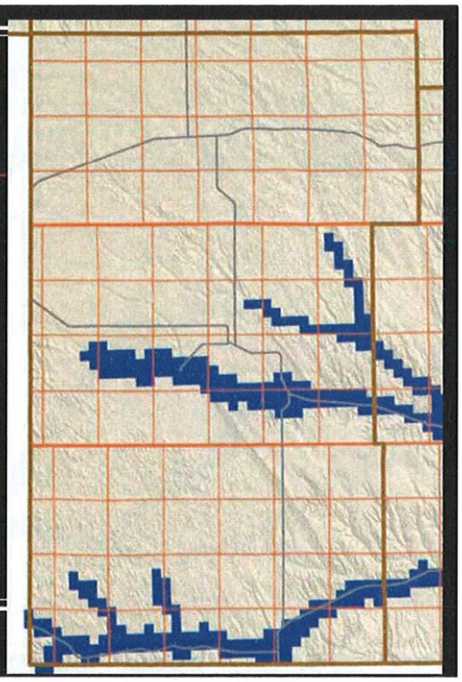
Affected acres in MRNRD = 37,300 based on 2007 irrigated acres (CREP area in MRNRD is approximately 81,000 acres)

Option 3 Map: TBNRD

Affected acres in TBNRD = 4,200 based on 2007 irrigated acres (CREP area in TBNRD is approximately 19,100 acres)

Option 3 Map: URNRD

Affected acres in URNRD = 22,700 based on 2007 irrigated acres
(CREP area in URNRD is approximately 49,000 acres)



Summary

- Vegetation management, augmentation, surface water contracts, and other options should remain a priority for dry-year compliance
- In the absence of funding, regulatory controls must be imposed when needed
- Three options for dry year compliance have been described in this presentation

Timeline for IMP Modification

- Board meetings—October 2009
- Public meetings—October-November 2009
- Annual forecast meeting—December 2009
- Adoption Process—beginning in December 2009

Timeline for IMP Modification

We must have a decision on the option selected by December 2009 – the State of Nebraska must be able to demonstrate its intent and ability to comply with the Compact

Questions?

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Nebraska Department of Natural Resources

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TAB 5

NEBRASKA DEPARTMENT OF NATURAL RESOURCES
QUARTERLY NEWSLETTER

Nebraska Resources Newsletter

Published Quarterly by the Nebraska Department of Natural Resources
301 Centennial Mall / P.O. Box 94676 / Lincoln, NE 68509-4676

Inside this Issue:

Issue 32, August 2009

Agency Numbers to Remember

Agency address:
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Agency fax number:
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http://www.dnr.ne.gov

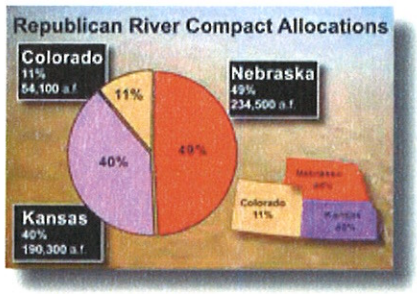
Editor's Note:
A full color electronic version of this newsletter can be found on the Department's web site along with back issues at **http://www.dnr.gov/dnrnews/newsarchive2.html.**

Republican River Arbitration and Litigation Summary

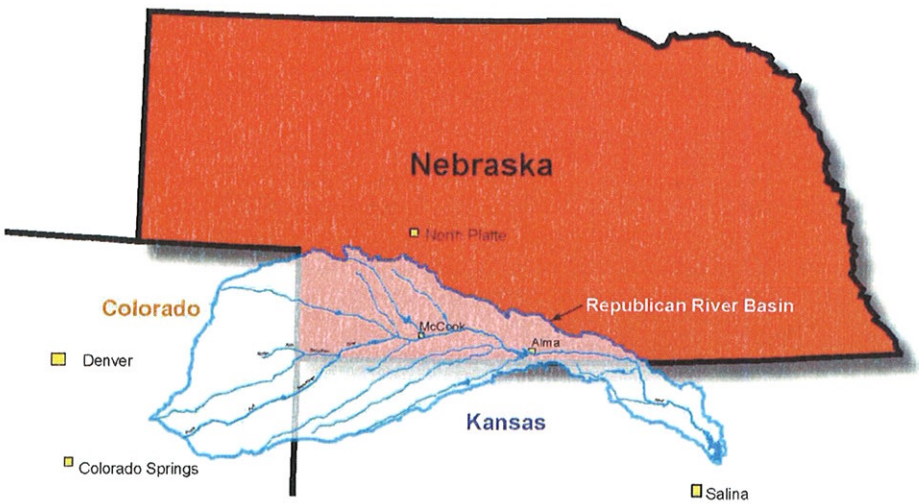
By James Williams

The states of **Colorado, Kansas, and Nebraska** recently completed non-binding arbitration on a number of issues related to the Republican River Compact. Kansas's primary concerns regarded damages due to overuse of water in Nebraska, and Nebraska's compliance in the future. Nebraska was concerned about a number of accounting issues. The arbitrator's decision on Legal Issues was provided on January 22, 2009, and his final decision was provided June 30, 2009.

Background



The **Republican River Compact** was adopted by the legislatures in Kansas, Nebraska, and Colorado in 1942 but was vetoed by President Roosevelt because no federal negotiator participated in the process. A federal representative was promptly appointed, a new compact was created and quickly adopted by the States and the United States Congress in 1943. The compact **established allocations of water** for use by the three states. While river depletions due to alluvial wells were included in compact accounting as early as 1959 Kansas expressed concern in the 1980s and early 1990s regarding non-alluvial wells and the potential river depletions due to these more distant wells. In 1998, Kansas filed an original action in the United States



Supreme Court against Nebraska regarding this and other issues. In December 2002, the three states signed the Final Settlement Stipulation (FSS) that **included all wells in and around the Republican River Basin and imported water in compact accounting**. In the FSS, the states agreed to a dispute resolution process that included non-binding arbitration prior to returning to the Supreme Court.

The timetable that was agreed to in the settlement specified that the first potential compliance period would be in 2006 *(if 2006 was designated a Water Short Year)*. Based on Nebraska's overuse, Kansas sent a demand letter to Nebraska in December 2007. **The letter included a request for damages totaling $72 million and a compliance plan that would have ceased irrigation on more than a half million acres in Nebraska.** Pursuant to the FSS, the states agreed to enter non-binding arbitration, which began in the fall of 2008.

Arbitration

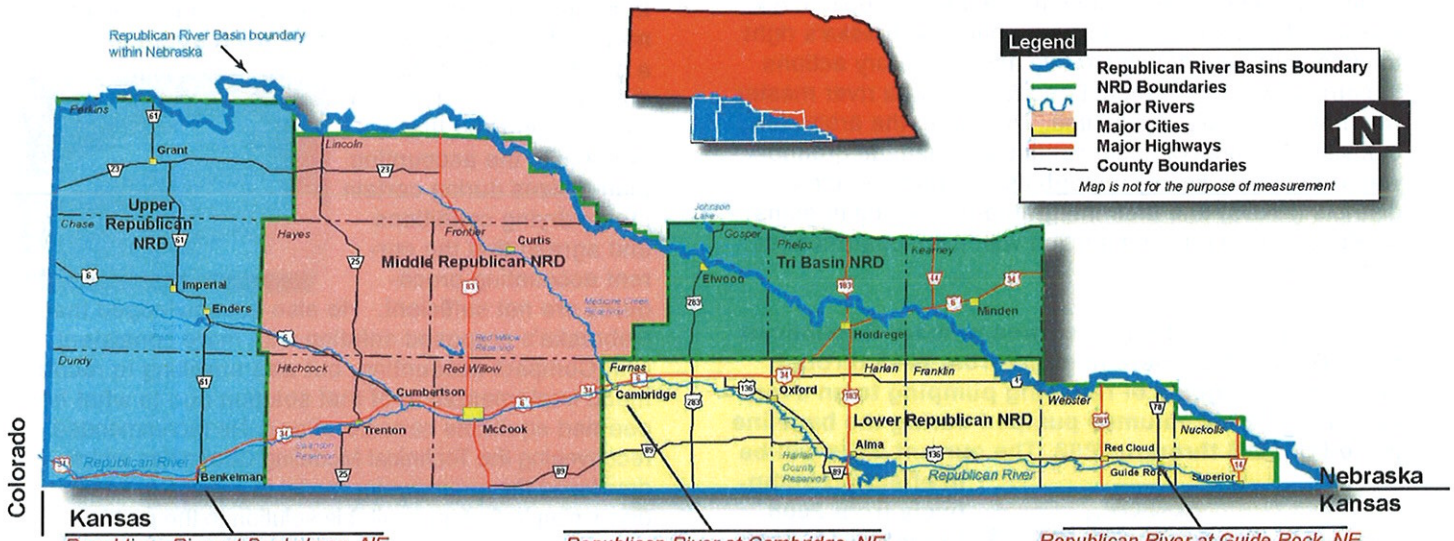
The three states chose to hire Karl Dreher as arbitrator. Mr. Dreher is the former director of the Idaho Department of Water Resources and has degrees in civil engineering.

The arbitration process included a discovery period, and a series of legal briefs, technical reports, and responses. A two-week hearing was held in Denver in March 2009, with an additional day in April for final testimony and closing arguments. After a summary brief was submitted by each of the three states, the arbitrator provided his decision on June 30, 2009.

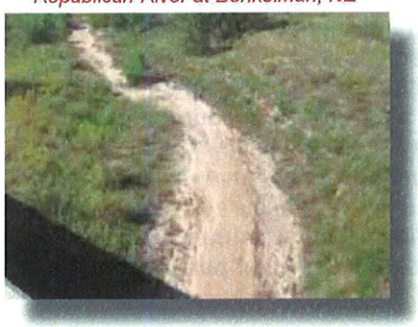
Damages

Kansas's original demand letter specified damages based on profits generated in Nebraska as a result of Nebraska's overuse of water. Early in the arbitration process, Nebraska argued and the arbitrator determined that damages should instead be based on actual damage suffered by Kansas due to lack of water for irrigation. Kansas presented evidence that the actual damages exceeded $9 million dollars. Nebraska presented

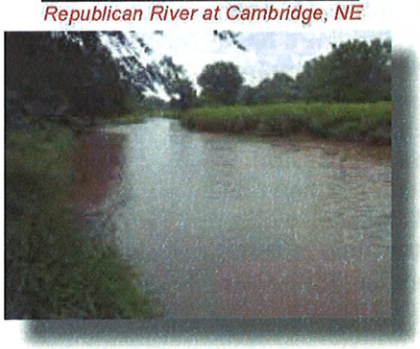
Republican River Basin Within Nebraska



Republican River at Benkelman, NE



Republican River at Cambridge, NE



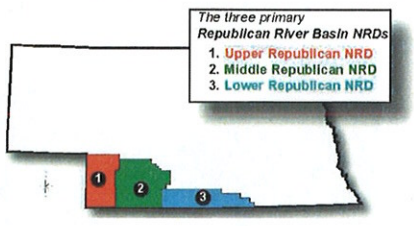
Republican River at Guide Rock, NE

evidence which illustrated that Kansas' damages would fall within a range of $0 to $1.2 million dollars. Colorado presented evidence estimating the damages at $2.3 million dollars. The arbitrator ultimately awarded $10,000 in nominal damages from Nebraska to Kansas on the basis that Kansas did not carry its burden of providing a reliable methodology for estimating actual losses incurred by Kansas. The arbitrator wrote that if Kansas could fix its flawed methodology in an additional arbitration or subsequent litigation, the final damages may be one to several million dollars.

Compliance

To ensure Nebraska's future compliance, Kansas had requested that Nebraska stop irrigating approximately 515,000 acres, scale back irrigated acreage added after 2000, and asked the arbitrator to recommend that a river master be appointed to oversee compliance. The arbitrator found that the remedy proposed by Kansas had not established that these actions needed to be applied. As a result, the arbitrator's decision upheld Nebraska's right to choose its own administrative and regulatory actions to comply with the Compact and found that a river master was not necessary at this time. Therefore, the arbitrator concluded Nebraska could continue to manage groundwater resources locally through its natural resources districts (NRDs) and their integrated management plans (IMPs) developed in conjunction with the Department of Natural Resources.

The original IMPs in the three primary Republican River Basin NRDs were in effect from 2005 through 2007, and had goals of reducing pumping to an average of 5% below volumes pumped during the baseline period of 1998 through 2002. The current IMPs will be in effect presumptively from 2008 though 2012. The revised IMPs have goals of reducing pumping by 20% compared with the baseline period. Given average rainfall, it is believed that this reduction in pumping will keep the state in compliance during the IMP period. In addition, the IMPs state that each NRD is to remain within its specified share of the state's overall allocation. While the arbitrator expressed concerns about the IMPs' abilities to deal with drought situations, Nebraska may make up shortfalls during dry years by leasing the rights to surface water, augmenting stream flow by pumping imported groundwater to the river, or employing a number of other methods. Even prior to the arbitrator's decision, the Department of Natural Resources performed an extensive review of additional measures which may be taken based on the annual forecast of allowable depletions, in the event any of the above options become infeasible. The Department will continue with these efforts.



The arbitrator made clear, however, that whatever measures Nebraska imposed would have to ensure Compact compliance and that, in his view, additional damages and injunctive relief would be warranted if Nebraska failed to comply in the future.

Accounting

Nebraska's primary issue seeks to address an error in the groundwater model accounting and determination of consumptive use and imported water supply. Fixing these errors will result in a **more accurate accounting of water in the Basin and result in an accounting benefit to Nebraska of approximately 10,000 acre feet per year on average**, with a greater benefit realized during dry years. The arbitrator recognized that a problem in the accounting materializes during certain steam drying conditions and agreed that the current accounting procedures are not sufficient. He also acknowledged that Nebraska's proposed solution was more consistent with Compact accounting, but was unwilling to recommend implementation of that solution due to what he deemed equitable considerations. He recommended reconvening the Technical Modeling Committee which developed the groundwater model to engage in further discussion to find an equitable solution to the problem.

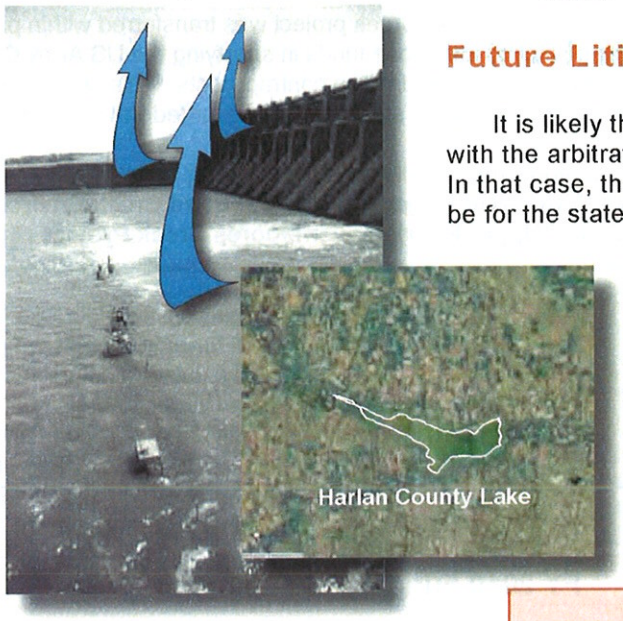
The remaining accounting issues addressed errors in the placement of certain groundwater model accounting points to match sub-basin definitions given in the FSS, as well as procedures for accounting water that flows through Haigler Canal. As with the primary accounting issue above, fixing these errors further enhances the accuracy of the accounting procedures and improves Nebraska's bottom line by approximately 2,000 acre-feet per year.

The arbitrator agreed that the groundwater model accounting point for the North Fork Republican should be moved to the state line between Colorado and Nebraska. While he did not agree that other groundwater accounting points should be moved, he did specify that water should not be counted twice, which occurs when it is measured by passing a stream gage, then again as a groundwater depletion after recharging the aquifer.

The arbitrator determined that he did not have enough information to recommend Nebraska's proposed modifications to accounting related to the Haigler Canal (also known as the Nebraska portion of the Pioneer Ditch).

Harlan County Lake Evaporation

Current Republican River accounting states that evaporation from Harlan County Lake is to be charged to Kansas and Nebraska in proportion to the volume used by the irrigation districts located in each state. In his January decision on legal matters, the arbitrator determined that the current accounting procedures should apply for 2006 accounting, but recommended that the charge for evaporation from Harlan County Lake should be renegotiated.



In his final decision, the arbitrator reversed his earlier legal opinion, and determined that Nebraska should be charged a portion of the 2006 Harlan County Lake evaporation. This issue was not discussed during the hearing, and Nebraska did not have an opportunity for rebuttal.

Future Issues for Arbitration

There are **two issues** that are likely to move forward for arbitration in the near future:

1. Colorado has proposed a plan to augment stream flow on the North Fork Republican River by pumping groundwater several miles north of the river and piping it to the river at the state line. Colorado has stated that it is going to request that the Republican River Compact Administration (RRCA) vote on the augmentation proposal. If rejected by the RRCA, it is likely that they will begin the dispute resolution process. Nebraska's concerns include protection of surface water users on the North Fork Republican River, the long-term depletion of ground water in the upper basin, and the effects on Republican River Compact accounting.

2. Nebraska requested the RRCA to consider whether a damage payment for a two-year period of noncompliance should result in a modification to the accounting to reflect that such payment mitigated any violation by making a state whole for that period. This "crediting issue" could apply in future two and five year compliance periods that overlap any noncompliance period where a damage payment has been made.

Future Litigation

It is likely that one or more states will be dissatisfied with the arbitrator's conclusions and recommendations. In that case, the recourse specified in the FSS would be for the states to seek leave to file a bill of complaint for an original action in the United States Supreme Court. If the Supreme Court accepts jurisdiction over one or more issues specified in the bill of complaint, the Supreme Court would nominate a special master to hear the issues and ultimately make recommendations to be adopted by the full court. The time frame for this litigation is unknown, but may take several years.

Republican River Basin

The **Republican River Basin** within Nebraska covers approximately one-eighth of Nebraska's land area. The water of the basin is shared with both Kansas, and Colorado. The Republican River enters Nebraska at the southwestern corner from Kansas and Colorado and flows eastward through Nebraska for about 215 miles before it reenters Kansas near Superior, Nebraska. Major tributaries of the Republican River include the Frenchman Creek, Driftwood Creek, Red Willow Creek, Medicine Creek, and Sappa Creek. The River's thirteen sub-basins within Nebraska fall over seventeen counties.

Within the Republican River Basin, there are approximately six million acres of agricultural land. Precipitation within the area varies between 17 and 25 inches per-year. A significant portion of the water resources of the Basin have been developed or controlled by storage reservoirs on the Republican or its tributaries. Among the reservoirs, the largest include Harlan County Dam, with a surface area of 12,577 acres; Enders Dam (surface area, 1,707 acres); Medicine Creek Dam (surface area, 1,768 acres); Red Willow Dam (surface area, 1,628 acres); and Trenton Dam (surface area, 4,974 acres).

Resources Development Fund Obligations for Fiscal Year 2010

By Kent Zimmerman

Work on approved **Nebraska Resources Development Fund** (NRDF) projects continued to progress more rapidly than the funding appropriations. As a result, the gap between project sponsors' current and projected reimbursable expenditures and available NRDF funds continued to widen. Requests for FY 2010 funding **totaled nearly $14 million**, compared against the **budget appropriation of $3,373,066** that the Commission had available to obligate. The sponsors worked in collaboration with DNR staff to reach a consensus for the FY 2010 funding recommendation.

At the meeting on May 14, the Commission took several actions related to the Resources Development Fund including the following:

- Allocation increases requested to cover cost overruns associated with increased construction and land costs were approved for **three projects** - Lake Wanahoo, Lower Turkey, and Western Sarpy/Clear Creek.
- Funding previously obligated to the Western Sarpy/Clear Creek project was transferred within project components to allow the sponsor (Papio-Missouri River NRD) to use those funds in satisfying the US Army Corps of Engineers requirement for "up front" payment of the local share of estimated contract costs. This project received approximately $9.36 million in American Reinvestment and Recovery Act stimulus funding for federal fiscal years 2009 and 2010.
- Obligations against the FY 2010 appropriation were as follows: **Maple Creek Recreation Area Project (Leigh Dam) - $656,978; Lower Turkey Creek Watershed Project - $436,002; Sand Creek Environmental Restoration Project (Lake Wanahoo) - $1,381,268; and Upper Prairie/Silver/Moores Creek Project - $898,752**.

Interrelated Water Management Plan Program

By Rex Gittins

At its May 14, 2009, meeting, the Nebraska Natural Resources Commission **awarded FY 2010 funding for sixteen projects** for the purpose of facilitating and funding the duties of natural resource districts arising under the Nebraska Ground Water Management and Protection Act. Awards included funding for **13 new projects** and for **continuing three previously approved** multi-year studies. **This program helps offset costs incurred by natural resources districts in research and implementation of interrelated water management plans and actions.**

FY 2010 Funding Summary

Project Number	Project Name	FY 2010 Funding	Lead Sponsor
18	Water Management Simulation & Optimization Analysis	$ 90,240	NPNRD
19	Recharge Estimation Across the Central Platte River Basin	$180,000	CPNRD
30	Republican River Augmentation Engineering Study	$220,500	URNRD
31	Characterization of Near Surface Lithologies under Selected Irrigation Canals	$466,338	NPNRD
32	Western Water Use Model	$169,200	NPNRD
33	Conjunctive Water Use Model of the Upper Niobrara River Basin	$ 48,000	UNWNRD
34	Development of a Conjunctive Water Management Plan for the Platte Valley	$170,000	CPNRD
35	Dedicated Observation Well and Geologic Data Network	$ 50,700	LBNRD
36	Elkhorn Loup Modeling Study Phase III	$289,166	LLNRD
37	Eastern Nebraska Water Resources Assessment 1(Study)	$169,500	LPNNRD
39	Republican River Basin Water Balance Study	$ 55,000	LRNRD
40	Aquifer Study	$ 50,000	LCNRD
41	Measuring Components of the Hydrologic Water Budget on Different Landscapes	$ 97,000	CPNRD
42	Water Accounting GIS	$ 96,000	SPNRD
43	Platte River Riparian Evaportranspiration Comparison	$ 67,900	CPNRD
	Total	**$2,219,544**	

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NE0176099

TAB 6

NEBRASKA COMPLIANCE REPORT

NEBRASKA COMPACT COMPLIANCE

BY:

JAMES SCHNEIDER

JAMES WILLIAMS

February 17, 2009

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I. INTRODUCTION

This report summarizes Nebraska's efforts to ensure compliance with the Republican River Compact (Compact) through the integrated management process. Our primary conclusions are set forth in Section IV, which shows that under normal conditions, *and even under the assumptions used by Kansas in support of its proposed compliance plan*, Nebraska's existing Integrated Management Plans (IMP) will ensure Compact compliance during the presumptive life of those IMPs (*i.e.*, through 2012). We are aware of nothing that compels Nebraska to prove today that its existing IMPs will ensure compliance with the Compact for the next 50 years as Kansas suggests. The current IMPs will be reevaluated at least on a five year basis (and as often as necessary) to ensure they are effective and that the regulatory tools being employed to achieve their objectives are working. Attempting to predict both the likely hydrology and the regulatory mechanisms that may be in place well beyond the life of the current IMPs is not realistic. Moreover, as explained in Section VI, if Kansas' proposed compliance plan were imposed on Nebraska today to guard against projected shortfalls *over the next 50 years*, Kansas would receive approximately 1,700,000 acre feet more water than she is entitled to over this period, fundamentally altering the States' allocations under the Compact.

II. DISTRIBUTION OF WATER MANAGEMENT RESPONSIBILITIES IN NEBRASKA.

Nebraska historically has managed the use of ground water and surface water under separate regimes. Surface water use has been regulated by the Department of Natural Resources (the "Department" or "NDNR") generally pursuant to the doctrine of prior appropriation. Ground water rights have been managed by Nebraska's 23 Natural Resource Districts (NRDs) against a Nebraska variation of the American Rule of reasonable use as modified by the doctrine of correlative rights.

More recently, ground water that is hydrologically connected to surface water has been managed jointly by *both* state and local authorities to protect long-term streamflow for the benefit of surface water appropriators, groundwater wells dependant on recharge from streamflow, and to ensure compliance with interstate obligations, including the Compact. The need to address interconnected waters came to the fore upon the passage of LB 108 in 1996,

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execution of the Final Settlement Stipulation ("FSS") in 2002, and the ensuing passage of broad legislation in 2004 ("LB 962"). That legislation significantly revised a number of provisions regarding water management in the State to address the unique challenges presented by hydrologically connected waters.

A critical component of LB 962, building on the foundation laid in LB 108, was its requirement for IMPs within areas of the State determined to be fully or over appropriated. Because the Republican River Basin is one such area, IMPs and complementary rules and regulations implemented by the NRDs and NDNR are in place to govern the use of hydrologically connected waters in that Basin. These IMPs represent a blueprint for sustainable water management in the Basin and facilitate Nebraska's Compact compliance.

A. Respective roles of the Department and the NRDs.

The Department is authorized to supervise and control the appropriation, diversion, and distribution of public waters. The Department has exclusive original jurisdiction to hear and adjudicate all matters pertaining to surface water rights. The Department ensures that the waters of natural streams are not wasted and that prior appropriators are protected against subsequent appropriators. With limited exception, groundwater as defined in Nebraska has included all subterranean flows of surface streams, which were governed by the ground water regime rather than the surface water regime. The Nebraska Groundwater Management and Protection Act creates a statutory framework for managing ground water issues in the state founded on a principle of local control administered through NRDs, with oversight authority in the Department. Every NRD is required to prepare a ground water management plan, which must be approved by the Department. The Act also allows the NRD to designate all or a portion of the district as a ground water management area to address ground water declines. Such a designation gives the NRD additional authority to regulate ground water use for quality and quantity issues.[1] Notably, NRDs may issue cease and desist orders to, collect penalties from, and

[1] NRDs can exercise the following control mechanisms: (1) allocating the amount of ground water that may be withdrawn by ground water users, (2) implementing a system for rotating ground water use, (3) adopting more restrictive well-spacing requirements, (4) requiring well meters to measure ground water use, (5) mandating reductions in irrigated acres, (6) requiring the use of best management practices, (7) requiring water quality monitoring, (8) implementing a moratorium on the construction of new wells, (9) and promulgating rules or regulations necessary to carry out the purposes of the management area.

revoke the rights of those who violate the rules they promulgate with regard to ground water management in these managements areas.

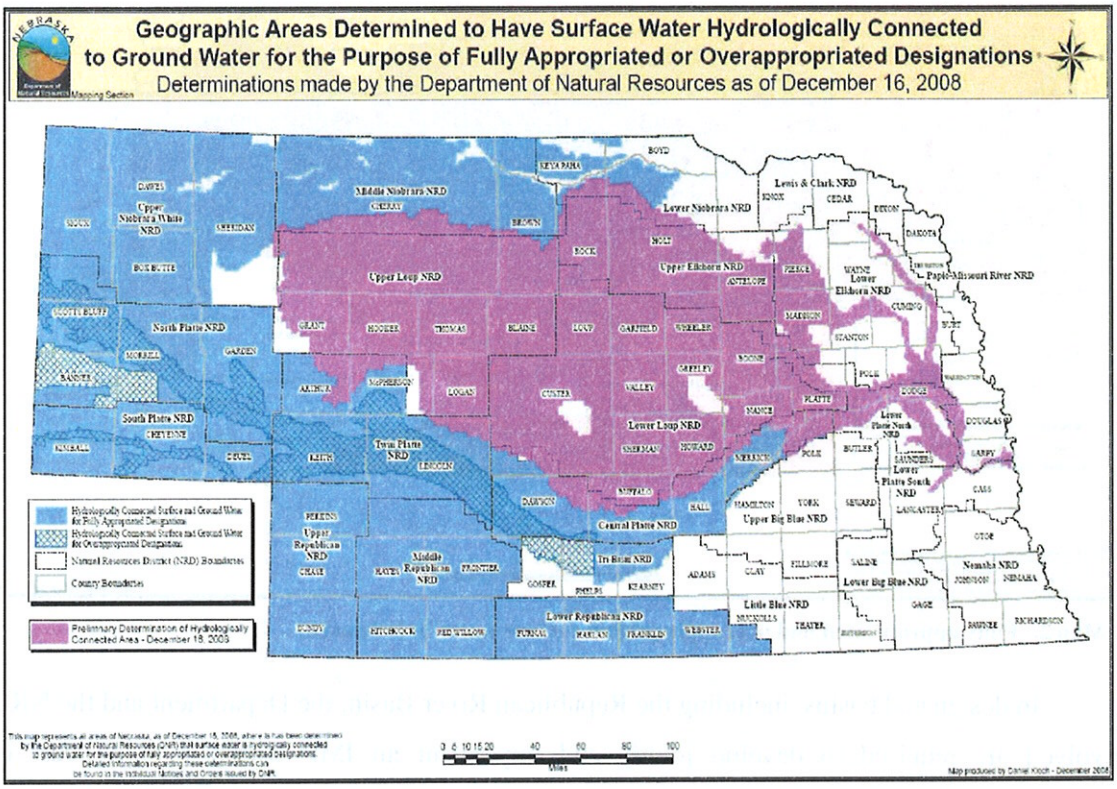
B. Hydrologically-connected ground water and the implementation of IMPs.

Active management of hydrologically connected waters began in 1996 when the Legislature passed LB 108. Within 30 days, all four NRDs in the Republican River Basin had requested determinations from the Department as to whether there were conflicts between surface water and ground water in the basin. The Department made a preliminary determination that such conflict existed in September of 1996 and that the conflict implicated Compact compliance. Some NRDs responded with moratoria on new irrigation wells and irrigated acres, but the process of integrated water management slowed in 1998 when Kansas sued Nebraska.

In 2002, the Legislature passed LB 103, mandating creation of a Water Policy Task Force to address conjunctive use management issues. The forty-nine Task Force members, appointed by the Governor from a statutorily specified mix of organizations and interests, were asked to discuss issues, identify options for resolution of issues, and make recommendations to the legislature and governor relating to any water policy changes deemed desirable. In December 2003, the Task Force provided the Legislature with draft legislation and suggested changes to statutes. The Legislature considered the Task Force recommendations in its 2004 session and subsequently passed LB 962, which incorporated most of the Task Force recommendations. Governor Mike Johanns signed the bill into law on April 15, 2004. LB 962 is codified as part of the Nebraska Groundwater Management and Protection Act.

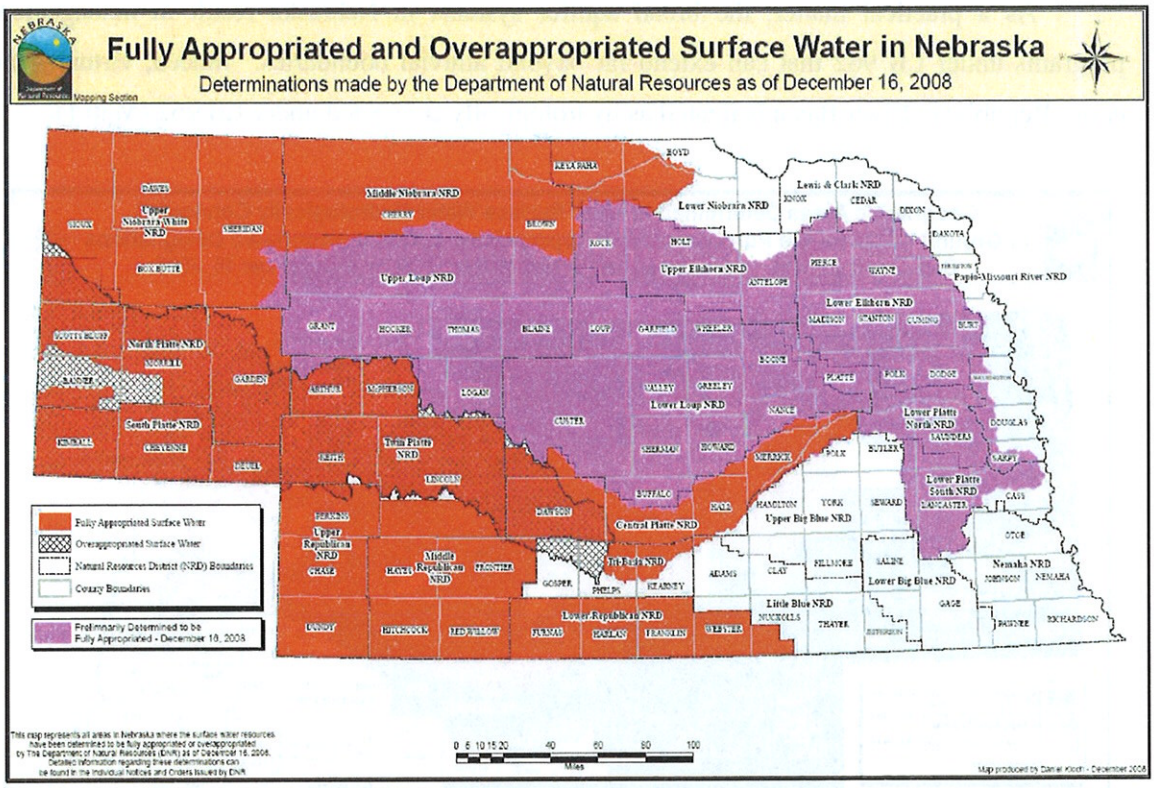
The significance of LB 962 is reflected in the findings of the Legislature, which include the fact that "[t]he management, conservation, and beneficial use of hydrologically connected ground water and surface water are essential to the continued economic prosperity and well-being of the state, including the present and future development of agriculture in the state" and that "[h]ydrologically connected ground water and surface water may need to be managed differently from unconnected ground water and surface water in order to permit equity among water users and to optimize the beneficial use of interrelated ground water and surface water supplies;" NEB. REV. STAT. § 46-703(1) and (2).

As a practical matter, the broad aquifer systems in Nebraska result in management programs under LB 962 that can extend far beyond alluvial boundaries. Indeed, virtually the entire Republican River Basin is treated as hydrologically connected under LB 962 (Map 1).



Map 1. Geographic areas determined to have surface water hydrologically connected to ground water for the purpose of fully appropriated or overappropriated designations.

LB 962 establishes a cooperative framework between local NRDs and the Department in furtherance of the overall goal of better managing the State's hydrologically connected ground water and surface water supplies. Under LB 962, the Department makes annual determinations of which basins, sub-basins or river reaches not previously designated as "fully appropriated" or "overappropriated" have since become "fully appropriated." NEB. REV. STAT. § 46-713(1). Whenever a basin is declared "overappropriated" or "fully appropriated," stays on new uses of ground water and surface water are imposed. Map 2 shows Nebraska's currently "designated" areas.



Map 2. Fully appropriated and overappropriated surface water in Nebraska.

In designated basins, including the Republican River Basin, the Department and the NRD involved are required to develop jointly and implement an IMP within 3 to 5 years of designation. A key goal of each IMP is to manage all hydrologically connected ground water and surface water for the purpose of sustaining a balance between water uses and water supplies so that the economic viability, social and environmental health, safety, and welfare of the basin, subbasin, or reach can be achieved and maintained for both the near and long term. In the overappropriated portions of the state, the IMP must provide for a reduction in current levels of water use so that it is possible to achieve a balance between water uses and water supplies. The IMPs are also required to address compliance with interstate compacts, decrees, and agreements. In addition, IMPs may rely on a number of voluntary and regulatory controls, including incentives, allocation of ground water withdrawals, rotation of use, and reduction of irrigated acres, among others.

If there are unresolved disputes between the Department and NRDs over the development or implementation of an IMP, a five member Interrelated Water Review Board ("IWRB") will resolve the dispute. To date, no conflicts have proved so irreconcilable as to necessitate intervention by the IWRB.

III. INTEGRATED MANAGEMENT PLANS AND ANNUAL FORECASTING

As noted above, the primary tool through which Nebraska manages hydrologically connected waters is the IMP. The IMPs are dynamic and may be reevaluated or revised at any time. Additionally, the Republican Basin IMPs currently have a presumptive five-year span (2008-2012), after which they will be reevaluated.[2] This section describes the current IMPs and the annual forecast used to determine additional measures, if any, necessary for Compact compliance. Each IMP contains overarching goals that facilitate Compact compliance. A significant measure employed in the IMPs for the Republican Basin is the setting of allowable pumping allocations within each NRD. However, Nebraska employs additional tools (e.g., surface water purchases) on occasion to ensure it remains within its Compact allocation. These additional measures are addressed in detail in Section V below.

A. Republican River Basin Integrated Management Plans

The original IMPs for the Republican River Basin were for the three-year period 2005 – 2007. During 2007 and early 2008 the Department, in conjunction with the NRDs, adopted revisions to their IMPs. The current IMPs presumptively cover the five-year period 2008 – 2012. These IMPs include a target pumping reduction of 20% from a baseline period (1998 – 2002). The IMPs and the rules and regulations implementing the objectives of the IMPs for each NRD are attached as Appendices A, B, and C.

In addition, to ensure Compact requirements will be met under any and all water supply conditions that may occur in the Basin, the IMPs contain provisions that limit the average net depletions due to ground water pumping to each NRD's allotted percentage of the allowable ground water depletions. The allowable ground water depletions are the maximum level of depletions to stream flow from groundwater pumping within the Compact area that can be allowed without exceeding the Compact allocation. This essentially amounts to the Nebraska

[2] Of course, if an IMP proves effective in meeting its objective, it need never be revised.

allocation plus imported water supply credit less all computed beneficial consumptive use due to surface water irrigation and reservoir evaporation. The remaining Nebraska allocation is then allotted between the NRDs based on the percentage of the depletions to streamflow caused by ground water pumping in each NRD during the baseline period (for the years 1998-2002).

B. Annual Forecast of the Water Supply in the Republican River Basin

To aid the NRDs in their short and long-term water planning efforts, and in order to determine what (if any) additional efforts may be required to ensure Compact compliance in a given year, DNR annually, in consultation with the NRDs, forecasts the short-term and long-term water supply projected for the Basin. The forecast allows the NRDs to determine whether additional compliance measures are necessary. This is done pursuant to Nebraska Revised Statutes § 46-715.5 in consultation with the affected NRDs. As an example of how this forecast is conducted, the December 2008 forecast and transmittal letter is included in Appendix D.

IV. PERFORMANCE OF IMPS

This section describes studies Nebraska completed to estimate the long-term performance of the current IMPs (e.g., including their 20% reduction in baseline pumping). The following are our conclusions:

- Under average climatic conditions, through 2012, Nebraska would maintain a positive five-year average of approximately 18,950 acre-feet. *See* Appendix E.

- Under the future scenario presented by Kansas, through 2012, Nebraska would maintain a positive five-year average, ranging from slightly positive in 2008 up to approximately 42,000 acre-feet in 2012. *See* Appendix F.

- Under an exceptionally (arguably unrealistic) scenario of repeated dry conditions through 2012, additional measures would be required to ensure Nebraska remains within its allocation by making up for a negative five-year average of between 340 acre feet (under normal year administration) and 8,288 acre-feet (under water-short year administration). *See* Appendix G.

NE0176110

A. The measure of Compact compliance

Any discussion of how compliance will be achieved must, of course, begin with an understanding of how compliance is measured. It is important in this regard to recognize that the FSS does not require a state to have a positive balance (allocation - consumption + imported water supply) during each and every year. Instead, Compact compliance is based on a running average. Two and five year compliance periods are provided for in the FSS, and submission of a three-year plan is possible during Water-Short Years. Consistent with the Arbitrator's preliminary decision, the Nebraska scenarios take into account that Compact accounting and compliance is to be conducted over a period of years.

B. Average years

The data used to create the average conditions groundwater model scenario are described in a report provided during March 2008 to the Republican River Compact Administration (RRCA), a copy of which has been reproduced as Appendix E. As reflected in Appendix E, the results of this analysis demonstrate that during a period of time with precipitation close to average, Nebraska depletions to stream flow will be less than Nebraska allocations, given the pumping volume limits incorporated in the IMPs. The estimated annual allocation and computed beneficial consumptive use (CBCU) for each year from 2008 through 2012 are summarized in Table 3C at the end of Appendix E. The allocation exceeds the CBCU less the Imported Water Supply Credit (IWS) by an average of approximately 18,950 acre-feet/year. Nebraska's allocation exceeds her CBCU by in excess of 94,700 acre-feet during this five year period.

C. The next 5 years as projected by Kansas

Appendix F applies the current Nebraska IMPs through 2012 to the future scenario used by Kansas in proposing its remedy. The tables contained in Appendix F represent accounting results of actual conditions through 2008 (2008 itself represents a Nebraska early estimate of the accounting for that year, developed for the annual forecast discussed above). The years 2009-2012 are represented by the years 1992-1995, as employed by Kansas. The groundwater CBCU and IWS used for these years was generated by running the RRCA Groundwater Model with 1992-1995 climatic conditions, and with 2006 irrigated acres and pumping volumes equal to

80% of the baseline pumping (as called for in the existing IMPs). The surface water CBCU and stream gage data are identical to that which occurred in 1992-1995.

As shown in Table F.1, the analysis for 2008-2012 shows Nebraska will have a positive annual balance for all years except one. Based on the five-year average used for Compact compliance, Nebraska would be in compliance for all years. Simply put, even considering Kansas' assumed future climatic conditions, the current IMPs will keep Nebraska in compliance during the period they are in effect. Of course, in 2012, Nebraska in cooperation with the NRDs will evaluate the success of the IMPs and jointly make any adjustments needed to ensure compliance during the next planning horizon.

D. Dry scenario

The Department also analyzed the impact of the IMPs under an extraordinarily dry scenario, involving a sequence of consecutive years assuming 35th percentile precipitation. This information was provided to the RRCA during a meeting in April 2008, and is reproduced as Appendix G of this document. As a preliminary matter, it should be noted that this scenario is even drier that that utilized by Kansas in its analyses (40th percentile).

As reflected in Appendix G, the results of this analysis demonstrate that during a period of time with significantly below average precipitation, Nebraska depletions to stream flow could be slightly greater than Nebraska allocations, given the pumping volume limits incorporated in the IMPs. The estimated annual allocation and CBCU for each year from 2008 through 2012 are summarized in Appendix G.

In dry years, Nebraska could experience a negative five-year average (Allocation plus IWS minus CBCU) of approximately 340 acre-feet. Also, under this dry condition it is possible that water-short year administration would be in effect for some or all of this period. In those circumstances, Nebraska could experience a negative two-year average of approximately 8,288 acre-feet (*see* Table 5C at the end of Appendix G). As discussed in the following section, Nebraska has or is developing responses to address these potential shortfalls.

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V. CLOSING THE GAP

This section describes additional compliance measures that are in place or are being developed by Nebraska to deal with the occasional potential shortfalls that may occur under acute and persistent dry conditions. These measures would be over and above the irrigation limits set in the respective IMPs. Closing this gap can be accomplished through any combination of one or more of the mechanisms discussed in this Section. Before considering the propriety of these measures, however, it is important to reflect briefly on the potential impact of any change in the RRCA Accounting Procedures, as pursued by Nebraska in this Arbitration (*see* Section V.a) or by application of a credit for any damages paid (*see* Section V.B).

A. Effect of proposed accounting changes

Nebraska developed the average and dry scenarios described above by using the current RRCA Accounting Procedures. Compliance with the currently-accepted procedures was a fundamental underpinning of the IMPs that are in place today. However, Nebraska has submitted for arbitration a number of proposed corrections to the current Accounting Procedures. Approval of any one or more of these changes could effectively minimize (or even eliminate) any projected gap between Nebraska's allocation and its use.[3] Table 1 is a summary of the proposed accounting changes, and the effects they would have in comparison with the current accounting procedures, applied to the years 2003 – 2008. Similarly, Table 2 is a summary of the proposed accounting changes and the effects on water-short year administration accounting. In Tables 1 and 2, the results for moving the accounting cells are listed separately and together with the results from the proposed CBCU calculation change, because these two changes are not additive.

[3] Moreover, as detailed in the concurrently filed report of The Flatwater Group, additional corrections should be made to the accounting spreadsheets, which would further reduce the amount of Nebraska's use. Those corrections (e.g., accounting for Harlan County Reservoir evaporation in a manner consistent with the Arbitrator's preliminary decision and corrections to the Input worksheets) are not reflected in this analysis.

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Table 1. Effects of proposed accounting changes, in addition to baseline balances from current accounting procedures [Allocation - (CBCU - IWS Credit)] with 5-year average values.

Year	Total Changes Related to Haigler Canal	All Accounting Cells Moved	Proposed CBCU Calculation Method	Proposed CBCU Calculation Method Plus All Accounting Cells Moved
2003	1,630	1,104	10,447	10,959
2004	1,354	1,476	11,242	11,342
2005	1,776	1,908	10,925	11,205
2006	1,039	2,069	10,206	10,569
2007	903	*	5,938	6,191
2008	1,630	*	7,439	7,839
2003-2007 Average	1,340	1,639 **	9,752	10,053
2003-2007 Sum	6,702	6,557 **	48,758	50,265
2004-2008 Average	1,340	*	9,150	9,429
2004-2008 Sum	6,702	*	45,750	47,145

* Groundwater model runs for the accounting cells issue have not been completed for 2007 and 2008.
** Four year average and sum for 2003 – 2006.

Table 2. Effects of proposed accounting changes, in addition to baseline balances from current accounting procedures [Allocation - (CBCU - IWS Credit)] with 2-year average values.

	Total Changes Related to Haigler Canal	All Accounting Cells Moved	Proposed CBCU Calculation Method	Proposed CBCU Calculation Method Plus All Accounting Cells Moved
2005	1,755	2,118	10,907	11,597
2006	1,023	2,311	10,344	11,118
2007	903	*	6,108	6,737
2005-2006 Average	1,389	2,214 **	10,626	11,358
2005-2006 Sum	2,777	4,429 **	21,251	22,716
2006-2007 Average	963	*	8,226	8,928
2006-2007 Sum	1,926	*	16,453	17,855

* Groundwater model runs for the accounting cells issue have not been completed for 2007.
** Four year average and sum for 2003 – 2006.

Clearly, resolution of these disputed issues as proposed by Nebraska will substantially change the predicted Nebraska compliance under the scenarios discussed above, potentially eliminating any shortfall. However even assuming the Accounting Procedures are not revised, Nebraska has at its disposal multiple additional tools to ensure Compact compliance. A summary of these tools and their demonstrable impacts in 2006 through 2008 appears below.

B. Application of damages credit

Nebraska also maintains a water credit must be taken into account in regard to the annual accounting for any year in which damages are paid. In other words, if damages in the form of

money is paid from Nebraska to Kansas, it is as if the water had been delivered, and must be taken into account when calculating future compliance. To appreciate the impact of the credit, the following example assumes the values in the far right column of Table F.1 (Allocation – (CBCU –IWS)) for 2005 and 2006 are reduced to zero, from 42,3.25 and 29,175 respectively, to reflect payment of damages to Kansas based on overuse by Nebraska in those two years. (Note that these numbers are presented as an example – Nebraska's shortfall in 2005-2006 is for the basin above Guide Rock, during Water-Short Year Administration.) This is based on the Arbitrator's preliminary decision that Kansas should be compensated for damages experienced in both 2005 and 2006 (as opposed to damages being based on the applicable two-year average).

By providing a credit to Nebraska for damages paid due to overuse in 2005 and 2006, the five-year averages projected in Table F.2 are revised as follows:

Year	Allocation – (CBCU –IWS) with a credit for damages paid based on violations in 2005/06
2007	(6,220)
2008	14,399
2009	14,945
2010	38,691
2011	41,585
2012	42,333

Thus, when the credit is applied, Nebraska's five-year averages improve by approximately 14,300 acre-feet in 2007 through 2009; and approximately 5,835 acre-feet in 2010. This adjustment is necessary to ensure Compact accounting properly reflects the fact that Kansas has been made whole by any payment in this action (*i.e.*, once payment is made, it is as if Nebraska had not overused in 2005 or 2006).

C. Dry-year leases of surface water

Nebraska and the NRDs leased the rights to surface water during 2006, 2007, and 2008. The water supplies relinquished by Nebraska were available for diversion by Kansas Bostwick Irrigation District (KBID) at the Guide Rock Diversion Dam. A summary of these actions is reflected in Appendix H.

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During 2006, the Department entered into an agreement with the Nebraska Bostwick Irrigation District (NBID) whereby the Superior Canal would not divert surface water during 2006. It was estimated that 5,000 acre-feet of natural flow would be available for diversion into Superior Canal. In addition, NBID agreed to the purchase of storage water available from Harlan County Lake based on the January 2006 estimate of storage from the U.S. Bureau of Reclamation. The January 2006 estimated irrigation storage supply in Harlan County Lake was 15,700 acre-feet; NBID was entitled to approximately 10,000 acre-feet of the total. Nebraska entered into two additional agreements with surface water users in 2006. The first was an agreement with the Riverside Canal Company to forgo diversion from Frenchman Creek during the 2006 irrigation season. The diversion is immediately above the confluence of Frenchman Creek with the Republican River. It is estimated that action maintained approximately 2,000 acre-feet in the river above Harlan County Lake, which would otherwise have been diverted into Riverside Canal. The second agreement above Harlan County Lake was with Frenchman Valley Irrigation District (FVID). FVID's Culbertson Canal diverts from Frenchman Creek above the Riverside Canal headgate. It was estimated that action would maintain 8,000 acre-feet in the river above Harlan County Lake, which would have been diverted into Culbertson Canal.

During 2007 Nebraska entered into an agreement with NBID whereby the State leased the natural flow that was available for diversion at the Superior Courtland Diversion Dam and made the water available to KBID. As in 2006, it was estimated that 5,000 AF of natural flow would be available for diversion into Superior Canal. In addition, the NRDs entered into additional agreements with three irrigation districts. The first was an agreement with the Riverside Canal Company to forgo diversion of 2,000 acre-feet from Frenchman Creek during the 2007 irrigation season. The second agreement above HCL was with FVID. FVID's Culbertson Canal diverts from Frenchman Creek above the Riverside Canal headgate near Palisade Nebraska. Prior to the lease, it was estimated that 8,000 acre-feet would remain in the river above HCL, which would have been diverted into Culbertson Canal. The third agreement above HCL was with Frenchman Cambridge Irrigation District (FCID). The FCID agreed to forego irrigation on the Cambridge Canal on nearly 17,664 acres, and agreed to the release of approximately 26,000 acre-feet from storage in Harry Strunk Lake during irrigation season.

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During 2008, the NDNR completed agreements with three irrigation districts. The first was an agreement with the Riverside Canal Company to forgo diversion of 2,000 acre-feet from Frenchman Creek during the 2008 irrigation season. The second agreement was with FVID to forego diversion of 8,000 acre-feet from Frenchman Creek. The third agreement was with FCID. The FCID agreed to not divert water to the Cambridge Canal until June 22, 2008. An estimated 5,000 acre-feet was available for storage in Harlan County Lake that would have otherwise been diverted.

The total benefit of these purchases is estimated to be 25,000 acre-feet in 2006, 53,500 acre-feet in 2007, and 15,000 acre-feet in 2008, totaling nearly 100,000 acre-feet over three years that was reserved for use by Kansas and representing a substantial reduction in Nebraska's consumptive use.

D. Vegetation management

Nebraska has worked to minimize the amount of water lost within its borders due to non-beneficial consumptive use. Prior to 2007, riparian vegetation management activities were limited to work by the U.S. Army Corps of Engineers near Harlan County Lake and efforts by the Nebraska Game and Parks Commission to control Salt Cedar below Swanson Reservoir. Beginning in 2007, Nebraska initiated more intensive programs. By the end of 2007, over 3,200 acres within 117 river miles along and in the Republican River channel and its tributaries had been cleared of invasive riparian vegetation to help improve conveyance. Additional vegetation management efforts continued into 2008 and more work is planned for the future. Just this fall, an additional 53 mile stretch from Cambridge to Harlan was similarly treated.

Nebraska is studying the effects of vegetation management on the consumptive use of water in the basin. Sites near Bartley and Benkelman, Nebraska, have been identified for study. At these locations, invasive vegetation has been removed from some areas, while it remains in other areas. Numerous trees have been instrumented to determine sap movement within each tree, and monitoring wells have been installed, along with meteorological equipment. The results of this study are expected to help determine the value of managing invasive species of vegetation. The study is expected to be completed within two years.

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E. Incentive programs

The NRDs and the State of Nebraska have been and will continue to participate in programs to retire irrigated acreage in the Republican River Basin. This includes participation in federal programs such as the Environmental Quality Incentives Program (EQIP) and the Conservation Reserve Enhancement Program (CREP). Within the Republican River Basin in Nebraska more than 40,000 acres have been idled for ten years or more as shown in Appendix I.

F. Augmentation study

Nebraska is currently developing plans for projects that will be used to augment stream flows of the Republican River. A coalition of Nebraska NRDs conducted a preliminary feasibility study for such augmentation. This same coalition has sought and received funding from the Nebraska Interrelated Water Management Plan Program Fund (IWMPPF) to conduct an Augmentation Engineering Study. This study is underway and has the following project objectives:

1) Identify a comprehensive system response to stream flow augmentation

2) Identify specific locations where augmentation well fields could be located

3) Identify existing uses that could be retired to comply with the FSS's terms regarding augmentation

4) Engineer and begin the implementation of augmentation systems

When completed, Nebraska's properly sized and managed augmentation system(s) will assist Nebraska in managing Compact compliance, especially during years of water-short administration. Preliminary feasibility studies for augmenting stream flow from groundwater withdrawals to ensure compliance are being developed. These studies will result in the development of augmentation systems that provide a holistic approach using combinations of groundwater pumping, storage, acreage retirements, or other options which may become available that will supplement streamflow and ensure Nebraska will meet her obligations. As part of the feasibility studies, preliminary modeling has been performed to quantify the depletions caused by additional pumping for augmentation.

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G. Summary

In summary, even under the most difficult circumstances, Nebraska possesses and can implement tools that collectively operate to ensure it remains in Compact compliance. Under average conditions presented in Appendix F, Nebraska will use well under her allocation on both a five-year average and on a two-year water short year basis. Even under severe dry year conditions as presented in Appendix G, Nebraska's overuse would be less than 3.5% without modification of the RRCA Accounting Procedures or credit for damages paid in this proceeding. If such conditions occurred, the shortfall would be eliminated through employment of the mechanisms discussed in this section.

VI. IMPACTS OF KANSAS PLAN

Nebraska has reviewed the documentation provided by Kansas' experts related to Kansas' proposed remedy for Nebraska compliance. The following discussion briefly presents the Kansas accounting scenario and summarizes a critical flaw in the Kansas approach.

A. Flaws in the Kansas approach

Climatic conditions directly affect both the amount of water a State has available to use (its allocation) and the impact a State's use of that water has on the total water supply (its depletions). In general, during wetter periods, a State will have a larger allocation due to increased stream flows as compared to drier periods with lower stream flows. On the depletions side, for an equivalent amount of ground water pumping, depletions from that pumping will be higher during a wetter period due to the additional water in streams to deplete as compared to drier periods.

In her compliance analysis, Kansas has used a dry period (the five years of 2002 through 2006, inclusive) to develop a proposed future limit for Nebraska of 175,000 acre-feet of groundwater CBCU. The average precipitation for this period based on the Compact gages is equivalent to approximately the 40th percentile of the long-term 1918 - 2006 precipitation. However, when determining how much reduction in groundwater pumping was needed to meet the allocation target of pumping for a dry period, Kansas modeled the years 1990 - 2006, in which precipitation was above average (60th percentile). By using the ***wet*** period to determine the baseline groundwater CBCU and the ***dry*** period to set the target groundwater CBCU, Kansas

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dramatically overestimates the amount of reduction in groundwater pumping that would be required to comply with the Compact.

B. The practical effect of the Kansas proposal

The accounting scenario developed by Kansas results in Nebraska delivering annually to Kansas significantly more water than is required by the Compact. This represents a fundamental shift in the Compact allocations, effectively depriving Nebraska of her full entitlement under the Compact nearly every year.

A review of Kansas' data indicates that she has incorrectly assumed Nebraska must remain within her allocation each and every year. As noted above, the measure of Compact compliance is average use over a two, three or five year period (depending on whether water short year or normal year accounting is in place). Figure 1 shows a comparison of the five-year running average values for Nebraska's allocation and CBCU minus IWS that would result from the Kansas remedy. The green areas in the figure illustrate the over deliveries that would occur (labeled as "Over-Delivery"), while the red areas show minor shortfalls that would remain.

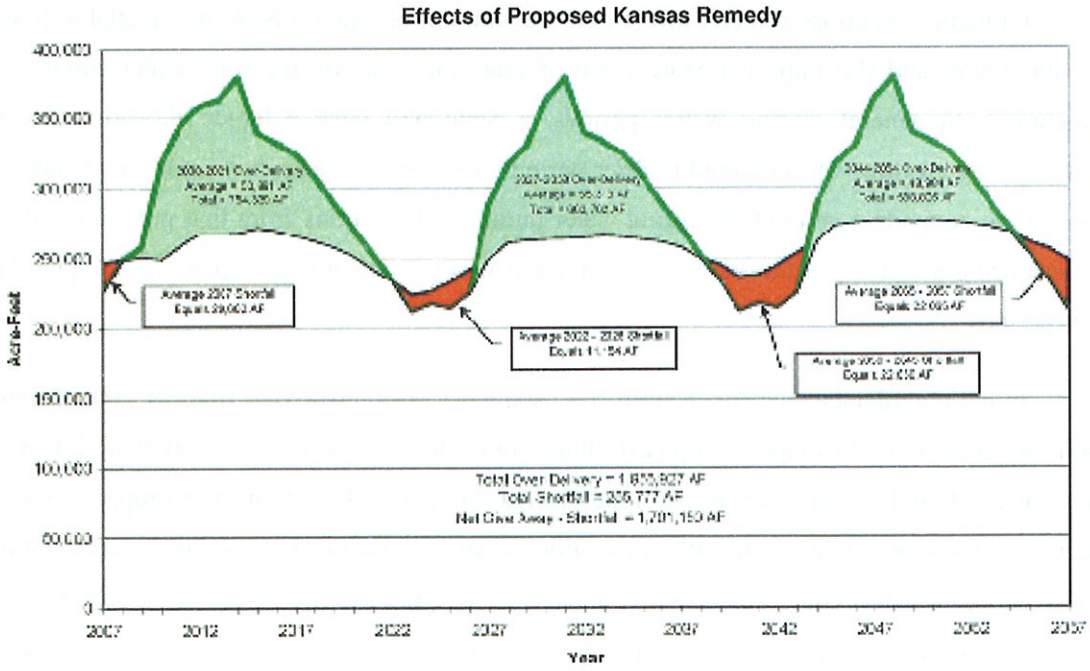

Figure 1. Over-deliveries of water and projected shortfalls under the proposed Kansas remedy.

Figure 1 shows that Kansas' proposed remedy would yield to Kansas an additional amount of water equal to the difference between the 1,956,927 acre feet over-delivery and the 255,777 acre feet shortfall. This volume of water (over 1.7 million acre feet) represents water which Kansas is not entitled under the Compact. The Kansas remedy results in a dramatic redistribution of the allocations of the Compact.

VII. CONCLUSIONS

Following the signing of the FSS, Nebraska has implemented landmark changes to its system of water regulation. The resulting integrated management planning process mandates a cooperative effort between the Department (historically responsible for surface water administration), and the NRDs (historically responsible for groundwater management). Taking into account all proposed future scenarios by Kansas and Nebraska, and assuming there are no changes to the current RRCA Accounting Procedures, Nebraska will, under the worst case, have only a modest shortfall of 8,288 acre feet on average (less than 3.5%). Recently, through dry year leasing of surface water supplies, Nebraska has shown the ability to make up substantially greater than this amount annually. We are confident the IMPs are more than sufficient to maintain compliance with the Compact through 2012, when they will be reevaluated and modified to ensure compliance into the future.

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Appendix A: Lower Republican Natural Resources District

Integrated Management Plan

LOWER REPUBLICAN NATURAL RESOURCES DISTRICT
GROUND WATER MANAGEMENT RULES AND REGULATIONS
AND INTEGRATED MANAGEMENT PLAN

Effective February 29, 2008

AUTHORITY – The Lower Republican Natural Resources District (LRNRD) adopts these Rules and Regulations pursuant to the authority granted in the Nebraska Ground Water Management and Protection Act, Chapter 46, Article 7.

PURPOSE – These Rules and Regulations are adopted for the following purposes: (1) to protect ground water quantity; (2) to prevent or resolve conflicts between ground water users and surface water appropriators in those areas where ground water and surface water are hydrologically connected; and (3) to implement the necessary controls to carry out the goals and objectives identified in the Integrated Management Plan (IMP) jointly adopted by the LRNRD and the Nebraska Department of Natural Resources (DNR).

CHAPTER 1 – DESIGNATION OF BOUNDARIES AND MANAGEMENT AREA

These Rules and Regulations apply within the geographic boundary of the LRNRD. The stratigraphic boundary is from the land surface to the base of the underlying sand and gravel layers that contain the water bearing material. The base of the sand and gravel layers rest on impervious layers of Niobrara Chalk, Pierre Shale or formations of the White River Group. See Map 1. The area within the foregoing geographic and stratigraphic boundaries shall be referred to as "the Management Area."

CHAPTER 2 – ENFORCEMENT AND PENALTIES

RULE 2-1 ENFORCEMENT

Penalties for violating certain provisions of these Rules and Regulations are identified below, which penalties will be enforced without the need for the LRNRD to obtain a cease and desist order. To the extent that specific penalties are not identified below, these Rules and Regulations shall be enforced by the LRNRD through the use of cease and desist orders issued in accordance with the Neb. Rev. Stat. § 46-707(7).

RULE 2-2 PENALTIES

Any person who violates any cease and desist order issued by the LRNRD pursuant to Neb. Rev. Stat. § 46-707(7), or who violates any controls or Rules or Regulations adopted by the LRNRD relating to the Management Area, shall be subject to penalties imposed through the controls adopted by the LRNRD. Such controls include, but are not limited to, a reduction (in whole or in part) in that person's allocation of

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ground water or a reduction in the number of certified irrigated acres. Notice and hearing shall be provided to such person before the LRNRD takes any action. Specific penalties may be identified in rules and regulations for some violations. Any person who violates a cease and desist order issued by the District pursuant to Neb. Rev. Stat. § 46-707(7) shall be subject to a civil penalty assessed pursuant to Neb. Rev. Stat. § 46-745.

CHAPTER 3 – ACCESS

RULE 3-1 ENTRY UPON LAND

The LRNRD or authorized designee shall have the power and authority to enter upon the land, after notification to the landowner, for any and all reasons relative to the administration of the provisions of these Rules and Regulations and the Ground Water Management and Protection Act. This entry shall not be considered trespass.

RULE 3-2 NOTICE

Notification for entry upon land may be accomplished by regular mail, certified mail or by oral communication.

RULE 3-3 ACCESS RELATED TO MEASURING DEVICES

The LRNRD hereby notifies all operators of its intent to enter onto property to verify the installation of flow meter devices (or other similar devices) used to measure the quantity of ground water pumped for irrigation, municipal, commercial and industrial purposes (referred to below as "measuring devices") and to read, or to verify the readings of, all measuring devices that have been installed. The LRNRD hereby notifies all operators of its intent to enter onto property to install cable seals to prevent the removal of such measuring devices.

CHAPTER 4 – DEFINITIONS

4-1.1. Abandoned Well: Any water well, the use of which has been accomplished or permanently discontinued, (1) which has been decommissioned as described in the rules and regulations of the Department of Health and Human Services Regulation and Licensure, and (2) for which a notice of abandonment has been filed with the Department of Natural Resources.

4-1.2. Act: The Nebraska Ground Water Management and Protection Act.

4-1.3. Additional Water Administration Year: When water is needed for diversion at Guide Rock and the projected or actual irrigation supply is less than 130,000 acre-feet of storage available for use from Harlan County Lake as determined by the United States Bureau of Reclamation for the Republican River Compact Administration.

4-1.4. Allocation: As it relates to water use for irrigation purposes, means the allotment of a specified total number of acre-inches of irrigation water per certified irrigated acre assigned to that regulated well over the allocation period. As it relates to other purposes, the allotment of a determined quantity of ground water.

4-1.5. Allocation Period: The number of years over which an allocation can be used.

4-1.6. Base Allocation: This amount, in acre-inches, is derived from dividing the allocation by the allocation period.

4-1.7. Baseline of Commercial or Industrial Uses: The amount of ground water used by a commercial or industrial user as computed in Rule 7-5.2.2.

4-1.8. Baseline of Municipal Uses: The amount of ground water used by a municipality as computed in Rule 7-5.1.2.

4-1.9. Board: The elected Board of Directors of the Lower Republican Natural Resources District.

4-1.10. Certification: The process whereby the LRNRD verifies and authorizes the use for a regulated ground water well.

4-1.11. Certified Use: Any use of ground water in accordance with Rule 6-6.

4-1.12. Certified Irrigated Acre: Any acre that is certified as such pursuant to the LRNRD Rules and Regulations, and that is actually capable of being supplied water through irrigation works, mechanisms or facilities existing at the time of allocation.

4-1.13. Commercial Livestock Well: A water well used for the watering of livestock and other uses directly related to the operation of a feedlot or other confined livestock operation or dairy.

4-1.14. Commercial Water User: A person who uses ground water for commercial purposes, including but not limited to, maintenance of the turf of a golf course.

4-1.15. Consumptive Use: That amount of water that is consumed under appropriate and reasonably efficient practices to accomplish without waste the purposes for which the appropriation or other legally permitted use are lawfully made.

4-1.16. Decommission: When used in relation to a water well, shall mean the act of filling, sealing, and plugging a water well in accordance with the Department of Health and Human Services Regulation and Licensure Rules and Regulations.

4-1.17. Dewatering Well: A water well constructed for the purpose of temporarily lowering the ground water surface elevation.

4-1.18. District, NRD, or LRNRD: The Lower Republican Natural Resources District.

4-1.19. DNR or Department: The Nebraska Department of Natural Resources.

4-1.20. Flow Meter: A device, approved by the LRNRD, to measure the quantity of ground water pumped, withdrawn, or taken from a water well.

4-1.21. Good Cause Shown: A reasonable justification for granting a variance to consumptively use water that would otherwise be prohibited by rule or regulation, and which the LRNRD reasonably and in good faith believes will provide an economic, environmental, social or public health and safety benefit that is equal to or greater than the benefit resulting from the prohibition from which a variance is sought.

4-1.22. Governmental Uses: Any ground water supplied to a governmental entity, including school districts, counties, and other political subdivisions, state agencies, or federal agencies.

4-1.23. Ground Water: That water which occurs in or moves, seeps, filters, or percolates through the ground under the surface of the land.

4-1.24. Historic Consumptive Use: That amount of water that has previously been consumed under appropriate and reasonably efficient practices to accomplish

without waste the purposes for which the appropriation or other legally permitted use was lawfully made.

4-1.25. History of Use: As used in these Rules and Regulations shall mean the exercise of a certified use in four (4) of the previous six (6) years.

4-1.26. Illegal Water Well: (a) any water well operated or constructed without or in violation of a permit required by the Act; (b) any water well not in compliance with Rules and Regulations adopted and promulgated pursuant to the Act; (c) any water well not properly registered in accordance with Neb. Rev. Stat. §§ 46-602 to 46-606; (d) any water well not in compliance with any other applicable laws of the State of Nebraska or with rules and regulations adopted and promulgated pursuant to such laws.

4-1.27. Inactive Status Well: A water well that is not currently in use, but is in a good state of repair and for which the owner has provided evidence of intent for future use by maintaining the water well in a manner which meets the following requirements: (1) the water well does not allow impairment of the water quality in the water well or of the ground water encountered by the water well; (2) the top of the water well or water well casing has a water-tight welded or threaded cover or some other water-tight means to prevent its removal without the use of equipment or tools to prevent unauthorized access, to prevent a safety hazard to humans and animals, and to prevent illegal disposal of wastes or contaminants into the water well; (3) the pump and pumping column have been removed; and (4) the water well is marked so as to be easily visible and located and is labeled or otherwise marked as to be easily identified as a water well and the area surrounding the water well is kept clear of brush, debris, and waste material. An inactive status water well shall be registered as such in the well registration records of the Nebraska DNR.

4-1.28. Incentive Program: A program that may require agreements or covenants concerning the use of land or water as necessary to produce the benefits for which the program is established.

4-1.29. Industrial Water User: A person who uses ground water for industrial purposes, including but not limited to, manufacturing and power generation.

4-1.30. Industrial Well: A water well designed and constructed to be used for industrial purposes including manufacturing, commercial and power generation uses of water. Commercial use includes, but is not limited to, maintenance of the turf of a golf course.

4-1.31. Integrated Management Area or Management Area: The entirety of the LRNRD as per Chapter 1 of these Rules and Regulations.

4-1.32. Late Permit: A permit applied for after construction has commenced on a regulated water well pursuant to Neb. Rev. Stat. § 46-735.

4-1.33. Little Blue Basin: The Little Blue Basin is that area, delineated by the DNR, within the geographic confines of the LRNRD and located outside of the Republican River Basin.

4-1.34. Offset. Any water that is used to compensate for ground water that has been withdrawn since the effective date of Neb. Rev. Stat. § 46-740 when such withdrawal is considered to be an expanded or new use. "Offset" may also include

any water that the LRNRD requires an applicant to provide to compensate for ground water that will be withdrawn pursuant a variance granted under Rule 5-1.

4-1.35. Offset Account: A tracking system for the amount of credits and debits for a municipal or industrial/commercial user pursuant to Rule 7-5.

4-1.36. Operator: The person who controls the day-to-day operation of the water well.

4-1.37. Overlying Land: The land that has been certified as being irrigated by a regulated well as per Rule 6-6.

4-1.38. Permit to Construct a Well: A document that must be obtained from the LRNRD in accordance with Rule 6-2 before construction of a regulated ground water well may be commenced in the Management Area pursuant to Neb. Rev. Stat. § 46-735.

4-1.39. Person: A natural person, partnership, limited liability company, association, corporation, municipality, irrigation district, agency or political subdivision of the state, or a department, agency, or bureau of the United States.

4-1.40. Public Water Supplier: A city, village, municipal corporation, metropolitan utilities district, rural water district, natural resources district, irrigation district, reclamation district, or sanitary and improvement district which supplies or intends to supply water to inhabitants of cities, villages, or rural areas for domestic or municipal purposes.

4-1.41. Public Water System: System for providing the public with water for human consumption, as further defined in 179 N.A.C. 2.

4-1.42. Range Livestock Well: A water well that is used for the watering of range livestock and other uses of water directly related to the operation of a pasture or range.

4-1.43. Regulated Well: A water well designed and constructed to pump more than fifty (50) gallons per minute. A series of water wells, with a combined discharge of more than fifty (50) gallons per minute, of which the water is commingled, combined, clustered or joined as a single unit for a single purpose, shall be considered as one regulated well.

4-1.44. Replacement Well: A water well which is constructed to provide water for the same purpose as the original water well and is operating in accordance with any applicable rules and regulations of the District and with any applicable permit from the Department and, if the purpose is for irrigation, the replacement water well delivers water to the same tract of land served by the original water well and (i) replaces a decommissioned water well within one hundred eighty days after the decommissioning of the original water well, (ii) replaces a water well that has not been decommissioned but will not be used after construction of the new water well and the original water well will be decommissioned within one hundred eighty days after such construction, except that in the case of a municipal water well, the original municipal water well may be used after construction of the new water well but shall be decommissioned within one year after completion of the replacement water well, or (iii) the original water well will continue to be used but will be modified and equipped within one hundred eighty days after such construction of the replacement water well to pump fifty gallons per minute or less and will be used only for range livestock, monitoring, observation, or any other nonconsumptive or de minimis use and approved by the District, and (iv) would

not be used to provide water to a use not certified with the well being replaced and (v) would not be used in such a way as to result in the consumption of more water than was historically consumed by the water well being replaced. A replacement well, as defined in Neb. Rev. Stat. § 46-602 or as further defined in LRNRD Rules and Regulations, is subject to the same provisions as the water well it replaces.

4-1.45. Reserve: That part of an allocation that is unused during the base allocation period.

4-1.46. Supplemental Well: A water well that provides ground water to acres that have a surface water permit. Annual use is not a requirement to be considered a supplemental well.

4-1.47. Test Hole: A hole designed solely for the purpose of obtaining information on hydrologic or geologic conditions.

4-1.48. Unregulated Well: A water well designed and constructed to pump fifty (50) gallons per minute or less and is not commingled, combined, clustered or joined with other water wells.

4-1.49. Variance: Approval to act in a manner contrary to existing rule or regulation obtained from a governing body whose rule or regulation is otherwise applicable.

4-1.50. Water Short Year: A year in which the projected or actual irrigation supply is less than 119,000 acre-feet of storage available for use from Harlan County Lake as determined by the United States Bureau of Reclamation for the Republican River Compact Administration.

4-1.51. Water Well: Any excavation that is drilled, cored, bored, washed, driven, dug, jetted, or otherwise constructed for the purpose of exploring for ground water, monitoring ground water, utilizing the geothermal properties of the ground, obtaining hydrogeologic information, or extracting water from or injecting fluid as defined in section 81-1502 into the underground water reservoir. Water well includes any excavation made for any purpose if ground water flows into the excavation under natural pressure and a pump or other device is placed in the excavation for the purpose of withdrawing water from the excavation for irrigation. For such excavations, construction means placing a pump or other device into the excavation for the purpose of withdrawing water for irrigation. Water well does not include (i) any excavation made for obtaining or prospecting for oil or natural gas or for inserting media to repressure oil or natural gas bearing formations regulated by the Nebraska Oil and Gas Conservation Commission or (ii) any structure requiring a permit by the Department used to exercise a surface water appropriation.

CHAPTER 5 – GENERAL PROVISIONS

RULE 5-1 VARIANCES

5-1.1. The Board may grant variances from the strict application of these Rules and Regulations upon good cause shown.

5-1.2. All requests for a variance shall be made on forms provided by the LRNRD and shall be acted upon at a formal adjudicatory hearing before the Board. This hearing shall be advertised in newspaper(s) of general circulation within the LRNRD. All known interested parties will be provided notice of the hearing. The

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well owner or his or her representative shall be present at the hearing, except that, with prior notification to the LRNRD, written testimony may be provided if the well owner cannot be present in person.

RULE 5-2 SEVERABILITY

If any Rule or Regulation or any part of any Rule or Regulation herein shall be declared invalid or unconstitutional, such declaration shall not affect the validity or constitutionality of the remaining portions thereof.

CHAPTER 6 – GENERAL MANAGEMENT

RULE 6-1 MORATORIUMS

6-1.1. The LRNRD hereby closes the entire Management Area to the issuance of new permits for regulated wells except as provided in Rules 6-1.2, 6-1.3, and 6-1.4.

6-1.2. The LRNRD hereby closes the entire Management Area to the initiation or expansion of consumptive uses with the exception of (1) those uses that pertain to human health, safety, and welfare, range livestock, (2) those uses for which an offset has been or will be provided as described in Rule 7-5 below, or (3) those uses for which an offset will be provided to compensate for ground water that will be withdrawn pursuant a variance granted under Rule 5-1.

6-1.3. Wells for new or expanded municipal, commercial and industrial uses are governed by Rule 7-5 below.

6-1.4. Replacement wells and wells for the expansion of range livestock use are not subject to the moratoriums.

RULE 6-2 PERMIT TO CONSTRUCT A WATER WELL

6-2.1. Except as provided in Rule 6-2.2, any person who intends to construct a regulated water well on land in the Management Area that he or she owns or controls shall, before commencing construction, apply with the LRNRD for a permit on a form provided by the LRNRD. Within thirty (30) days after the application is properly prepared and filed, the LRNRD shall either issue the approved permit (with or without conditions) or deny the permit application. An incomplete or defective application shall be returned for correction. If correction is not made within sixty (60) days, the application shall be canceled.

6-2.2. Exceptions. No permit shall be required for:

6-2.2.1. Test holes

6-2.2.2. Dewatering wells with an intended use of ninety (90) days or less.

6-2.2.3. A single water well designed and constructed to pump fifty (50) gallons per minute or less.

6-2.3. Applications for a permit to construct a water well that require consideration of a variance request shall not be deemed as properly filed and complete until such time as the Board has acted to approve the variance request.

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6-2.4. A person shall apply for a permit before he or she modifies a water well, for which a permit was not required when the well was constructed, into one for which a permit would otherwise by required.

6-2.5. The permit application shall be accompanied by a $50.00 filing fee payable to the LRNRD and shall contain:

6-2.5.1. The name and post office address of the well owner;

6-2.5.2. The nature of the proposed use;

6-2.5.3. The intended location of the proposed water well or other means of obtaining ground water;

6-2.5.4. The intended size, type and description of the proposed water well and the estimated depth, if known;

6-2.5.5. The estimated capacity in gallons per minute;

6-2.5.6. The acreage and location by legal description of the land involved if the intended use is for irrigation;

6-2.5.7. A description of the proposed use, if other than irrigation;

6-2.5.8. The registration number of the well being replaced, if applicable;

6-2.5.9. The certified use of the well being replaced, if applicable;

6-2.5.10. The historic consumptive use of the well being replaced, if applicable; and

6-2.5.11. Such other information as the District may require.

6-2.6. Any person who has failed or in the future fails to obtain a permit before construction is commenced shall make application for a late permit on forms provided by the LRNRD. The application for a late permit shall be accompanied by a $250.00 fee payable to the District and shall contain the same information required in Rule 6-2.5.

6-2.7. The application for a permit shall be denied if (a) the location or operation of the proposed water well or other work would conflict with any regulations or controls adopted by the LRNRD; (b) the proposed use would not be a beneficial use; or (c) in the case of a late permit only, that the applicant did not act in good faith in failing to obtain a timely permit.

6-2.8. No refund of any application fees shall be made regardless of whether the permit is issued, canceled, or denied.

6-2.9. The issuance, by the LRNRD, of a permit or the registration of a water well with the DNR shall not vest in any person the right to violate any LRNRD rule, regulation, or control in effect on the date of issuance of the permit or the registration of the water well, or to violate any rule, regulation, or control properly adopted after such date.

6-2.10. The applicant shall commence construction as soon as possible after the date of approval and shall complete construction and equip the water well prior to the date specified in the conditions of approval, which shall not be more than one (1) year from the date of approval, unless it is clearly demonstrated in the application that one (1) year is an insufficient period of time for such construction. Failure to complete the project under the terms of the permit may result in the withdrawal of the permit by the LRNRD.

RULE 6-3 WELL SPACING

6-3.1. No regulated irrigation well shall be constructed upon any land in this District within six hundred (600) feet of any registered regulated irrigation well of different ownership, except, any irrigation water well that replaces an irrigation water well that was drilled prior to September 20th, 1957, and which is less than six hundred (600) feet from a registered irrigation well may be located closer than six hundred (600) feet from another regulated well if it is drilled within fifty (50) feet of the water well being replaced.

6-3.2. No regulated irrigation, industrial or public water system well shall be constructed upon any land in this District within one thousand (1000) feet of any registered regulated industrial or public water system well of different ownership.

6-3.3. A replacement well must be constructed within one thousand three hundred and twenty (1320) feet from the well that it is replacing.

6-3.4. The well spacing required by Rule 6-3.1 shall also apply to the distance between a proposed new regulated well and an unregistered regulated water well but only for a period of sixty (60) days to allow for registration of such unregistered water well.

Rule 6-4 FLOW METERS

6-4.1. Flow meters meeting accuracy specifications established in Rule 6-4.2 shall be installed on all regulated wells by April 1, 2005, except that, before any inactive wells are placed in service, a flow meter shall be installed, the LRNRD shall be notified of the well's status change, and the status of the well in the well registration records of the DNR shall be updated to reflect its active status.

6-4.1.1. No such well shall be operated within the District without a properly installed and operational flow meter.

6-4.1.2. The penalty for operating a well without a properly installed and operational flow meter shall be the loss of the base allocation for the following year and the well will not be allowed to be pumped until the required flow meter is installed and/or made properly operative and free from any tampering.

6-4.2. All meters shall be tested for accuracy using recognized industry testing methods and certified by the manufacturer according to those standards. At any rate of flow within the normal flow limits, the meter shall register not less than ninety eight (98) percent nor more than one hundred and two (102) percent of the water actually passing through the meter. All meters shall have a register or totalizer and shall read in U. S. gallons, acre-feet or acre-inches.

6-4.3. Installation – The operator shall, on forms provided by the LRNRD, report the location, by legal description, and certify the proper installation of flow meters. The LRNRD may, at a time of its own choosing, verify the location and proper installation of flow meters. The proper installation of a meter is such that it meets the manufacturer's specifications and/or more restrictive specifications developed by the LRNRD as reflected in this Rule.

6-4.3.1. Whenever a manufacturer's or dealer's instructions and/or specifications are more restrictive, they shall govern.

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6-4.3.2. In no case may a meter be installed with less than five (5) unobstructed pipe diameters upstream of the meter or less than one (1) unobstructed pipe diameter downstream of the meter.

6-4.3.3. If the meter is installed downstream of a mainline check valve, there must be at least ten (10) pipe diameters upstream of the meter. If there are not at least ten (10) pipe diameters upstream of the meter, straightening vanes must be installed.

6-4.3.4. Meters must be located so as to prevent damage to the meter from excessive vibration.

6-4.3.5. Meters must be installed so that the removal of the meter for service or maintenance can be performed with the use of normal tools and does not require excessive or unusual removal of hardware or other appurtenances.

6-4.3.6. Meters shall not be removed except for service or maintenance.

6-4.3.7. The LRNRD may establish a method by which the installed meter is tagged, sealed, marked or otherwise protected from tampering.

6-4.4. Improperly Installed Meters – The installation of meters that do not meet the manufacturers' or LRNRD standards must be corrected. If the LRNRD determines that a meter has been improperly installed, it will send a certified letter to the well owner and operator requesting correction within fourteen (14) days. Failure to provide for proper installation, or to correct a problem identified by the LRNRD in its certified letter, may result in the imposition of the penalties as described in section 6-4.1.2 above.

6-4.5. Inoperative Meters – Well owners and/or operators shall notify the LRNRD of an inoperative meter within one (1) working day from the time the defect is noted. The LRNRD shall repair or temporarily replace the inoperative meter and charge the well owner for the service. Failure to report inoperative meters shall result in the imposition of penalties as described in section 6-4.1.2 above.

6-4.6. Tampering with an Installed Flow Meter – Following a hearing before the Board, if it is found that tampering so as to affect the accuracy or true use of the meter has occurred, the LRNRD shall impose the penalties described in section 6-4.1.2 above and may prorate the allocation for the current year.

6-4.7. Removing a Cable Seal or Removing a Flow Meter – Removing a cable seal and/or removing a flow meter without written approval by the District staff shall result in the loss of fifty percent (50%) of the base allocation for the following year.

6-4.8. Service – It is the responsibility of the operator to provide for service and to maintain the flow meter according to either the manufacturer's standards or more restrictive standards developed by the LRNRD. The operator may grant permission for this service to be provided by the LRNRD, at a cost to the operator. A form, provided by the LRNRD, shall authorize this service and the LRNRD may enter onto property to provide this service. This service shall be provided in the off-season and will not interfere with the normal operation of the meter or the well.

6-4.9. The LRNRD may establish a program to randomly inspect the serviceability and to verify use of a meter. The LRNRD may correct discrepancies noted at the time of

the inspection. Discrepancies that require the repair of a meter may be performed by the LRNRD, at a cost to the well owner, with the prior permission of the well owner.

6-4.10. When an installed non-mechanical flow meter is in need of replacement, it shall be replaced with a mechanical flow meter.

6-4.11. Only mechanical flow meters are allowed to be installed after the effective date of these rules.

RULE 6-5 REPORTS

6-5.1. Owners and operators of regulated irrigation wells shall allow District staff to determine from the flow meters, by January 15 of each year, the total water withdrawn from that well since the last reading.

6-5.1.1. If the owner and/or operator of a regulated irrigation well disputes the amount of total water withdrawn from the well during the year as read by District staff, the owner and/or operator shall have until April 1 of the following year to file an objection with the District.

6-5.2. Each operator of a regulated irrigation well shall report by November 15 of each year, on forms provided by the District, the acres irrigated by that well during the preceding irrigation season and the type of crop grown on such acres.

6-5.3. Each operator of a regulated well, other than an irrigation well, shall report by January 15 of each year, on forms provided by the LRNRD, the total water withdrawn from that well during the preceding calendar year and the nature of the use of that water.

6-5.4. Failure to allow the District staff or authorized designee to read the meter or to provide the reports identified in Rules 6-5.2 and 6-5.3 shall result in the loss of allocation for the next crop year or current year, in the case of a regulated well other than an irrigation well.

6-5.5. In order to ensure compliance with the Republican River Compact Accounting procedures, additional reports may be required from operators.

RULE 6-6 CERTIFICATION OF USES

6-6.1. After December 31, 2004, no regulated well shall be operated until its use is certified and approved by the Board pursuant to these Rules and Regulations.

6-6.2. Any operator aggrieved by a determination of the Board regarding approval of certification of irrigated acres or of non-irrigation uses may request a hearing before the Board for the purpose of reconsidering that determination. Such request shall be filed on a form provided by the LRNRD within thirty (30) days of the Board's action on the certification. Such hearing shall be a formal adjudicatory hearing and shall be conducted in accordance with the LRNRD'S Rules and Regulations for the Enforcement of the Ground Water Management and Protection Act. The burden of proof shall be on the person requesting the hearing to establish that the Board's decision should be modified.

6-6.3. The Board may review each certification for all uses no less often than every five (5) years. Errors or inconsistencies discovered during that review shall be resolved to the satisfaction of the Board before any new allocation is made to the previously

certified uses. Following notice and a hearing, the Board may rescind any previously approved certification and any previously granted allocation to a well for which false or misleading information was used to obtain the certification required by Rule 6-6.5 or 6-6.12.

6-6.4. Any change in farming operation or ownership that would result in a change in the number or location of certified irrigated acres shall be reported to the LRNRD no later than December 31 of the calendar year in which the change occurred. Any change in use of a regulated well used for purposes other than irrigation that would result in a change in that well's certification shall be reported to the LRNRD no later than December 31 of the calendar year in which the change occurred. The Board may reject such changes if it finds that such changes would cause an increase in Nebraska's consumptive use as calculated pursuant to the Republican River Compact or would have detrimental effects on other ground water users or on surface water appropriators.

6-6.5. No later than January 1, 2005, each owner or operator of a regulated irrigation well shall certify (a) the well registration number for that well, (b) the number and location of all acres irrigated at least once by that well between January 1, 1999 and December 31, 2004, and (c) the maximum number of acres irrigated by that well in any one (1) year within that time period. Such certification shall be on forms provided by the LRNRD and shall be accompanied by applicable records from the U.S.D.A. Farm Service Agency and/or the County Assessor and such other information as requested by the LRNRD to verify the information certified.

6-6.6. The Board may take action to approve, modify and approve, or reject the certifications provided by owners and/or operators pursuant to Rule 6-6.5. The number and location of certified irrigated acres, which shall be approved for each such irrigation well, shall be determined at a public meeting of the Board after consideration of the following:

6-6.6.1. The information provided on and with the certification filed in accordance with Rule 6-6.5;

6-6.6.2. Any water use reports for that well filed in accordance with Rule 6-5;

6-6.6.3. U.S.D.A. Farm Service Agency records or County Assessor records;

6-6.6.4. Aerial photographs; and

6-6.6.5. Other information available to and deemed relevant by the Board.

6-6.7. Only those acres that are actually capable of being supplied with ground water through irrigation works, mechanisms or facilities existing at the time of certification may be approved as certified acres by the Board.

6-6.8. Any acres that are changed from irrigated to non-irrigated in the County Assessor's office, shall permanently forfeit the certification for those acres and they will not be considered certified acres for purposes of allocating water for irrigation.

6-6.9. If certification is not filed pursuant to Rule 6-6.5 to 6-6.7 for an irrigation well constructed prior to July 26, 2004, the well shall be an illegal water well as that term is defined in Rule 4-1.26.

6-6.10. The Board shall not certify any irrigated acres for an illegal water well, as that term is defined in Rule 4-1.26, and an illegal water well shall receive no future

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allocation of water until such certification has been filed and until the Board has approved or modified and approved that certification. Certification of acres can be approved for any such well if and when the deficiency that caused that well to be an illegal water well is corrected.

6-6.11. The Board may approve a change in the location of certified irrigated acres on contiguous property when the owner or operator of a regulated well changes to the use of an alternative delivery system or changes the location of the current delivery system. New acres not previously irrigated or certified may be certified if previously certified acres are removed from certification and the new acres are on the same contiguous property as the previously certified acres. The number of acres to be removed from certification must equal the number of newly certified acres to qualify for approval.

6-6.12. No later than June 1, 2005, each owner or operator of a regulated well used for purposes other than irrigation shall certify (1) the well registration number for that well, (2) the nature and location of the use of the water withdrawn from that well, (3) the measured or estimated average annual quantity and the maximum quantity of water withdrawn from that well between January 1, 2004, and December 31, 2004, and a description of the method used to determine that quantity, (4) if the well was constructed before December 9, 2002, but has not yet been used for its intended purpose, the quantity of water proposed to be withdrawn from that well in the future, and (5) if the owner or operator of the well desires that the annual quantity of use to be certified for that well be in excess of the quantity historically withdrawn by that well, the quantity proposed and an explanation why that quantity is necessary to accomplish the purpose for which the well is used. Such certification shall be on forms provided by the LRNRD and shall be accompanied by such information as requested by the LRNRD to verify the information certified.

6-6.13. Any new or expanded municipal, commercial or industrial use shall be considered to be a "certified" use so long as it is offset pursuant to the procedures described in Rule 7-5.

6-6.14. No later than July 15, 2005, the Board shall take action to approve, modify and approve, or reject the certifications provided by the owners and/or operators of non-irrigation wells pursuant to Rule 6-6.12. Such action shall be taken after reviewing the information provided by the owner or operator of the well and any other information available to and deemed relevant by the Board. The Board's approval of the certification for such a well shall not, by itself, limit the quantity of water that can be withdrawn by that well in 2005 or any subsequent year. Any such limitations on the quantity that can be withdrawn annually from that well will be imposed through the Board's allocation of water to that well pursuant to the LRNRD's Rules and Regulations. The Board may use the information provided through such certification if and when it determines the amount to be allocated to that well.

6-6.15. Only those non-irrigation uses that are actually capable of being supplied with ground water through works, mechanisms or facilities existing at the time of certification may be approved as certified uses by the Board.

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6-6.16. If no certification is filed pursuant to Rule 6-6.12 for a regulated well constructed prior to June 1, 2005, and used for other than irrigation purposes, that well shall not be used until such certification has been filed with the LRNRD and approved by the Board.

6-6.17. Certification shall not be approved by the Board for any regulated non-irrigation well, which is an illegal water well as that term is defined by Rule 4-1.26 of the LRNRD's Rules and Regulations. The Board may approve such certification if and when the deficiency that caused the well to be an illegal water well is corrected.

RULE 6-7 WATER SHORT YEAR ADMINISTRATION

6-7.1. No later than October 15, 2005 and October 15 of each following year, the DNR shall notify the LRNRD of the potential for a Water Short Year. Notification of updates to such determinations shall be provided monthly, or more often as requested, through the following June 30th at which time the final determination shall be made.

6-7.2. Upon receiving notice of the potential designation of a Water Short Year, the LRNRD shall provide notice to irrigators of this designation by publishing said notice in newspapers of general circulation in the LRNRD and shall place said notice on the LRNRD website.

6-7.3. There will be no further reductions to allocations or certified irrigated acres needed to maintain compliance with the Republican River Compact without Board approval following a Public Hearing.

RULE 6-8 INCENTIVE PROGRAM

Unless permitted by the rules and regulations established by individual incentive programs, no certified acres may be enrolled in incentive programs sponsored by or funded by the District if such certified acres do not have a history of use in four (4) of the previous six (6) years.

These incentive programs may include any Federal, State, or Local programs that have the effect of reducing the LRNRD's overall consumptive use. Subject to State law, the LRNRD may also raise the money necessary to provide cost share for incentive programs it utilizes. If sufficient irrigated acres are retired, through the use of incentive programs, above what is needed to meet the requirements of the Republican River Compact, the LRNRD may re-evaluate and alter the allocation previously set per irrigated acre.

Participation in an incentive program shall not result in the permanent loss of an allocation unless the acres involved are changed from irrigated status to non-irrigated status with the County Assessor. Upon completion of the enrollment period required by the incentive program, the certified irrigated acres will be granted an allocation prorated to the years remaining in the allocation period.

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CHAPTER 7 – MANAGEMENT OF USES

RULE 7-1 GROUND WATER TRANSFER FOR IRRIGATION, PUBLIC WATER SUPPLIES AND INDUSTRIAL PURPOSES

7-1.1. Transfers for Irrigation Purposes: The LRNRD finds that the transfer of ground water off of the overlying land for irrigation purposes may contribute to conflicts between ground water users and surface water appropriators, and to disputes over the Republican River Compact. For those reasons, and except as described below, the LRNRD hereby closes all of the Management Area to the withdrawal and transfer of ground water off the overlying land or otherwise changing the location of use of ground water for irrigation purposes.

7-1.2. Allocations of ground water shall not be transferred except as provided pursuant to Rule 6-6.11.

7-1.3. Transfers by Public Water Suppliers: Pursuant to Neb. Rev. Stat. §§ 46-739(k) and 46-742, the District is required to allow the withdrawal and transport of ground water when a public water supplier providing water for municipal purposes receives a permit from the Department pursuant to the Municipal and Rural Domestic Ground Water Transfers Permit Act. Except to the extent that a public water supplier has obtained a permit under the Municipal and Rural Domestic Ground Water Transfers Permit Act, the LRNRD hereby closes all of the Management Area to the withdrawal and transfer of ground water off of the overlying land or otherwise changing the location of use of ground water for municipal purposes. A public water supplier shall notify the District at the time that it files an application with the Department for a permit under the Municipal and Rural Domestic Ground Water Transfers Permit Act.

7-1.4. Transfers by Commercial and Industrial Water Users: The District will allow industrial ground water users to transfer water pursuant to a permit granted by the Department, or pursuant to written notice filed with the DNR, as provided for in the Industrial Ground Water Regulatory Act. Except to the extent that a commercial or industrial water user has obtained a permit from the Department under the Industrial Ground Water Regulatory Act, the LRNRD hereby closes all of the Management Area to the withdrawal and transfer of ground water off of the overlying land or otherwise changing the location of use of ground water for commercial or industrial uses. A commercial or industrial water user shall notify the District at the time that it files an application with the Department for a permit under the Industrial Ground Water Regulatory Act.

7-1.5. Department Review of Permit Applications: Upon receipt of an application by a public water supplier seeking a permit under the Municipal and Rural Domestic Ground Water Transfers Permit Act, an application by a commercial or industrial water user under the Industrial Ground Water Regulatory Act, or a person seeking a permit to transfer ground water to another state, the Department shall consult with the District. As part of that consultation, the District shall provide the

Department with whatever relevant information that it may have in its possession, including but not limited to, the following:

7-1.5.1. The applicant's unmet offset obligations, if any;

7-1.5.2. The amount of water in the applicant's "offset account" as defined in Rule 7-5 below;

7-1.5.3. Whether the applicant will need to provide an offset for the proposed water use in order to maintain compliance with the Republican River Compact; and

7-1.5.4. Whether the applicant will need to mitigate any effects to surrounding ground water users or surface water appropriators;

RULE 7-2 ALLOCATION

7-2.1. The use of ground water from all regulated water wells shall be allocated by the LRNRD. Allocations will be set after considering: (1) the relationship between wells and surface waters and the impact of well usage on stream flow; (2) whether ground water levels are declining; and (3) such other factors as the Board determines may be relevant to the appropriate amount of water to be withdrawn.

7-2.2. GENERAL PROVISIONS:

7-2.2.1. Allocation – 45 acre-inches for the allocation period.

7-2.2.2. Base Allocation – 9 acre-inches per year for all regulated wells for all certified acres.

7-2.2.3. Allocation Period – Five (5) years; January 1, 2008 through December 31, 2012.

7-2.2.4. Base Certification – 325,876 certified irrigated acres

7-2.2.5. Base Allocation Year – January 1st to December 31st

7-2.2.6. The LRNRD's net depletions shall not exceed twenty-six percent (26%) of the State's allowable ground water depletions as determined by the Republican River Compact Administration Ground Water Model. It may be necessary to adjust the base allocation, as defined in Rule 7-2.2.2., within the five-year allocation period in order to meet this requirement.

7-2.2.7. The District's base allocation may be increased or decreased proportionately with any increase or decrease in the water supply conditions. Such increase or decrease will become effective only after the Board holds a public hearing.

7-2.2.8. Pursuant to Neb. Rev. Stat. § 46-739, the LRNRD may establish different provisions for restriction of water wells that were constructed after January 1, 2001.

7-2.3. SUPPLEMENTAL WELLS: If land with a surface water appropriation is also served by a regulated well, any surface water used on that land or leased or purchased by the District or the DNR shall be deducted from the allocation of ground water to the regulated well serving that land (not to exceed the base allocation).

7-2.4. PENALTY: If at the end of an allocation period an operator has exceeded his or her allocation, the allocation for the next allocation period shall be reduced by the

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number of acre-inches by which said allocation was exceeded in the prior allocation period for the first three inches of overuse and by twice the number of inches of overuse for the fourth and subsequent inches of overuse. Nothing in Rule 7-2.4 negates applicability of Rule 7-2.5.

7-2.5. An operator must have a positive balance in his or her allocation before using water in any year of an allocation period. The LRNRD shall notify landowners and/or operators anytime the balance of their allocation goes below zero.

7-2.6. For irrigation purposes, if at the end of the allocation period, an operator has consumed less than his or her allocation, he or she may carry the reserve or unused portion forward to the subsequent allocation period. Reserve ground water must be used for the same certified acres for which the water was originally allocated. It is expected that certain operators will be carrying forward into the current allocation period the unused portion of their 2005-2007 allocation, not to exceed the base allocation (11 or 12 inches depending upon geographic location within the District) for that period.

7-2.7. Certified irrigated acres participating in the Federal Conservation Reserve Program (CRP), EQIP, or similar programs shall not receive an allocation during the term of participation. Certified irrigated acres removed from these programs shall be granted an allocation that is prorated for the remaining years of the allocation period provided that those acres have remained in irrigated status with the County Assessor.

7-2.8. The LRNRD may review any allocation or reduction control imposed and shall adjust allocations or reductions to accommodate or otherwise reflect findings of such review consistent with the integrated management objectives. Such review shall consider more accurate data or information that was not available at the time of the allocation or reduction order, designation of a Water Short Year and such other factors as the LRNRD deems appropriate.

7-2.9. The LRNRD may institute formal adjudicatory proceedings or take any other legal action authorized or permitted by law to prohibit further withdrawal of ground water from any regulated well whenever an operator has exhausted his or her allocation during or before the end of any allocation period or has in any other way violated the amount, limitations, or conditions of his or her allocation or violated any other rules of the LRNRD. In the event of such action, no ground water may be withdrawn until the operator has adhered to LRNRD Rules and Regulations.

RULE 7-3 RESERVED

RULE 7-4 LIMIT OR PREVENT THE EXPANSION OF NEW ACRES

7-4.1. Beginning on January 1, 2005, no irrigation well may be used to irrigate any acre that was not irrigated with ground water at some time between January 1, 1999 and December 31, 2004.

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RULE 7-5 MUNICIPAL, COMMERCIAL, AND INDUSTRIAL USES

7-5.1. Municipal Use Accounting and Offsets

7-5.1.1. Allocation Amount – The minimum annual allocation for a municipality located within the boundaries of the LRNRD may be the greater of either 1) the amount of ground water authorized by a permit issued pursuant to the Municipal and Rural Domestic Ground Water Transfers Permit Act, or 2) the governmental, commercial, and industrial uses of the municipality plus a per capita allowance of 225 gallons per person per day. Persons served by a municipality outside of its corporate limits shall be considered part of the municipality's population if such service begins prior to January 1, 2026.

7-5.1.2. Establishment of a Baseline – In order to define what are new and expanded consumptive uses within the municipality, the District must establish a baseline of existing municipal uses as of July 14, 2006, which is the date on which Neb. Rev. Stat. § 46-740(3) became effective.

7-5.1.2.1. To define this baseline, the District shall 1) collect monthly data for ground water pumped during each twelve (12) month period beginning August 1 and ending July 31 for the years 2001 to 2006, measured in gallons, and 2) collect monthly discharge data for the same period (if available) measured in gallons. The District will subtract the amount discharged from the amount pumped for each twelve (12) month period to determine the total amount of water consumptively used over each twelve (12) month period during the August 2001 to July 2006 timeframe. The largest amount of water consumptively used over a twelve (12) month period from August 1 to July 31 during these five (5) twelve (12) month periods will be the baseline. If the municipality does not discharge wastewater to a natural watercourse but uses lagoons, then the highest amount of ground water pumped during a twelve (12) month period starting August 1 and ending July 31 between 2001 and 2006 will be considered the baseline use unless through the variance process the municipality can establish that the baseline amount should be reduced.

7-5.1.3. Accounting System – Starting with the period beginning on August 1, 2007, and based upon the calculations made using the foregoing formula, the total amount of ground water used by each municipality within the Management Area will be measured for each year (August 1 through July 31) and be compared to the baseline calculated in Rule 7-5.1.2.

7-5.1.3.1. The total amount of ground water used annually by the municipality shall be determined by, 1) collecting monthly data for the amount of ground water pumped between August 1 and July 31, measured in gallons, and 2) collecting monthly discharge data (if available) between August 1 and July 31, measured in gallons. The annual amount discharged shall be subtracted from the annual amount pumped to determine the total amount of water consumptively used over each twelve (12) month period. If the municipality does not discharge wastewater to a natural watercourse but uses lagoons, then the amount of ground water pumped between August 1 and July 31 will be used to determine the annual amount of ground water used.

7-5.1.3.2. Between August 2007 and January 1, 2026, the District shall, for each municipality, document the difference between each subsequent annual calculation and the baseline. For each five (5) year increment between August 1, 2007 and January 1, 2026, the District shall maintain a cumulative total of the amount of consumptive use that exceeds the baseline and the consumptive use that is less than the baseline.

7-5.1.3.3. If it is determined at the end of any five (5) year increment between August 1, 2007 and January 1, 2026, that the cumulative total exceeds the baseline amount, measures will be taken by the LRNRD within six (6) months thereafter to offset the exceedence, if:

7-5.1.3.3.1. The municipality's water use remains below or equal to the amount of ground water authorized by a permit that was issued pursuant to the Municipal and Rural Domestic Ground Water Transfers Permit Act, if applicable; or

7-5.1.3.3.2. The municipality's water use remains below or equal to the governmental, commercial and industrial uses of the municipality plus a per capita allowance of two hundred and twenty-five (225) gallons per person per day; or

7-5.1.3.3.3. The baseline exceedence is due to any new or expanded single commercial or single industrial development served by any municipality which, after July 14, 2006, commences water use resulting in the consumptive use of water in amounts less

than twenty-five (25) million gallons annually.

7-5.1.3.4. If it is determined at the end of any five (5) year increment between August 1, 2007 and January 1, 2026 , that the cumulative total exceeds the baseline amount, measures will be taken by that municipality within six (6) months thereafter, with prior approval from the Board, to offset the exceedence, if:

7-5.1.3.4.1. The municipality's water use exceeds the amount of ground water authorized by a permit that was issued pursuant to the Municipal and Rural Domestic Ground Water Transfers Permit Act, if applicable; or

7-5.1.3.4.2. The municipality's water use exceeds the governmental, commercial and industrial uses of the municipality plus a per capita allowance of two hundred and twenty-five (225) gallons per person per day; or

7-5.1.3.4.3. The baseline exceedence is due to any new or expanded single commercial or single industrial development served by any municipality which, after July 14, 2006, commences water use resulting in the consumptive use of water in amounts greater than twenty-five (25) million gallons annually.

7-5.1.3.5. The municipality must provide an annual report to the District describing the nature of the offsets being implemented pursuant to Rule 7-5.1.3.4. That report shall describe the nature of the offset, along with the timing, location, and amount of the offset.

7-5.1.3.6. An "offset account" shall be created for each municipality. For each year that the amount of consumptive use is less than the baseline, a credit in that amount shall be made to that municipality's offset account. For each year that the amount of consumptive use is greater than the baseline, a debit in that amount shall be made to that municipality's offset account. If it is determined at the end of any five (5) year increment between August 1, 2007 and January 1, 2026, that the cumulative total of consumptive use is less than the baseline amount, that below-baseline amount shall be carried over into the next five (5) year period in that municipality's offset account.

7-5.1.3.6.1. If, by January 1, 2026, there is a credit in

any municipality's offset account, that credit shall be deposited into the District's water bank.

7-5.1.3.6.2. The District shall be responsible for maintaining and managing the offset accounting system for each municipality within the Management Area.

7-5.1.3.7. The District shall enter into agreements with each municipality within the Management Area regarding the nature of governmental uses. This Agreement shall specify the type of use and the amount of water used.

7-5.1.3.8. Each municipality within the Management Area shall track all new or expanded (i.e., post-July 14, 2006) consumptive water uses by all single commercial and single industrial users served by that municipality, the amount of water used for governmental uses within that municipality, the permanent population of the municipality, and the persons served by the municipal system outside of its corporate limits if such service begins prior to January 1, 2026.

7-5.1.3.8.1. The data collected by the municipality pursuant to Rules 7-5.1.3.1. and 7-5.1.3.8. for the period from August 1st through July 31st of each year shall be submitted to the District no later than October 1st of that year.

7-5.1.3.8.2. The municipality shall also submit to the District by no later than October 1st of each year a report documenting its calculation of the persons served by the municipal system outside of its corporate limits. The District may either accept or reject the municipality's calculations. If the District rejects the municipality's calculations, the District may rely upon whatever information is available to determine the number of persons so served.

7-5.1.3.9. Any permanent reduction in consumptive use of water within the Management Area associated with municipal growth including governmental, industrial, and commercial growth (e.g., by taking irrigated acres out of production), between July 14, 2006 and January 1, 2026, shall accrue to the LRNRD's water bank to be used in whole or in part to offset increased consumptive use elsewhere within the Management Area.

7-5.1.3.9.1. The District shall determine the amount of reduced consumptive use that is due to the growth of a municipality based on the Management Area average net crop irrigation requirement.

7-5.1.3.9.1.1. The average net crop irrigation requirement will be calculated by taking the weighted average net crop irrigation requirement of the five major crops grown in the last five years worth of crop type data from Ag Statistics. The net crop irrigation requirement for each crop will be determined from available data.

7-5.1.3.9.2. If the permanent reduction in consumptive use is associated with the retirement of irrigated acres, and those acres were previously irrigated with a ground water well, the current landowner of such well shall, within 180 days, either decommission the well, or modify and equip the well to pump fifty (50) gallons per minute or less and only use it for range livestock, monitoring, observation, or any other nonconsumptive or de minimis use approved by the District.

7-5.1.3.9.3. The District shall notify in writing the previous landowner and the municipality that the consumptive use calculated in Rule 7-5.1.3.9.1 has been transferred to the District's water bank.

7-5.1.3.9.4. If the permanent reduction in consumptive use results in the retirement of certified irrigated acres, those acres shall be decertified by the District.

7-5.1.4. Water Conservation Plan – Each municipality of the first class and second class that are located within the Management Area shall file a conservation plan with the District within three (3) months following the effective date of this Integrated Management Plan.

7-5.1.4.1. Each municipality shall update and file a new conservation plan with the District no less than every three (3) years

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after the initial conservation plan is filed.

7-5.1.4.2. During the three (3)-year period after the plans are initially filed, the District shall determine whether to develop guidelines to describe the information to be contained in future conservation plans.

7-5.1.4.3. Although not required, Villages located within the Management Area may submit a conservation plan to the District. This may be used by the District and the Village as an information and education tool to promote conservation practices and efforts.

7-5.1.5. Post-January 1, 2026 Allocation. – On or after January 1, 2026, the base amount for an annual allocation to a municipality shall be determined as the greater of either (a) the amount of water authorized by a permit issued pursuant to the Municipal and Rural Domestic Ground Water Transfer Permit Act or (b) the greatest annual use prior to January 1, 2026, for uses specified in Neb. Rev. Stat. § 46-740(3)(b) plus the per capita allowance described in Neb. Rev. Stat. § 46-740(3)(b)(ii).

7-5.1.5.1. On and after January 1, 2026, increases in the consumptive use of water by a municipality that result in a decrease in streamflow shall be addressed by the Integrated Management Plan pursuant to controls or incentive programs adopted pursuant to Neb. Rev. Stat. § 46-715. Each municipality may be subject to controls adopted pursuant to such section for amounts in excess of the allocations.

7-5.2. Non-Municipal Commercial and Industrial Use Allocation, Accounting and Offsets

7-5.2.1. Allocation – Prior to January 1, 2026, the annual allocation amount for non-municipal commercial or industrial users shall be the greater of either 1) the amount specified in a permit issued pursuant to the Industrial Ground Water Regulatory Act, or 2) the amount necessary to achieve the commercial or industrial use, including all new or expanded uses that consume less than twenty-five (25) million gallons annually.

7-5.2.2. Establishment of Baseline – In order to define what are new or expanded single commercial or industrial developments served by non-municipal wells which, after the operative date of Neb. Rev. Stat. § 46-740(5), commence water use, the District must establish a baseline of existing uses as of July 14, 2006.

7-5.2.2.1. To define this baseline, the District shall 1) collect monthly data for ground water pumped during each twelve (12) month period beginning August 1 and ending July 31 for the years 2001 to 2006, measured in gallons, and 2) collect monthly discharge data for the same period (if

available) measured in gallons. The District will subtract the amount discharged from the amount pumped for each twelve (12) month period to determine the total amount of water consumptively used over each twelve (12) month period during the August 2001 to July 2006 timeframe. The largest amount of water consumptively used over a twelve (12) month period from August 1 to July 31 during these five (5) twelve (12) month periods will be the baseline. If the non-municipal commercial or industrial user does not discharge wastewater to a natural watercourse but uses lagoons, then the highest amount of ground water pumped during a twelve (12) month period starting August 1 and ending July 31 between 2001 and 2006 will be considered the baseline use unless through the variance process the non-municipal commercial or industrial user can establish that the baseline amount should be reduced.

7-5.2.3. Accounting System – Starting with the period beginning on August 1, 2007, and based upon the calculations made using the foregoing formula, the total amount of ground water used by each non-municipal commercial or industrial user within the Management Area will be measured for each year (August 1 through July 31) and be compared to the baseline calculated in Rule 7-5.2.2.

7-5.2.3.1. The total amount of ground water used annually by the non-municipal commercial or industrial users shall be determined by, 1) collecting monthly data for the amount of ground water pumped between August 1 and July 31, measured in gallons, and 2) collecting monthly discharge data (if available) between August 1 and July 31, measured in gallons. The annual amount discharged shall be subtracted from the annual amount pumped to determine the total amount of water consumptively used over each twelve (12) month period. If the non-municipal commercial or industrial user does not discharge wastewater to a natural watercourse but uses lagoons, then the amount of ground water pumped between August 1 and July 31 will be used to determine the annual amount of ground water used.

7-5.2.3.2. Between August 2007 and January 1, 2026, the District shall, for each non-municipal commercial and industrial user, document the difference between each subsequent annual calculation and the baseline. For each five (5) year increment between August 1, 2007 and January 1, 2026, the District shall maintain a cumulative total of the amount of consumptive use that exceeds the baseline and the

consumptive use that is less than the baseline.

7-5.2.3.3. If it is determined at the end of any five (5) year increment between August 1, 2007 and January 1, 2026, that the cumulative total exceeds the baseline amount, measures will be taken by the LRNRD within six (6) months thereafter to offset the exceedence, if:

7-5.2.3.3.1. The non-municipal commercial or industrial user's water use remains below or equal the amount of ground water authorized by a permit that was issued pursuant to the Industrial Ground Water Regulatory Act, if applicable; and

7-5.2.3.3.2. The baseline exceedence is due to any new or expanded single commercial or industrial development served by a non-municipal well which, after July 14, 2006, commences water use resulting in the consumptive use of water in amounts less than twenty-five (25) million gallons annually.

7-5.2.3.4. If it is determined at the end of any five (5) year increment between August 1, 2007 and January 1, 2026, that the cumulative total exceeds the baseline amount, measures will be taken by that non-municipal commercial or industrial user within six (6) months thereafter, with prior approval from the Board, to offset the exceedence, if:

7-5.2.3.4.1. The non-municipal commercial or industrial user's water use exceeds the amount of ground water authorized by a permit that was issued pursuant to the Industrial Ground Water Regulatory Act, if applicable; or

7-5.2.3.4.2. The baseline exceedence is due to any new or expanded single commercial or single industrial development served by any non-municipal well which, after July 14, 2006, commences water use resulting in the consumptive use of water in amounts greater than twenty-five (25) million gallons annually.

7-5.2.3.5. The non-municipal commercial and industrial users must provide an annual report to the District describing the nature of the offsets being implemented pursuant to Rule 7-5.2.3.4. That report shall describe the nature of the offset, along with the timing, location, and amount of the

offset.

7-5.2.3.6. An "offset account" shall be created for each non-municipal commercial and industrial user. For each year that the amount of consumptive use is less than the baseline, a credit in that amount shall be made to that non-municipal commercial or industrial user's offset account. For each year that the amount of consumptive use is greater than the baseline, a debit in that amount shall be made to that non-municipal commercial or industrial user's offset account. If it is determined at the end of any five (5) year increment between August 1, 2007 and January 1, 2026, that the cumulative total of consumptive use is less than the baseline amount, that below-baseline amount shall be carried over into the next five (5) year period in that non-municipal commercial or industrial user's offset account.

7-5.2.3.6.1. If, by January 1, 2026, there is a credit in any non-municipal commercial or industrial user's offset account, that credit shall be deposited into the District's water bank.

7-5.2.3.6.2. The District shall be responsible for maintaining and managing the offset accounting system for each non-municipal commercial and industrial user within the Management Area.

7-5.2.3.7. Each commercial or industrial water user within the Management Area shall track all of its new or expanded (i.e., post-July 14, 2006) consumptive water uses.

7-5.2.3.7.1. The data collected by each commercial or industrial water user pursuant to Rules 7-5.2.3.1. and 7-5.2.3.7. for the period from August 1 through July 31 of each year shall be submitted to the District no later than October 1 of that year.

7-5.2.3.8. Any permanent reduction in consumptive use of water within the Management Area associated with non-municipal commercial or industrial use (e.g., by taking irrigated acres out of production), between July 14, 2006 and January 1, 2026, shall accrue to the LRNRD's water bank to be used in whole or in part to offset increased consumptive use elsewhere within the Management Area.

7-5.2.3.8.1. The District shall determine the amount of reduced consumptive use that is due to the growth of a non-municipal commercial or industrial use based on the Management

Area average net crop irrigation requirement.

7-5.2.3.8.1.1 The average net crop irrigation requirement will be calculated by taking the weighted average net crop irrigation requirement of the five major crops grown in the last five years worth of crop type data from Ag Statistics. The net crop irrigation requirement for each crop will be determined from available data.

7-5.2.3.8.2. If the permanent reduction in consumptive use is associated with the retirement of irrigated acres, and those acres were previously irrigated with a ground water well, the current landowner of such well shall, within 180 days, either decommission the well, or modify and equip the well to pump fifty (50) gallons per minute or less and only use it for range livestock, monitoring, observation, or any other nonconsumptive or de minimis use approved by the District.

7-5.2.3.8.3. The District shall notify in writing the previous landowner and the non-municipal commercial or industrial user that the consumptive use calculated in Rule 7-5.2.3.8.1. has been transferred to the District's water bank.

7-5.2.3.8.4. If the permanent reduction in consumptive use results in the retirement of certified irrigated acres, those acres shall be decertified by the District.

INTEGRATED MANAGEMENT PLAN
Jointly Developed by the
DEPARTMENT OF NATURAL RESOURCES
And the
LOWER REPUBLICAN NATURAL RESOURCES DISTRICT

AUTHORITY

This Integrated Management Plan (IMP) was prepared by the Board of Directors of the Lower Republican Natural Resources District (LRNRD) and the Nebraska Department of Natural Resources (DNR) in accordance with the Nebraska Ground Water Management and Protection Act, Chapter 46, Article 7.

BACKGROUND

In 1943 the States of Colorado, Kansas and Nebraska entered into the Republican River Compact (the "Compact") with the approval of the United States Congress. The Compact provides for the equitable apportionment of the "virgin water supply" of the Republican River Basin. In 1998, following several years of dispute about Nebraska's consumptive use of water within the Basin, Kansas filed an original action in the United States Supreme Court against the States of Nebraska and Colorado, seeking, among other things, to include ground water in the calculation of the virgin water supply and consumptive use. After several rulings by the Court and its Special Master (including a recommendation that the depletions to stream flow from the use of ground water be included in the virgin water supply and be included in the calculations of each State's beneficial consumptive use), and several months of negotiation, the three States entered into a comprehensive Final Settlement Stipulation (FSS). That FSS was approved by the Supreme Court on May 19, 2003 and the Special Master's final report approving the Republican River Compact Administration Ground Water Model developed by the three States for use in computing stream flow depletions resulting from ground water use was submitted to the Court on September 17, 2003.

The State of Nebraska is responsible for compliance with the Compact.

Ground water use within the Republican River Basin is regulated by four Natural Resource Districts: the LRNRD, the Upper Republican Natural Resources District (URNRD), the Middle Republican Natural Resources District (MRNRD), and the Tri-Basin Natural Resources District (Tri-Basin) (collectively referred to below as the "Districts"). Both prior and subsequent to the approval of the FSS, the DNR conducted and participated in several meetings with the LRNRD during which it explained that, in order for the State of Nebraska to achieve and maintain compliance with the terms of the FSS and the Compact, it would be necessary to undertake the following: (1) to continue the moratorium on new surface water appropriations and new ground water wells, (2) to

reduce all ground water pumpage from historic levels across the entire Basin, and (3) to further reduce ground water pumping to comply with the Compact in water short years. The foregoing steps were to be accomplished to the extent possible through the use of incentive programs to reduce consumptive use of water. Similar discussions were held between the DNR and each of the other Basin Natural Resources Districts regarding the need (1) to accurately measure actual ground water pumpage and surface water diversions throughout the Basin and within each District; (2) for the Tri-Basin to maintain, at sufficient levels to offset depletions to the Republican River caused by ground water pumping within the Republican River Compact area within Tri-Basin, the Compact Imported Water Supply that Nebraska receives because of discharges from the "ground water mound"; and, 3) for each of the Districts other than the Tri-Basin to reduce their ground water pumping from their "1998-2002 baseline pumping volumes," which the DNR has defined as follows:

URNRD – 531,763 acre-feet

MRNRD – 309,479 acre-feet

LRNRD – 242,289 acre-feet

The DNR, through the use of the Republican River Compact Administration Ground Water Model, has also determined each Natural Resources District's depletions to streamflow for the 1998-2002 period (referred to below as the "1998-2002 baseline depletion") and the related depletion proportion (referred to below as the "1998-2002 baseline depletion proportion"):

URNRD – 74,161 acre-feet (44% of the depletions)

MRNRD – 52,168 acre-feet (30% of the depletions)

LRNRD – 43,954 acre-feet (26% of the depletions)

The percentage of allowable ground water depletions for each Republican River Natural Resources District was based on the proportion of the average ground water depletions caused by ground water pumping within each District that occurred during the baseline period from 1998-2002 as determined by model runs of the Republican River Compact Administration Ground Water Model, with ground water pumping within each District alternated between being turned off and then being turned on. The pumping volumes used to make these determinations will be evaluated within the next five years to determine their accuracy as compared with metered pumping volumes. If the baseline pumping volumes are found to be in error, the pumping volumes for the 1998-2002 period will be revised and the percentage of depletions for this period will be readjusted based on the new pumping volumes.

On June 24, 2005, the first Integrated Management Plan (2005 IMP) adopted by the LRNRD and the DNR became effective. That 2005 IMP described the ground water rules and regulations for the 2005-2007 period. Among other things, that 2005 IMP

provided for a base ground water allocation of 12 acre-inches per year (36 acre-inches for the allocation period) for all regulated wells located west of U.S. Highway 183, and a base ground water allocation of 11 acre-inches per year (33 acre-inches for the allocation period) for all regulated wells located east of U.S. Highway 183. The 2005 IMP also allowed the landowners to carry forward unused allocations.

Since adoption of the 2005 IMP, efforts have been taken to implement incentive programs, studies, and research to further our understanding and ability to comply with the Republican River Compact and FSS. The LRNRD and the DNR now seek to adopt and implement a revised IMP for the regulation of water resources within the District as required by the laws of the State of Nebraska, specifically the Ground Water Management and Protection Act.

The LRNRD will meet its responsibility under Neb. Rev. Stat. §46-715 of the Ground Water Management and Protection Act, including meeting the obligations under the FSS, by adopting revised Rules and Regulations to implement this 2007 IMP. The LRNRD understands that the URNRD and the MRNRD have also revised their 2005 IMPs, and have chosen to adopt a "compliance standard" whereby they have agreed that their use of ground water shall be within the allocation granted to them as determined by the 1998-2002 baseline pumping volumes, reduced by a certain percentage. They have also agreed that they will be assigned their proportionate share of stream flow depletions as calculated by the 1998-2002 baseline depletion percentages. The failure of any one Natural Resources District to adopt, implement or enforce IMPs adequate to meet their proportionate share of the responsibility to achieve and maintain Nebraska's compliance with the Compact and the FSS shall not itself require any additional action by the other Districts.

GOALS AND OBJECTIVES

The LRNRD and the DNR have adopted the following Goals and Objectives.

Goals:

1. Ensure that ground water and surface water users within the LRNRD assume their share of the responsibility to keep Nebraska in compliance with the Republican River Compact. Neither the LRNRD or DNR will require the Integrated Management Plan to be amended solely for the purpose of changing the responsibility of water users within the LRNRD based on the failure of the other Basin NRDs to implement or enforce an Integrated Management Plan to meet their share of the responsibility to keep Nebraska in compliance with the Republican River Compact.

2. Provide that LRNRD's share of that responsibility be distributed in an equitable manner and, to minimize to the extent possible, adverse economic, social and environmental consequences.

3. To sustain a balance between water uses and water supplies within the District so that the economic viability, social and environmental health, safety, and welfare of the District can be achieved and maintained for both the near and long term.

Objectives:

1. With limited exceptions, prevent the initiation of new or expanded uses of water that increase Nebraska's computed beneficial consumptive use of water within the LRNRD.

2. Cause the required reductions in water use to be achieved through a combination of regulatory and incentive programs designed to reduce beneficial consumptive use.

3. The DNR shall ensure that administration of surface water appropriations in the Basin is in accordance with the Compact and in full compliance with Nebraska law.

4. After taking into account any reduction in beneficial consumptive use achieved through basin-wide incentive programs, make such additional reductions in ground water use in Water Short Years as are necessary to achieve a reduction in beneficial consumptive use in the LRNRD in an amount proportionate to the total reduction in consumptive use that is needed in Nebraska above Guide Rock in such years. Basin-wide incentive programs will be used to achieve reductions in beneficial consumptive use. There will be no further reductions without Board approval following a Public Hearing.

5. The LRNRD and the DNR will investigate or explore methods to manage the impact of vegetative growth on stream flow.

6. The LRNRD and the DNR will investigate or explore augmentation projects that would add to or retime the water supply within the Basin. Such augmentation and retiming projects include, but are not necessarily limited to, the following:

    a. Leasing or purchasing surface water and/or ground water;
    b. Augmentation wells, both within and outside of the Republican River Basin;
    c. Exploring trans-basin diversion projects;
    d. Conjunctive management of surface water irrigation projects.

7. The LRNRD and DNR will investigate, explore, and evaluate the effectiveness of vegetation management projects that would add to the water supply within the Basin. The District's ground water allocation may be adjusted upwards if it is found that such projects result in a water savings.

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8. The LRNRD's net depletions shall not exceed twenty-six percent (26%) of the State's allowable ground water depletions as determined by the Republican River Compact Administration Ground Water Model. It may be necessary to adjust the base allocation, as defined in Rule 7-2.2.2., within the five-year allocation period in order to meet this requirement. The District's base allocation may be increased or decreased proportionately with any increase or decrease in the water supply conditions.

MAP

The area subject to this IMP is the geographic area within the boundaries of the Lower Republican Natural Resources District.

GROUND WATER CONTROLS

The authority for the ground water component of this IMP is the Nebraska Ground Water Management and Protection Act, Chapter 46, Article 7. The ground water controls for this integrated management plan that will be adopted and implemented by the LRNRD are those found in the **LOWER REPUBLICAN NATURAL RESOURCES DISTRICT GROUND WATER MANAGEMENT RULES AND REGULATIONS.**

SURFACE WATER CONTROLS – DEPARTMENT OF NATURAL RESOURCES

The authority for the surface water component of this IMP is the Nebraska Ground Water Management and Protection Act, Chapter 46, Article 7. The surface water controls that will be continued and/or begun by the DNR are as follows:

1. DNR shall continue to administer surface water under the prior appropriation system.
2. The DNR shall implement the following additional surface water administration as required by the Final Settlement Stipulation:
   A. To provide for regulation of natural flow between Harlan County Lake and Superior-Courtland Diversion Dam, Nebraska will recognize a priority date of February 26, 1948 for Kansas Bostwick Irrigation District, the same priority date as the priority date held by the Nebraska Bostwick Irrigation District's Courtland Canal water right.
   B. When water is needed for diversion at Guide Rock and the projected or actual irrigation supply is less than 130,000 acre-feet of storage available for use from Harlan County Lake as determined by the Bureau of Reclamation using the methodology described in Harlan County Lake Operation Consensus Plan attached as Appendix K to the Final Settlement Stipulation, Nebraska will close junior, and require compliance with senior, natural flow diversions of surface water between Harlan County Lake and Guide Rock.

C. Nebraska will protect storage water released from Harlan County Lake for delivery at Guide Rock from surface water diversions.

D. Nebraska, in concert with Kansas and in collaboration with the United States, and in the manner described in Appendix L to the Final Settlement Stipulation, will take actions to minimize the bypass flows at Superior-Courtland Diversion Dam.

3. Metering of all surface water diversions at the point of diversion from the stream will continue to be required. For surface water canals that are not part of a Bureau of Reclamation project, farm turnouts will be required to install and maintain a DNR approved measuring device by the start of the 2005 irrigation season. All measuring devices shall meet DNR standards for installation, accuracy and maintenance. All appropriators will be monitored to ensure that neither the rate of diversion nor the annual amount diverted exceeds that allowed by the applicable permit or by statute.
4. The DNR's moratorium on the issuance of new surface water permits was made formal by Order of the Director dated July 14, 2004. Exceptions may be granted by the DNR to the extent permitted by statute or to allow issuance of permits for existing reservoirs that currently do not now have such permits. Such reservoirs are limited to those identified through the Final Settlement Stipulation required inventory of reservoirs with over 15 acre-feet capacity.
5. All proposed transfers of surface water rights shall be subject to the criteria for such transfers as found in Neb. Rev. Stat. §§ 46-290 to 46-294.04 and related DNR rules or the criteria found in Neb. Rev. Stat. §§ 46-2,120 to 46-2,130 and related DNR rules.
6. The DNR completed the adjudication process within the LRNRD upstream of Guide Rock for the individual appropriators in the Republican River Basin in 2004. The results of that adjudication provided up-to-date records of the number and location of acres irrigated with surface water by such appropriators. Those records will be used by the DNR to monitor use of surface water and to make sure that unauthorized irrigation is not occurring. The DNR shall also be proactive in initiating subsequent adjudications whenever information available to the DNR indicates the need for adjudication as outlined by state statutes.
7. At this time, due to the already limited availability of surface water supplies, the DNR shall not require that surface water appropriators apply or utilize additional conservation measures or that they be subject to other new restrictions on surface water use, except as may be necessary to meet the goals and objectives of this plan and to maintain compliance with the Compact.
8. The DNR reserves the right to request, in the future, that this IMP be modified to require any such additional measures. In the event such a request is made, the DNR shall "allow the affected surface water appropriators and surface water project sponsors a reasonable amount of time, not to exceed one hundred eighty (180) days, unless extended by the DNR, to identify the

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conservation measures to be applied or utilized, to develop a schedule for such application and utilization, and to comment on any other proposed restrictions." Neb. Rev. Stat. § 46-716(2).

9. Where necessary, the Department may further restrict surface water appropriators to comply with the Compact.

INCENTIVE PROGRAMS

The LRNRD and DNR intend to establish and implement financial or other incentive programs to reduce beneficial consumptive use of water within the LRNRD. As a condition for participation in an incentive program, water users or landowners, and the LRNRD may be required to enter into and perform such agreements or covenants concerning the use of land or water as are necessary to produce the benefits for which the incentive program is established.

Such incentive programs may include any program authorized by state law and/or Federal programs such as, but not limited to, the Conservation Reserve Enhancement Program (CREP) and Environmental Quality Incentives Program (EQIP) operated by the U.S. Department of Agriculture.

MONITORING PROGRAM

The DNR and the LRNRD shall develop a plan to gather and evaluate data, information, and methodologies that could be used to implement Neb.Rev.Stat. §§ 46-715 to 46-717, increase understanding of the surface water and hydrologically connected ground water system, and test the validity of the conclusions and information upon which the integrated management plan is based.

MODIFICATIONS TO THE INTEGRATED MANAGEMENT PLAN

Modifications to this Integrated Management Plan including the rules and regulations contained within will require an agreement by both the District and the Department as to the proposed changes. After the proposed changes have been agreed to, a joint hearing on those changes will be required. Following the joint hearing, the District and the Department shall issue an order reflecting the decision made.

INFORMATION CONSIDERED

Information used in the preparation and to be used in the implementation of this integrated management plan can be found in the simulation runs of the Republican River Compact Administration Ground Water Model, the data tables of the Final Settlement Stipulation for the Republican River Compact, Chapters 3, 6 and 7 of the 1994 Lower Republican NRD Ground Water Management Plan and additional data on file with the LRNRD and the DNR.

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Appendix B: Middle Republican Natural Resources District

Integrated Management Plan

RULES and REGULATIONS

Ground Water Management Area

Established July 1, 1998
Effective February 1, 2008

And the

INTEGRATED MANAGEMENT PLAN

For the
Middle Republican
Natural Resources District
And The
Nebraska Department of
Natural Resources

Established January 1, 2005
Effective February 8, 2008

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Adopted May 18, 1998	
Established July 1, 1998	
Revised July 1, 1999	
Revised July 1, 2000	
Revised November 17, 2003	
Revised January 1, 2005	Hearing October 6, 2004
Revised October 3, 2006	Hearing June, 13, 2006
Revised December 1, 2006	Hearing September 12, 2006
Revised February 1, 2008	Hearing August 30, 2007

Integrated Management Plan

Adopted November 9, 2004	
Established January 1, 2005	Hearing October 6, 2004
Revised February 8, 2008	Hearing January 8, 2008

PREFACE

Legislative Intent.

The Legislature finds that ownership of water is held by the state for the benefit of its citizens, that ground water is one of the most valuable natural resources in the state, and that an adequate supply of ground water is essential to the general welfare of the citizens of this state and to the present and future development of agriculture in the state. The Legislature recognizes its duty to define broad policy goals concerning the utilization and management of ground water and to ensure local implementation of those goals. The Legislature also finds that natural resources districts have the legal authority to regulate certain activities and, except as otherwise specifically provided by statute, as local entities are the preferred regulators of activities which may contribute to ground water depletion.

Every landowner shall be entitled to a reasonable and beneficial use of the ground water underlying his or her land subject to the provisions of Chapter 46, article 6, and the Nebraska Ground Water Management and Protection Act and the correlative rights of other landowners when the ground water supply is insufficient for all users. The Legislature determines that the goal shall be to extend ground water reservoir life to the greatest extent practicable consistent with beneficial use of the ground water and best management practices.

The Legislature further recognizes and declares that the management, protection, and conservation of ground water and the beneficial use thereof are essential to the economic prosperity and future well-being of the state and that the public interest demands procedures for the implementation of management practices to conserve and protect ground water supplies and to prevent the contamination or inefficient or improper use thereof.

The Legislature recognizes the need to provide for orderly management systems in areas where management of ground water is necessary to achieve locally determined ground water management objectives and where available data, evidence, or other information indicates that present or potential ground water conditions, including subirrigation conditions, require the designation of areas with special regulation of development and use.

The Legislature recognizes that ground water use or surface water use in one natural resources district may have adverse effects on water supplies in another district or in an adjoining state. The Legislature intends and expects that each natural resources district within which water use is causing external impacts will accept responsibility for ground water management in accordance with the Nebraska Ground Water Management and Protection Act in the same manner and to the same extent as if the conflicts between ground water use and surface water use were contained within the district.

Legislative Findings

The Legislature finds that:

(a)(1) The management, conservation, and beneficial use of hydrologically connected ground water and surface water are essential to the continued economic prosperity and well-being of the state, including the present and future development of agriculture in the state;

(2) Hydrologically connected ground water and surface water may need to be managed differently from unconnected ground water and surface water in order to permit

equity among water users and to optimize the beneficial use of interrelated ground water and surface water supplies;

(3) Natural resources districts already have significant legal authority to regulate activities which contribute to declines in ground water levels and to nonpoint source contamination of ground water and are the preferred entities to regulate, through ground water management areas, ground water related activities which are contributing to or are, in the reasonably foreseeable future, likely to contribute to conflicts between ground water users and surface water appropriators or which may be necessary in order to resolve disputes over interstate compacts or decrees, or to carry out the provisions of other formal state contracts or agreements;

(4) The Department of Natural Resources is responsible for regulation of surface water resources and local surface water project sponsors are responsible for much of the structured irrigation utilizing surface water supplies, and these entities should be responsible for regulation of surface water related activities which contribute to such conflicts or provide opportunities for such dispute resolution;

(5) The department, following review and concurrence of need by the Interrelated Water Review Committee of the Nebraska Natural Resources Commission, should also be given authority to regulate ground water related activities to mitigate or eliminate disputes over interstate compacts or decrees or difficulties in carrying out the provisions of other formal state contracts or agreements if natural resources districts do not utilize their ground water management authority in a reasonable manner to prevent or minimize such disputes or difficulties; and

(6) All involved natural resources districts, the department, and surface water project sponsors should cooperate and collaborate on the identification and implementation of management solutions to such conflicts or provide opportunities for mitigation or elimination of such disputes or difficulties

(b)(1) The levels of nitrate nitrogen and other contaminants in ground water in certain areas of the state are increasing;

(2) Long-term solutions should be implemented and efforts should be made to prevent the levels of ground water contaminants from becoming too high and to reduce high levels sufficiently to eliminate health hazards;

(3) Agriculture has been very productive and should continue to be an important industry to the State of Nebraska;

(4) Natural resources districts have the legal authority to regulate certain activities and, as local entities, are the preferred regulators of activities which may contribute to ground water contamination in both urban and rural areas;

(5) The Department of Environmental Quality should be given authority to regulate sources of contamination when necessary to prevent serious deterioration of ground water quality;

(6) The powers given to districts and the Department of Environmental Quality should be used to stabilize, reduce, and prevent the increase or spread of ground water contamination; and

(7) There is a need to provide for the orderly management of ground water quality in areas where available data, evidence, and other information indicate that present or potential ground water conditions require the designation of such areas as management areas.

AUTHORITY - These rules and regulations are adopted pursuant to the authority granted in the Nebraska Ground Water Management and Protection Act.

PURPOSE - The purposes of the management area are (1) to protect ground water quantity; and (2) the prevention or resolution of conflicts between users of ground water and appropriators of surface water, which ground water and surface water are hydrologically connected through implementation of controls to meet the goals and objectives identified in the Integrated Management Plan for the Middle Republican Natural Resources District and the Nebraska Department of Natural Resources.

CHAPTER 1 – MANAGEMENT AREA

RULE 1-1 MANAGEMENT AREA DESIGNATION AND BOUNDARIES

1-1 A sub area of the management area designated on July 1, 1998 is hereby designated for purposes of implementing the Integrated Management Plan. The geographic and stratigraphic boundaries of the sub area coincide with the existing geographic and stratigraphic boundaries of the existing management area designated on July 1, 1998 (such sub area for integrated management will be referred to as a "management area"). The geographic boundary of the management area is the boundary of the Middle Republican Natural Resources District. The stratigraphic boundary of the management area is from the land surface to the base of the underlying sand and gravel layers that contain the water bearing material. The base of the sand and gravel layers rest on impervious layers of Niobrara Chalk, Pierre Shale or formations from the White River Group. (see Map 1)

1-2 A list of legal descriptions identifying the Quick Response and Platte sub areas is on permanent file at the office in Curtis and is available for inspection during normal business hours. (10/03/2006)

CHAPTER 2 – GENERAL PROVISIONS

RULE 2-1 VARIANCES

2-1.1 The Board may grant variances from the strict application of these rules and regulations upon good cause shown.

2-1.2 All requests for a variance shall be made on forms provided by the District and will be acted upon at a formal adjudicatory hearing before the Board. This hearing will be advertised in the legal newspaper of the District and all known involved parties will be advised of the hearing. The well owner or his or her representative shall be present at the hearing. With prior notification to the District, written testimony may be provided if the well owner cannot be present.

2-1.3 The Board, at its discretion, may designate conditions under which specific requests for a variance may be approved by methods other than a formal adjudicatory hearing. A variance granted under these conditions shall be referred to as an expedited variance.

RULE 2-2 EXPEDITED VARIANCE

2-2.1 The Board hereby approves the following expedited variances and allows approval without Board consideration:

1. Alternative methods for metering of wells that pump less than two hundred and fifty (250) gallons per minute.
2. Exempt unused and inactive status wells from the metering requirement until well is placed into active status or is otherwise used.
3. Approval of permits to construct a contamination / remediation well for the purpose of withdrawal or treatment of contaminated water, or for the introduction or removal of air, water or chemicals. The expedited variance request shall include written approval of the state agency with supervisory responsibility for the planned project.
4. Approval of permits to construct a monitoring / observation well for the purpose of withdrawal of water or the observation of water levels during aquifer testing, collection of water quality samples and providing hydrologic information. A monitoring / observation well shall not have a permanent pump installed. The expedited variance request shall include the planned disposition of the well after its intended use is completed.

2-2.2 All requests for an expedited variance shall be made on forms provided by the District.

2-2.3 Approval, approval with conditions or denial of a properly completed request for an expedited variance will be made within thirty (30) days of the receipt of the completed variance.

RULE 2-3 SEVERABILITY

If any rule or any part of any rule herein shall be declared invalid or unconstitutional, such declaration shall not affect the validity or constitutionality of the remaining portions thereof.

RULE 2-4 VIOLATIONS AND ENFORCEMENT

These rules and regulations shall be enforced by the District through the use of cease and desist orders issued in accordance with the "Rules and Regulations for the Enforcement of the Nebraska Ground Water Management and Protection Act", adopted on March 27, 2000, and section II, subsection E, Rule 4 of the "General Policy Statement".

RULE 2-5 PENALTIES

Any person who violates any cease and desist order issued by the District pursuant to section 46-707 or any controls or rules or regulations adopted by the NRD relating to the management area shall be subject to penalties imposed through the controls adopted by the District including, but not limited to, having any allocation of water granted or irrigated acres certified by the District reduced

in whole or in part. Notice and hearing shall be provided to such person before the District takes any action. Specific penalties may be identified in rule and regulation for some violations. Any person who violates a cease and desist order issued by the District pursuant to section 46-707 shall be subject to a civil penalty assessed pursuant to section 46-745, Reissue Revised Statutes of Nebraska.

RULE 2-6 ACCESS

2-6.1 The District shall have the power and authority to enter upon the land, after notification to the landowner, for any and all reasons relative to the administration of the ground water management area, and provisions of the Ground Water Management and Protection Act. This entry shall not be considered trespass.

2-6.2 Notification may be accomplished by regular mail, certified mail or by oral communication.

2-6.3 The District hereby notifies all operators of its intent to enter onto property, to verify the installation of flow meters or other devices and to read or verify the readings of flow meters or other devices used to measure the quantity of ground water used for irrigation. This process will take place between October 1 and December 31 each year.

CHAPTER 3 – DEFINITIONS

RULE 3-1 DEFINITIONS

3-1.1 Abandoned Well: means any water well, the use of which has been accomplished or permanently discontinued, which has been decommissioned as described in the rules and regulations of the Nebraska Department of Health and Human Services Regulation and Licensure, and a notice of abandonment has been filed with the Department of Natural Resources.

3-1.2 Act: The Nebraska Ground Water Management and Protection Act.

3-1.3 Additional Water Administration Year: When water is needed for diversion at Guide Rock and the projected or actual irrigation supply is less than 130,000 acre feet of storage available for use in Harlan County Lake.

3-1.4 Allocation: As it relates to water use for irrigation purposes, means the allotment of a specified total number of acre-inches of irrigation water per certified irrigated acre per year or an average number of acre-inches of irrigation water per certified irrigated acre over any reasonable period of time. As it relates to other purposes, the allotment of a determined quantity of ground water.

3-1.5 Animal Unit: A unit of measurement for any livestock operation. For each type of livestock identified below, the number of animal units shall be the number of livestock in the livestock operation times the multiplier following that livestock type.

Slaughter/Feeder Cattle	1.0	Cow/calf pair	1.2
Dairy Cow	1.4	Swine >55 lbs	0.4
Swine <55 lbs	0.05	Horse	2.0
Chickens	0.01	Sheep	0.1

3-1.6 Backup Well: Used in conjunction with a livestock operation well or an industrial well. A backup well cannot be used at the same time as the primary well or wells. A backup well is not subject to the increased spacing requirements of the District.

3-1.7 Base Allocation: This amount, in acre-inches, is derived from dividing the allocation by the base allocation period.

3-1.8 Base Allocation Period: This is the number of years that an allocation can be used.

3-1.9 Board: The elected Board of Directors of the Middle Republican Natural Resources District.

3-1.10 Bonus Inches: An additional allocation, granted by the approval of the Board, only after yearly compliance following the 2006 crop year. (11/13/07)

3-1.11 Certification: The process whereby the annual use of ground water for a regulated well is reported to and verified by the District.

3-1.12 Certified Use: any use of ground water in accordance with Rule 4-6.

3-1.13 Certified Irrigated Acre: Any acre that is certified as such pursuant to the rules and regulations of the District and that is actually capable of being supplied water through irrigation works, mechanisms or facilities existing at the time of allocation.

3-1.14 Confined Livestock Operation: shall mean totally roofed buildings, which may be open sided or completely enclosed on the sides, wherein animals or poultry are housed over solid concrete or dirt floors or slatted floors over pits or manure collection areas in pens, stalls or cages, with or without bedding materials and mechanical ventilations.

3-1.15 Consecutive Water Short Years: Shall mean the need for additional action if a water short year has been designated for at least two consecutive years and Nebraska was not within its yearly allocation during those years. (11/13/07)

3-1.16 Consumptive Use: is that amount of water that is consumed under appropriate and reasonably efficient practices to accomplish without waste the purposes for which the appropriation or other legally permitted use are lawfully made.

3-1.17 Critical Unit(s): An area(s) designated by the District where circumstances require additional controls.

3-1.18 Cumulative Allocation : Base allocation times allocation period (11/13/07)

3-1.19 Dewatering Well: shall mean a water well constructed for the purpose of temporarily lowering the ground water surface elevation.

3-1.20 District, NRD, MRNRD: The Middle Republican Natural Resources District.

3-1.21 Flow Meter: a device, approved by the District, to measure the quantity of ground water pumped, withdrawn, or taken from a water well.

3-1.22 Good Cause Shown: shall mean a reasonable justification for granting a variance to consumptively use water that would otherwise be prohibited by rule or regulation and which the District reasonably and in good faith believes will provide an economic, environmental, social or public health and safety benefit that is equal to or greater than the benefit resulting from the prohibition from which a variance is sought.

3-1.23 Ground Water: shall mean that water which occurs in or moves, seeps, filters, or percolates through the ground under the surface of the land.

3-1.24 Historic Consumptive Use: is that amount of water that has previously been consumed under appropriate and reasonably efficient practices to accomplish without waste the purposes for which the appropriation or other legally permitted use was lawfully made.

3-1.25 History of Use: as used in these rules shall mean the exercise of a certified use in four (4) of the previous six (6) years.

3-1.26 Illegal Water Well: (a) any water well operated or constructed without or in violation of a permit required by the Act, (b) any water well not in compliance with rules and regulations adopted and promulgated pursuant to the Act, (c) any water well not properly registered in accordance with sections 46-602 to 46-604, (d) any water well not in compliance with any other applicable laws of the State of Nebraska or with rules and regulations adopted and promulgated pursuant to such laws.

3-1.27 Inactive Status Well: shall mean a water well that is not currently in use, but is in a good state of repair and for which the owner has provided evidence of intent for future use by maintaining the water well in a manner which meets the following requirements: (1) the water well does not allow impairment of the water quality in the water well or of the ground water encountered by the water well; (2) the top of the water well or water well casing has a water-tight welded or threaded cover or some other water-tight means to prevent its removal without the use of equipment or tools to prevent unauthorized access, to prevent a safety hazard to humans and animals, and to prevent illegal disposal of wastes or contaminants into the water well; and (3) the water well is marked so as to be easily visible and located and is labeled or otherwise marked as to be easily identified as a water well and the area surrounding the water well is kept clear of brush, debris, and waste material. An inactive status water well shall be registered as such in the well registration records of the Nebraska Department of Natural Resources.

3-1.28 Incentive Program: shall mean a program that may require agreements or covenants concerning the use of land or water as necessary to produce the benefits for which the program is established.

3-1.29 Industrial Well: shall mean a water well the purpose of which includes but is not limited to; manufacturing, commercial and power generation uses of water. Commercial includes, but is not limited to, maintenance of the turf of a golf course.

3-1.30 Late Permit: shall mean a permit applied for after construction has commenced on a regulated water well pursuant to section 46-735.

3-1.31 Livestock Operation: shall mean the feeding or holding of livestock in buildings, lots or pens which are not used for growing of crops or vegetation, but does not include the holding of cattle in calving operations for less than ninety (90) days per year.

3-1.32 Livestock Operation Well: A regulated well providing for the watering of animals in a "livestock operation" or "confined livestock operation" and for which a livestock waste control facility permitted by the Nebraska Department of Environmental Quality is required.

3-1.33 Livestock Well: A water well not classified as a livestock operation well but which is used for the watering of (1) livestock, poultry, farm and domestic animals used in operating a farm or (2) domestic livestock as related to normal farm and ranch operations or (3) range livestock or stock use on a farm or ranch.

3-1.34 Operator: The person who controls the day-to-day operation of the water well.

3-1.35 Permit to Construct a Well: shall mean a document that must be obtained from the District in accordance with Rule 4-2 before construction of a regulated well water well may be commenced in the management area pursuant to section 46-735.

3-1.36 Person: A natural person, a partnership, a limited liability company, an association, a corporation, a municipality, an irrigation district, an agency or a political subdivision of the state, or a department, an agency, or a bureau of the United States.

3-1.37 Pooling: shall mean the common management of all or part of the certified acres and the associated allocation by two or more persons. (11/13/07)

3-1.38 Platte Sub Area: That portion of the Middle Republican NRD that is located outside the boundaries of the Republican River Basin as delineated for the Republican River Compact.

3-1.39 Primary Well: when used with regard to livestock operation or industrial wells, shall mean the well or wells used for the certified use on a daily or other routine basis.

3-1.40 Public Water System: a system for providing the public with water for human consumption, as further defined in Title 179 Chapter 2.

3-1.41 Quick Response Sub Area: That area included in the area delineated by the Department of Natural Resources and shown on Map 1.

3-1.42 Quick Response Wells: Those wells located in or serving acres in the Quick Response Sub Area.

3-1.43 Reduction of Acres: A uniform percentage reduction of each landowners irrigated acres. Such uniform reduction may be adjusted for each

landowner based upon crops grown on his or her land to reflect the varying consumptive requirements between crops.

3-1.44 Regulated Well: A water well designed and constructed to pump more than fifty (50) gallons per minute. A series of water wells, with a combined discharge of more than fifty (50) gallons per minute, of which the water is commingled, combined, clustered or joined as a single unit for a single purpose shall be considered as one regulated well. (12/01/2006)

3-1.45 Replacement Well: In accordance with Nebraska Statute NRRS 46-602(2)(a) through 46-602(2)(c). (11/13/07)

3-1.46 Reserve: That part of an allocation that is unused during the base allocation period.

3-1.47 Supplemental Well: A regulated well that provides supplemental ground water to acres that are normally irrigated by surface water. Annual use is not a requirement to be considered a supplemental well.

3-1.48 Transfer Permit: shall mean a document that must be obtained from the District in accordance with Rule 5 whereby the point of use, type of use or rules governing the use of ground water is exchanged or moved.

3-1.49 Test Hole: shall mean a hole designed solely for the purpose of obtaining information on hydrologic or geologic conditions.

3-1.50 Unregulated Well: a water well designed and constructed to pump fifty (50) gallons per minute or less and is not commingled, combined, clustered or joined with other water wells.

3-1.51 Unused / Seldom Used Well: a water well that has not been placed in inactive status but is used less than one (1) year in three (3).

3-1.52 Upland Sub Area: That area of the District not delineated as the Quick Response Sub Area or the Platte Sub Area.

3-1.53 Variance: approval to act in a manner contrary to existing rule or regulation from a governing body whose rule or regulation is otherwise applicable.

3-1.54 Water Short Year Administration: will be in effect in those years in which the projected or actual irrigation supply is less than 119,000 acre feet of storage available for use from Harlan County Lake.

3-1.55 Water Well: In accordance with Nebraska Statute 46-601.01. (11/13/07)

3-1.56 Wellhead Protection Area: A delineated area around a public water supply well or wells, used for human needs, representing the thresholds based on time of travel of ground water toward the public water supply well or wells.

CHAPTER 4 – GENERAL MANAGEMENT

RULE 4-1 MORATORIUM

4-1.1 The District finds that the use of hydrologically connected ground water and surface water resources is contributing to conflicts between ground water and surface water users and to disputes over the Republican River Compact. The District hereby closes all of the management area, as defined in Rule 1-1, to the issuance of new permits for regulated wells except as provided in 4-1.2.

4-1.2 Replacement wells and backup wells, as defined in 3-1.6, are not subject to the moratorium. (11/17/07)

RULE 4-2 PERMIT TO CONSTRUCT A WATER WELL

4-2.1 Except as provided in Rule 4-2.3 any person who intends to construct a regulated water well on land in the management area which he or she owns or controls shall, before commencing construction, apply with the District for a permit on a form provided by the District. The District shall review such applications and issue the approved permit, with or without conditions, or deny the permit within thirty (30) days after the application is properly prepared and received. An incomplete or defective application shall be returned for correction. If correction is not made within sixty (60) days the application shall be cancelled.

4-2.2 Applications for a permit to construct a water well that require consideration of a variance request shall not be deemed as properly filed and complete until such time as the Board has acted to approve the variance request.

4-2.3 Exceptions. No permit shall be required for:

- 4-2.3.1 Test holes
- 4-2.3.2 Dewatering wells with an intended use of ninety (90) days or less.
- 4-2.3.3 A single water well designed and constructed to pump fifty (50) gallons per minute or less.

4-2.4 A permit is required for a water well designed and constructed to pump fifty (50) gallons per minute or less if such water is commingled, combined, clustered, or joined with any other water well or wells or other water source, other than a water source used to water range livestock. Such wells shall be considered one (1) well and the combined capacity shall be used as the rated capacity.

4-2.5 A person shall apply for a permit before he or she modifies a water well, for which a permit was not required when the well was constructed, into one for which a permit would otherwise by required.

4-2.6 The application shall be accompanied by a $50.00 filing fee payable to the District and shall contain:

- 4-2.6.1 The name and post office address of the well owner,
- 4-2.6.2 The nature of the proposed use,

4-2.6.3 The intended location of the proposed water well or other means of obtaining ground water,

4-2.6.4 The intended size, type and description of the proposed water well and the estimated depth, if known,

4-2.6.5 The estimated capacity in gallons per minute,

4-2.6.6 The acreage and location by legal description of the land involved if the intended use is for irrigation,

4-2.6.7 A description of the proposed use if other than irrigation,

4-2.6.8 The registration number of the well being replaced, if applicable,

4-2.6.9 The certified use of the well being replaced, if applicable,

4-2.6.10 The historic consumptive use of the well being replaced, if applicable, and

4-2.6.11 Such other information as the District may require.

4-2.7 Any person who has failed or in the future fails to obtain a permit before construction is commenced shall make application for a late permit on forms provided by the District.

4-2.8 The application for a late permit shall be accompanied by a $250.00 fee payable to the District and shall contain the same information required in Rule 4-2.6.

4-2.9 An application for a new regulated well with an intended consumptive use of more than three hundred (300) acre feet over a twelve (12) month period requires, in addition to the information required by 4-2.6, the following information:

4-2.9.1 The availability to the applicant of alternative sources of surface or ground water,

4-2.9.2 Any negative effect of the proposed withdrawal on ground water and surface water supplies needed to meet present or reasonable future demands for water in the intended area of withdrawal within the state, to comply with any interstate compact or decree, or to fulfill the provisions of any other formal state contract or agreement,

4-2.9.3 Any adverse environmental effect of the proposed withdrawal, and

4-2.9.4 The cumulative effect of the proposed withdrawal relative to the matters listed in 4-2.9.1 through 4-2.9.3

4-2.10 The application for a permit shall be denied if (1) the location or operation of the proposed water well or other work would conflict with any regulations or controls adopted by the District, (2) the proposed use would not be a beneficial use, or (3) in the case of a late permit only, that the applicant did not act in good faith in failing to obtain a timely permit.

4-2.11 No refund of any application fees shall be made regardless of whether the permit is issued, canceled, or denied.

4-2.12 The issuance, by the District, of a permit or the registration of a water well with the Nebraska Department of Natural Resources shall not vest in any person the right to violate any District rule, regulation, or control in effect

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on the date of issuance of the permit or the registration of the water well or to violate any rule, regulation, or control properly adopted after such date.

4-2.13 The applicant shall commence construction as soon as possible after the date of approval and shall complete construction and equip the water well prior to the date specified in the conditions of approval, which shall not be more than one (1) year from the date of approval, unless it is clearly demonstrated in the application that one (1) year is an insufficient period of time for such construction. Failure to complete the project under the terms of the permit may result in the withdrawal of the permit by the District.

RULE 4-3 WELL SPACING

4-3.1 No regulated well except a backup well shall be constructed upon any land in this District within one thousand three hundred and twenty (1320) feet of any other registered regulated well, regardless of ownership except;

4-3.1.1 Any irrigation water well that replaces an irrigation water well which was drilled prior to September 20th, 1957, and which is less than six hundred (600) feet from a registered irrigation well may be located closer than one thousand three hundred and twenty (1320) feet from another regulated well if it is drilled within fifty (50) feet of the water well being replaced.

4-3.1.2 A replacement well may be constructed less than one thousand three hundred and twenty (1320) feet from another registered regulated water well, if it is constructed within one hundred (100) feet of the water well it replaces or is relocated no closer than the well it replaces to other wells and if such replaced water well was, when constructed, in compliance with all applicable laws, rules and regulations.

4-3.2 The well spacing required by Rule 4-3.1 shall also apply to the distance between a proposed new regulated well and an unregistered regulated water well but only for a period of sixty (60) days to allow for registration of such unregistered water well.

Rule 4-4 FLOW METERS

4-4.1 Flow meters meeting accuracy specifications established in Rule 4-4.2 shall be installed on all regulated wells by the end of the year 2004 except,

4-4.1.1 For a well with a pumping capacity of less than two hundred and fifty (250) gallons per minute, an alternative measuring device or method, approved by the District, with an accuracy of plus or minus five (5) percent of the actual water flow, may be used.

4-4.1.2 Before any inactive wells are placed in service, a flow meter shall be installed, the District shall be notified of the well's status change, and the status of the well in the well registration records of the Department of Natural Resources shall be updated to

reflect its active status. No such well shall be operated thereafter without a properly installed and operational flow meter.

4-4.2 All meters shall be tested for accuracy using recognized industry testing methods and certified by the manufacturer according to those standards. At any rate of flow within the normal flow limits, the meter, except as noted in Rule 4-4.1.1, shall register not less than ninety eight (98) percent or more than one hundred and two (102) percent of the water actually passing through the meter. All meters shall have a register or totalizer and shall read in U. S. gallons, acre-feet or acre-inches.

4-4.3 Installation – The operator shall, on forms provided by the District, report the location, by legal description, and certify the proper installation of flow meters. The District may, at a time of its own choosing, verify the location and proper installation of flow meters. The proper installation of a meter is such that it meets the manufacturer's specifications and/or more restrictive specifications developed by the District.

4-4.3.1 In no case may a meter be installed with less than five (5) unobstructed pipe diameters upstream of the meter or less than one (1) unobstructed pipe diameter downstream of the meter.

4-4.3.2 If the meter is installed downstream of a mainline check valve, there must be at least ten (10) pipe diameters upstream of the meter. If there are not at least ten (10) pipe diameters upstream of the meter, straightening vanes must be installed.

4-4.3.3 Meters must be located so as to prevent damage to the meter from excessive vibration.

4-4.3.4 Meters must be installed so that the removal of the meter for service or maintenance can be performed with the use of normal tools and does not require excessive or unusual removal of hardware or other appurtenances.

4-4.3.5 The District may establish a method by which the installed meter is tagged, sealed, marked or otherwise protected from tampering.

4-4.3.6 New installations or changes to the location of currently installed meters shall be permanent and shall be mounted no higher than six feet above ground level. (10/3/2006)

4-4.3.7 Electronic meters or any meter with a digital readout must have an uninterruptible power supply. (10/03/2006)

4-4.4 Improperly Installed Meters – The installation of meters that do not meet manufacturers' or District standards must be corrected. Failure to provide for proper installation will result in the loss of allocation for the next crop year.

4-4.5 Inoperative Meters – Landowners shall notify the District of an inoperative meter within one (1) working day from the time the defect is noted. The District will repair or temporarily replace the inoperative meter and charge the well owner for the service. Failure to report inoperative meters will result in the loss of allocation for the next crop year.

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4-4.6 Tampering with an installed flow meter – Following a hearing before the Board, if it is found that tampering so as to affect the accuracy or true use of the meter has occurred, the District shall withhold the allocation for the next crop year and may prorate the allocation for the current year.

4-4.7 Service – It is the responsibility of the operator to provide for service and maintain the flow meter according to either the manufacturer's standards or more restrictive standards developed by the District. The operator may grant permission for this service to be provided by the District, at a cost to the operator. The District may enter onto property to provide this service. This service will be provided in the off-season and will not interfere with the normal operation of the meter or the well.

4-4.8 The District may establish a spot check program to inspect the serviceability and verify use of a meter. The District may correct discrepancies noted at the time of the inspection. Discrepancies that require the repair of a meter may be performed by the District, at a cost to the well owner, with the permission of the well owner.

4-4.9 The district may require that meters that have been repaired two out of the last five years for vibration damage or more frequently to be moved to a location where vibration damage is minimal or modifications are made to the meter register that are more resistant to vibration damage. (10/03/2006)

4-4.10 By the beginning of the 2008 crop year all meters shall be permanently mounted in the irrigation distribution system. (10/03/2006)

4-4.11 Challenges of usage readings require that the landowner provide sufficient evidence to substantiate their claim. For electric wells power records may serve this purpose. (10/03/2006)

RULE 4-5 REPORTS

4-5.1 Each operator of a regulated well, other than an irrigation well, shall report, on forms provided by the District, by January 15 of each year, the total water withdrawn from that well during the preceding calendar year and the nature of the use of that water.

4-5.2 Failure to provide this report shall result in the loss of allocation for the next crop year or current year, in the case of a regulated well other than an irrigation well.

4-5.3 In order to ensure compliance with the Republican River Compact Accounting procedures, additional information may be required in reports from operators. (11/13/07)

RULE 4-6 CERTIFICATION

4-6.1 After June 1, 2004 for irrigation wells, and December 1, 2004 for wells used for other than irrigation purposes, no regulated well shall be operated until its use is certified and approved by the Board pursuant to these rules and regulations.

4-6.2 Any operator aggrieved by a determination of the Board regarding approval of certification of irrigated acres or of non-irrigation uses may request a hearing before the Board for the purpose of reconsidering that

determination. Such request shall be filed on a form provided by the District within thirty (30) days of the Board's action on the certification. Such hearing shall be a formal adjudicatory hearing and shall be conducted in accordance with the District's Rules and Regulations for the Enforcement of the Ground Water Management and Protection Act. The burden of proof shall be on the person requesting the hearing to document that the Board's decision should be modified.

4-6.3 The Board shall review each certification for all uses no less often than every five (5) years. Errors or inconsistencies discovered during that review shall be resolved to the satisfaction of the Board before any new allocation is made to the previously certified uses. Following notice and a hearing, the Board may rescind any previously approved certification and any previously granted allocation to a well for which false or misleading information was used to obtain the certification required by Rule 4-6.5 or 4-6.14.

4-6.4 Any change in farming operation or ownership that would result in a change in the number or location of certified irrigated acres shall be reported to the District no later than December 31 of the calendar year in which the change occurred. Any change in use of a regulated well used for purposes other than irrigation that would result in a change in that well's certification shall be reported to the District no later than December 31 of the calendar year in which the change occurred. The Board may reject such changes if it finds that such changes would cause an increase in Nebraska's consumptive use as calculated pursuant to the Republican River Compact or would have detrimental effects on other ground water users or on surface water appropriators.

IRRIGATION USES

4-6.5 No later than January 1, 2004 each owner or operator of a regulated irrigation well shall certify (1) the well registration number for that well, (2) the number and location of all acres irrigated at least once by that well between January 1, 1993 and December 31, 2002, (3) the maximum number of acres irrigated by that well in any one (1) year within that time period, (4) the number and location of all acres irrigated by that well in 2003. Such certification shall be on forms provided by the District and shall be accompanied by applicable records from the Farm Service Agency and/or the County Assessor and such other information as requested by the District to verify the information certified.

4-6.6 By the beginning of the 2008 crop year all ground water irrigated acres certified with the district must be taxed as irrigated acres by the County Assessor. Acres not assessed as irrigated will not receive an allocation. Certified acres currently enrolled in the Conservation reserve Program may be an exception to this rule. (10/03/2006)

4-6.7 The Board may take action to approve, modify and approve, or reject the certifications provided by owners and/or operators pursuant to Rule 4-6.5.

The number and location of certified irrigated acres, which shall be approved for each such irrigation well, shall be determined at a public meeting of the Board after consideration of the following:

- The information provided on and with the certification filed in accordance with Rule 4-6.5,
- Any water use reports for that well filed in accordance with Rule 4-5,
- U.S.D.A. Farm Service Agency records,
- County Assessor records,
- Aerial photographs, and
- Other information available to and deemed relevant by the Board.

4-6.8 Only those acres that are actually capable of being supplied with ground water through irrigation works, mechanisms or facilities existing at the time of certification may be approved as certified acres by the Board.

4-6.9 An irrigation well constructed before June 12, 2002 but not registered until after December 31, 2003, shall be approved for no more than (1) its proven record of use or (2) one hundred and sixty (160) certified irrigated acres.

4-6.10 Replacement irrigation wells constructed after May 19, 2003 shall be approved for no more certified acres than the certified use for the well being replaced.

4-6.11 After January 1, 2004, with the prior approval of the Board, an irrigation well that was constructed prior to June 12, 2002 but has not yet been used for irrigation, is in inactive status or is unused may be granted certified acres. That approval may be granted only upon the written request of the well owner and when the Board has determined (1) that the well is in compliance with all applicable rules and regulations of the District (2) the location and number of acres proposed to be irrigated by that well in the future will be limited to no more than one hundred and sixty (160) acres, the acres that the well is capable of serving or the certified use being replaced. This certified use includes supplementing existing surface water irrigated acres or replacing the use of active wells on certified irrigated acres.

4-6.12 If certification is not filed pursuant to Rule 4-6.5 to 4-6.10 for an irrigation well constructed prior to January 1, 2004, the well shall be an "illegal water well" as that term is defined in District Rule 3-1.24.

4-6.13 The Board shall not certify any irrigated acres for an illegal water well, as that term is defined in District Rule 3-1.24, and an illegal water well shall receive no future allocation of water until such certification has been filed and until the Board has approved or modified and approved that certification. Certification of acres can be approved for any such well if and when the deficiency that caused that well to be an illegal water well is corrected.

4-6.14 The number of acres that may be certified and approved for a well from which the water is applied to the crop through a sprinkler system may be

up to five (5) percent greater than the actual area planted to crops if there are non-cropped areas under the sprinkler system.

NON-IRRIGATION USES

4-6.15 No later than September 1, 2004, each owner or operator of a regulated well used for purposes other than irrigation shall certify (1) the well registration number for that well, (2) the nature and location of the use of the water withdrawn from that well, (3) the measured or estimated average annual quantity of water withdrawn from that well between January 1, 1993 and December 31, 2002 and a description of the method used to determine that quantity, (4) the measured or estimated maximum quantity withdrawn from that well in any one (1) year during that time period, (5) the measured or estimated quantity of water withdrawn from that well in 2003, (6) if the well was constructed before June 12, 2002 but has not yet been used for its intended purpose, the quantity of water proposed to be withdrawn from that well in the future, (7) if the well is a replacement well constructed after January 1, 2003, the information required by items (1) through (5) above for the well replaced, (8) if the well was constructed after June 12, 2002, the quantity withdrawn in 2003 and the quantity of water proposed to be withdrawn from that well in the future, and (9) if the owner or operator of the well desires that the annual quantity of use to be certified for that well be in excess of the quantity historically withdrawn by that well, the quantity proposed and an explanation why that quantity is necessary to accomplish the purpose for which the well is used. Such certification shall be on forms provided by the District and shall be accompanied by such information as requested by the District to verify the information certified.

4-6.16 No later than November 1, 2004, the Board shall take action to approve, modify and approve, or reject the certifications provided by the owners and/or operators of non-irrigation wells pursuant to Rule 4-6.14. Such action shall be taken after reviewing the information provided by the owner or operator of the well and any other information available to and deemed relevant by the Board. The Board's approval of the certification for such a well shall not, by itself, limit the quantity of water that can be withdrawn by that well in 2005 or any subsequent year. Any such limitations on the quantity that can be withdrawn annually from that well will be imposed through the Board's allocation of water to that well pursuant to the District's rules and regulations. The Board may use the information provided through such certification if and when it determines the amount to be allocated to that well.

4-6.17 Only those non-irrigation uses that are actually capable of being supplied with ground water through works, mechanisms or facilities existing at the time of certification may be approved as certified uses by the Board.

4-6.18 If no certification is filed pursuant to Rule 4-6.14 for a regulated well constructed prior to September 1, 2004, and used for other than irrigation

purposes, that well shall not be used and shall not receive an allocation from the District until such certification has been filed with the District and approved by the Board.

4-6.19 Certification shall not be approved by the Board for any regulated non-irrigation well, which is an "illegal water well" as that term is defined by Rule 3-1.24 of the District's rules and regulations. The Board can approve such certification if and when the deficiency that caused the well to be an illegal water well is corrected.

4-6.20 Certification of use for an inactive status or unused non-irrigation well will be approved only when that well is returned to active status, has been registered as such with the Department of Natural Resources, and is in compliance with all applicable rules and regulations of the District.

RULE 4-7 WATER SHORT YEAR ADMINISTRATION

4-7.1 No later than October 1, 2005 and October 1 of each following year the Department of Natural Resources will notify the District of the potential for Water Short Year administration. Notification of updates to such determinations will be provided monthly, or more often as requested, through the following June 30th at which time the final determination will be made.

4-7.2 Upon receiving notice of the potential designation of a Water Short Year, the District shall provide notice to irrigators of this designation by placing said notice on the District website.

4-7.3 Consecutive Water Short Years may require additional reductions in certified acres or reductions in the base allocation.

4-7.4 Beginning with the 2007 crop year, consecutive Water Short year designations may result in the reduction of the cumulative allocation, for irrigation uses, by one (1) inch for each year remaining in the base allocation period. This reduction shall not apply to a Water Short year in which the State of Nebraska is within its yearly allocation. Producers with certified irrigated acres will be notified of this reduction by notices published in newspapers of general circulation in the district. (11/13/07)

4-7.5 Following the designation of a consecutive Water Short Year, the Board may adopt additional measures as needed to maintain compliance with the Republican River Compact. (11/13/07

4-7.6 Additional measures needed in a Water Short Year may be mitigated, at the discretion of the Board, by the active participation in incentive programs, river flow enhancement projects or other projects designed to reduce consumptive use. (11/13/07)

RULE 4-8 INCENTIVE PROGRAM

4-8.1 Unless permitted by the rules and regulations established by individual incentive programs, no certified acres may be enrolled in incentive programs or special initiatives sponsored by or funded by the District if such certified acres do not have a history of use in four (4) of the previous six (6) years.

4-8.2 These incentive programs may include any Federal, State, or Local programs that have the effect of reducing the MRNRD's overall consumptive use. Subject to State law, the MRNRD may also raise those funds necessary to provide the districts share of payments in incentive programs it utilizes. If sufficient irrigated acres are retired, through the use of incentive programs, above what is needed to meet the requirements of the Republican River Compact, the MRNRD may re-evaluate and alter the allocation previously set per irrigated acre.

4-8.3 The district incentive programs may provide for the temporary or permanent retirement of certified ground water irrigated acres. (10/03/2006)

4-8.4 Guidelines for incentive programs shall be established by the district or in cooperation with other agencies participating in the incentive program. (10/03/2006)

RULE 4-9 POOLING (11/13/07)

4-9.1 On forms provided by the district, two or more persons may agree to pool the allocation from their individual wells on their combined certified acres.

4-9.2 Information provided shall identify all persons involved, maps showing all acres pooled and all wells used along with the serial number and location of the flow meters for the wells and the history of use for each well.

4-9.3 The District may limit pooling if the use is between sub areas with different allocations.

4-9.4 The District may deny a request for pooling based on the rate of decline in areas in which the pooling will be used. District statistics and Ground Water Level Change maps from the Conservation and Survey Division of the University of Nebraska may be used for a reference of areas of decline. (11/13/07)

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CHAPTER 5 – MANAGEMENT OF USES

RULE 5-1 TRANSFERS- GENERAL

5-1.1 Any person who intends to withdraw ground water and (a) transfer that ground water off the overlying land which he or she owns or controls or (b) otherwise change the location of use of ground water shall, before making such transfer, apply for a permit on forms provided by the District or as required by statute. (11/13/07)

5-1.2 Requests for a transfer that require a permit which falls under the authority of the Nebraska Department of Natural Resources, including the Municipal and Rural Domestic Ground Water Transfers Permit Act and the Industrial Ground Water Regulatory Act, will not be considered for action by the district until such time as the permits are approved by NDNR. (11/13/07)

5-1.3 The MRNRD shall approve the withdrawal and transport of ground water when a public water supplier providing water for municipal purposes receives a permit from the Nebraska Department of Natural Resources pursuant to the Municipal and Rural Domestic Ground Water Transfers Permit Act.

5-1.4 Applicants for permits or approval for transfer pursuant to the Industrial Ground Water Regulatory Act are not required to apply for a transfer permit from the District. (11/13/07)

5-1.5 Issuance of the permit shall be conditioned on the applicant's compliance with the rules and regulations of the District from which the water is withdrawn.

5-1.6 The applicant shall be required to provide access to his or her property at reasonable times for purposes of inspection by officials of the District.

5-1.7 All applications for a transfer permit under the authority of the district shall be made on forms provided by the district and shall be approved, denied or conditioned by the Board. (11/13/07)

5-1.8 The application for a transfer permit shall be denied or conditioned to the extent that it is necessary to (1) ensure the consistency of the transfer with the purpose or purposes for which the management area was designated, (2) prevent adverse effects on other ground water users or on surface water appropriators, (3) maintain compliance with the Republican River Compact, and (4) otherwise protect the public interest and prevent detriment to the public welfare.

5-1.9 The application for a transfer permit also shall be denied if (1) the location or operation of the proposed water well or other works would conflict with any regulations or controls adopted by the District or (2) the proposed use would not be a beneficial use.

5-1.10 The District may further limit the allocation upon transfer of use if the use is between sub areas with different allocations.

5-1.11 Transfer of use or permanent transfer may be made within sub areas, from the Quick Response Sub Area to the Upland Sub Area, and out of a critical unit.

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5-1.12 The District may deny a request for transfer based on the rate of decline in the area into which the transfer will be used. District statistics and Ground Water Level Change maps from the Conservation and Survey Division of the University of Nebraska may be used for a reference of areas of decline. (10/03/2006)

5-1.13 The District may limit the allocation to the consumptive use associated with the certified use if the transfer is to a different preference use.

5-1.14 All requests for a transfer shall be made in accordance with Rule 5-1.

5-1.15 All requests for a transfer shall show a history of use.

5-1.16 The issuance, by the District, of a transfer permit shall not vest in any person the right to violate any District rule, regulation, or control in effect on the date of issuance of the permit or to violate any rule, regulation, or control properly adopted after such date.

5-1.17 The issuance, by the District, of a transfer permit shall not vest in any person the right to violate any statute, state agency or other jurisdictional agency's rule, regulation, or control in effect on the date of issuance of the permit or to violate any rule, regulation, or control properly adopted after such date. It is the responsibility of the applicant to ensure compliance with other rules and regulations.

5-1.18 The District shall review such applications and issue, with or without conditions, or deny the permit within thirty (30) days after the application is properly filed. An incomplete or defective application shall be returned for correction. If correction is not made within sixty (60) days the application shall be cancelled.

RULE 5-2 TRANSFERS- TYPES and PERMIT REQUIREMENTS

5-2.1 Transfers out of the District. Any person who desires to withdraw ground water from wells located within the District and transport that ground water out of the District for use elsewhere in the State may do so after obtaining a transfer permit in accordance with Rule 5-3. Use of the withdrawn water must be approved by the District within which the water will be used. Ground water shall not be transferred or transported to lands outside of the boundaries of the Republican River Basin as defined in the Republican River Compact.

5-2.2 Transfers into the District. Ground water withdrawn outside the District shall not be transported for use inside the District unless the District from which the ground water is withdrawn approves the withdrawal and transport in advance. Use of the transported water must be in accordance with these rules.

5-2.3 Transfer out of State. Requests for transfer of ground water out of state pursuant to NRRS Section 46-613.01 shall not be acted upon by the District until such time as the approval or denial, by the Nebraska Department of Natural Resources, of the required transfer permit.

5-2.4 Transfer of Use. A portion or all of the base allocation may be transferred to another user for the same or another use. Only the accumulated unused portion of a base allocation can be transferred. If an allocation

had been completely used, no transfer of use would be available until the next allocation period. Reserve associated with the allocation or portion thereof may also be transferred. Bonus inches may not be transferred. (11/13/07)

5-2.4.1 If the transfer of use is for the entire base allocation, the well from which the use was transferred cannot be used during the period of time covered by the transfer. The well must be configured to prevent the possibility of contamination of the ground water.

5-2.4.2 After January 1, 2008, the transfers of use will not be accepted after October 15th in the final year of an allocation period. (11/13/07)

5-2.5 Permanent Transfer. A permanent transfer may be accomplished by decommissioning a well and discontinuing its certified use and transferring the right to that use to another owner or new location on property owned by the same landowner. The new well shall be limited to the quantity of the allocation associated with the certified use from the well being replaced. (10/03/2006)

5-2.5.1 If the well for which the use is being permanently transferred is part of a series, or a well that is commingled, combined, clustered or joined with other water wells, then only that pro rata portion of the allocation is transferred.

5-2.6 Permanent Transfer of Acres. A landowner may permanently transfer a portion of his certified acres to another party. This transfer shall not result in an increase in total certified acres. The district may limit this transfer according to rules 5-2.7 through 5-2.13 and the capability of the wells involved to pump water to the acres transferred. (10/03/2006)

5-2.7 The allocation for any use is associated with the certification of that use. The right to use the allocation shall be surrendered with a transfer of use or a permanent transfer. The new user would be limited to the quantity of allocation associated with the certified use and would be subject to the same restrictions on volume of use as the original allocation. A portion of the allocation for a municipal use may be transferred to another use. The amount transferred would be deducted from the municipal allocation.

5-2.8 The District may further limit the allocation, upon transfer of use, if the use is between sub areas with different allocations.

5-2.9 Transfer of use or permanent transfer may be made within sub areas, from the Quick Response Sub Area to the Upland Sub Area, and out of a critical unit.

5-2.10 The District may deny a request for transfer based on the rate of decline in the area into which the transfer will be used. District statistics and Ground Water Level Change maps from the Conservation and Survey Division of the University of Nebraska may be used for a reference of areas of decline. (10/03/2006)

5-2.11 If the transfer is to a different preference of use, the District may limit the allocation to the consumptive use associated with the certified use that is being transferred. (11/13/07)

5-2.12 All requests for a transfer shall be made in accordance with Rule 5-1.

5-2.13 All requests for a transfer shall show a history of use.

5-2.14 n application for a permit to transfer shall be made on forms provided by the district and shall contain the following information: (11/13/07)

5-2.14.1 The name and post office address of the well owners for the point of withdrawal and the point of transfer,

5-2.14.2 The point of withdrawal,

5-2.14.3 The point of transfer,

5-2.14.4 The registration number of the water well(s) involved,

5-2.14.5 If for irrigated use, the certified acres of the water well(s) involved,

5-2.14.6 The capacity of the well from which the transfer is made,

5-2.14.7 The nature of the proposed use and whether it is a reasonable and beneficial use of ground water,

5-2.14.8 The availability to the applicant of alternative sources of surface or ground water,

5-2.14.9 Any negative effect of the proposed withdrawal on ground water and surface water supplies needed to meet present or reasonable future demands within the State or to comply with the Republican River Compact,

5-2.14.10 Any adverse environmental effect of the proposed withdrawal or transportation of ground water,

5-2.14.11 The cumulative effect of the proposed withdrawal and transfer relative to the matters listed in 5-2.14.2 through 5-.14.10, and

5-2.14.12 Any other factors consistent with the purposes of this section that the District deems relevant to protect the health, safety, and/or welfare of the District and its citizens.

RULE 5-3 ALLOCATION

5-3.1 The use of ground water from all regulated water wells shall be allocated by the District. Allocations will be set after considering: (1) the relationship between wells and surface waters and the impact of well usage on stream flow; (2) whether ground water levels are declining; and (3) such other factors as the Board determines may be relevant to the appropriate amount of water to be withdrawn.

5-3.2 INDUSTRIAL USES: Regulated wells for industrial uses, in place prior to January 1, 2004, shall receive an allocation determined on a case-by-case basis, taking into account the history of use of the wells and the needs of the industry for which the well is used. Additional allocations, up to twenty (20) percent above established use, may be granted for expansion. The industry shall provide notice to the District of its need for additional allocation. Additional allocations as needed to comply with state or federal rules shall be added to the certified use without penalty to the industry.

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5-3.3 New industrial uses shall be granted a base consumptive use allocation of 80.65 acre feet per year. (12/01/2006)

5-3.3.1 For uses requesting an allocation greater than 80.65 acre feet, the allocation must be approved by the board of directors. The person requesting the allocation shall provide evidence that the allocation requested is no greater than the industry related standard for that type of use.

5-3.3.2 The requested allocation shall only be granted upon proof that another certified use, of an equal or greater amount, is permanently retired or transferred in accordance with 5-2.6 through 5-2.13. (11/13/07)

5-3.3.3 Preapproval, by the board, of an allocation may be requested by an economic development group or similar organization. Allocations approved in this manner are only valid for a period of one year from the date of approval unless the industry begins operation.

5-3.3.4 Allocations for industrial wells the use of which come under the authority of the Industrial Ground Water Regulatory Act shall be determined by the amount permitted by the Act.

5-3.3.5 In all situations an economic development group or an industry may purchase or otherwise retire an existing allocation and apply that use to there planned development.

5-3.4 MUNICIPAL USES – Without further need of application, each municipality shall be granted an annual per capita allocation as shown in Table 1. This allocation for an "average town" is based on the land area of all communities in the District with a public water supply and the base allocation for Upland Sub Area irrigated acres. Municipal uses shall be reviewed at the February Board meeting each year and adjustments for growth shall be computed. The reports as required in Rule 4-5 are necessary to determine overall ground water use in the District. Industrial uses within a municipality that exceed the existing municipal allocation shall be in accordance with 5-3.3, new industrial uses. These industrial uses shall include, but not be limited to, manufacturing, commercial, power generation and maintenance of the turf of a golf course. (11/13/07)

5-3.5 LIVESTOCK OPERATION WELLS - will be allocated an amount equal to the maximum reasonable quantity of water for livestock and poultry as shown in Table 2.

5-3.6 Upon completion by the operator and receipt by the District of the report required by Rule 4-5, allocations for industrial uses, municipal uses and livestock operation uses shall be reviewed annually and adjustments to allocations may be considered at the February Board meeting.

5-3.7 IRRIGATION USES (11/13/07)

5-3.7.1 Base allocation – Twelve (12) inches per year

5-3.7.2 Base allocation period – Five (5) years

5-3.7.3 Cumulative allocation – 60 inches

5-3.7.3.1 Cumulative allocation may be increased by one (1) bonus inch each time the State of Nebraska has stayed within its yearly allocation the previous two years.

5-3.7.4 Base certification – One hundred (100) percent of certified irrigated acres

5-3.7.5 Allocation Year – January 1st to December 31st

PROVISIONS FOR SUB AREAS

5-3.8 **UPLAND SUB AREA -** For the period commencing January 1, 2008 and ending December 31, 2012,

5-3.8.1 Allocation: Sixty (60) inches for the entire period

5-3.8.2 Maximum Allocation Year use: unrestricted

5-3.8.3 Maximum Allocation Year use in Water Short Year: unrestricted subject to any changes made pursuant to Rule 4-7.

5-3.9 **QUICK RESPONSE SUB AREA** - For the period commencing January 1, 2008 and ending December 31, 2012.

5-3.9.1 Allocation: Sixty (60) inches for the entire period

5-3.9.2 Maximum Allocation Year use: unrestricted

5-3.9.3 Maximum Allocation Year use in Water Short Year: unrestricted subject to any changes made pursuant to Rule 4-7.

5-3.10 **PLATTE SUB AREA -** For the period commencing January 1, 2008 and ending December 31, 2012,

5-3.10.1 Allocation: unrestricted

5-3.10.2 Allocation period: Not applicable

5-3.10.3 Base allocation: Not applicable

5-3.10.4 Base Certification: One hundred (100) percent of certified irrigated acres

5-3.10.5 Maximum yearly use: unrestricted

5-3.11 **SUPPLEMENTAL WELLS –** For the period commencing January 1, 2008 and ending December 31, 2012,

5-3.11.1 Allocation: Sixty (60) inches minus the amount of surface water delivered to, transferred from or otherwise available at the headgate or delivery point at the field to those acres also irrigated with ground water. (10/03/2006) (11/13/07)

5-3.11.2 In a Water Short Year, base certification and maximum allocation shall be in accordance with 5-3.8 and 5-3.9 minus the amount of surface water used on those acres also irrigated with ground water. (10/03/2006)

5-3.12 PENALTY - If at the end of an allocation period an operator has exceeded his or her allocation, the allocation for the next allocation period shall be reduced by the number of acre inches by which said allocation was exceeded in the prior period for the first three inches of overuse and by

twice the number of inches of overuse for the fourth and subsequent inches of overuse.

5-3.13 PENALTY – Overuse of the base allocation during a Water Short Year shall result in the reduction of twice the number of acre-inches overused in the next allocation period.

5-3.14 An operator must have a positive balance in his or her allocation before using water in any year of an allocation period. The District will notify landowners and/or operators anytime the balance of their allocation goes below zero.

5-3.15 For irrigation purposes, if at the end of the allocation period, an operator has consumed less than his or her allocation, he or she may carry the reserve or unused portion forward to the subsequent allocation period. However, the maximum amount of reserve cannot exceed the base allocation of the completed period. Reserve ground water must be used for the same certified acres for which the water was originally allocated, unless approved for transfer pursuant to Rule 5-2.4.

5-3.16 Certified irrigated acres participating in the Federal Conservation Reserve Program (CRP), EQIP, prevented planting or similar programs shall not receive an allocation during the term of participation. Certified irrigated acres removed from these programs shall be granted an allocation that is prorated for the remaining years of the allocation period.

5-3.17 Supplemental wells shall be reported to the District before an allocation is granted.

5-3.18 On or before January 1, 2005, operators of all other regulated water wells for which allocations have not been established by the District shall apply for an allocation and such wells shall not be operated until the District has approved an allocation. The allocation for uses not specifically identified shall be equal to the allocation for irrigated uses as set for the sub area in which the well is located for each one hundred and sixty (160) acres or eighty (80) acre portion thereof under the control of the operator. These acres cannot be certified for other uses or receive another allocation without the consent of the District.

5-3.19 The District may review any allocation, rotation or reduction control imposed in a management area and/or sub area and shall adjust allocations, rotations or reductions to accommodate or otherwise reflect findings of such review consistent with the ground water management objectives. Such review shall consider more accurate data or information that was not available at the time of the allocation, rotation or reduction order, designation of a Water Short Year and such other factors as the District deems appropriate.

5-3.20 The District may institute formal adjudicatory proceedings or take any other legal action authorized or permitted by law to prohibit further withdrawal of ground water from any regulated well whenever an operator has exhausted his or her allocation during or before the end of any allocation period or has in any other way violated the amount, limitations, or conditions of his or her allocation or violated any other rules of the

District. In the event of such action, no ground water may be withdrawn until the operator has adhered to District rules and regulations.

RULE 5-4 CRITICAL UNITS

5-4.1 SWANSON Critical Unit - That portion of the Quick Response Sub Area west of a north-south line through the centerline of Trenton Dam. (see Map 2)

5-4.1.1 Action will not be allowed that would increase the certified acres in this unit.

RULE 5-5 REDUCTION OF IRRIGATED ACRES

5-5.1 No later than November 15 after the designation of the potential for a Water Short Year, the District will notify operators, by mail, in the appropriate sub areas of the potential requirement to reduce certified ground water irrigated acres pursuant to Rule 4-7.

5-5.2 Operators in the Quick Response Sub Area will be required to report, on forms provided by the District, their certified uses, the acres that will be reduced and their proposed uses for the upcoming year.

5-5.3 Certified acres with crops requiring ten (10) acre-inches or less of ground water shall not be required to reduce according to Rule 5-5.2.

RULE 5-6 LIMIT OR PREVENT THE EXPANSION OF NEW ACRES

5-6.1 Beginning on November 17, 2003 and except as provided by Rules 4-6.10 and 5-6.2, no irrigation well may be used to irrigate any acre that was not irrigated with ground water at some time between January 1, 1993 and November 17, 2003.

5-6.2 With the prior approval of the Board and completion of the appropriate transfer permit, acres not irrigated with ground water between January 1, 1993 and November 17, 2003, may be irrigated only if the Board determines that irrigation has been or will be discontinued on an equal or greater number of acres that were irrigated with ground water between January 1, 2000 and November 17, 2003. In deciding whether to approve any such proposed substitution of ground water irrigated acres, the Board shall consider the extent to which, if at all, such substitution of acres would adversely affect other ground water users or surface water appropriators or would cause an increase in Nebraska's consumptive use as calculated pursuant to the Republican River Compact.

NE0176187

INTEGRATED MANAGEMENT PLAN
Jointly Developed by the
DEPARTMENT OF NATURAL RESOURCES
And the
MIDDLE REPUBLICAN NATURAL RESOURCES DISTRICT

I. AUTHORITY

This integrated management plan (IMP) was prepared by the Board of Directors of the Middle Republican Natural Resources District (MRNRD) and the Nebraska Department of Natural Resources (NDNR) in accordance with Neb. Rev. Stat. §§ 46-715 through 46-718.

II. BACKGROUND

In 1943 the States of Colorado, Kansas and Nebraska entered into the Republican River Compact (Compact) with the approval of Congress. The Compact provides for the equitable apportionment of the "virgin water supply" of the Republican River Basin. Following several years of dispute about Nebraska's consumptive use of water within the Basin, Kansas filed an original action in the United States Supreme Court (Court) against the states of Nebraska and Colorado in 1998. After several rulings by the Court and its Special Master and several months of negotiation, all three states entered into a comprehensive agreement known as the Final Settlement Stipulation (FSS). The FSS was approved by the Court on May 19, 2003, and the Special Master's final report approving the Joint Ground Water Model developed by all three states for use in computing streamflow depletions resulting from ground water use and for computing the imported mound credit was submitted to the Court on September 17, 2003.

In July, 1996, the MRNRD and the other three Natural Resources Districts in the Republican River Basin, pursuant to then Section 46-656.28 of the Nebraska statutes, initiated a joint action planning process with the Department of Water Resources (DWR), the predecessor agency to NDNR. In accordance with that process, DWR first made a preliminary determination in 1996 that "there was reason to believe that the use of hydrologically connected ground water and surface water resources is contributing to or is in the reasonably foreseeable future likely to contribute to disputes over the Republican River Compact." When the studies required by Section 46-656.28 had been completed, NDNR issued its conclusions on May 20, 2003, in the form of a report entitled: "Republican River Basin, Report of Preliminary Findings." Those conclusions included the following determination:

> Pursuant to Section 46-656.28 and the preliminary findings in this report, the Department determined that present and future Compact disputes

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arising out of the use of hydrologically connected ground water and surface water resources in the Republican River Basin could be eliminated or reduced through the adoption of a joint action plan.

Following four hearings on that report, NDNR made final the preliminary conclusions in the report and the four Basin Natural Resources Districts were so informed. The MRNRD and the other three Districts each then adopted orders to proceed with developing a joint action plan for integrated management of hydrologically connected surface water and ground water resources in the Basin; preparation of a joint action plan for the MRNRD began soon thereafter.

The Nebraska Legislature adopted LB962 in April of 2004 and it was signed by Governor Johanns on April 15, 2004, and became operative on July 16, 2004. That bill repealed Section 46-656.28 and replaced it with legislation providing for a revised process for addressing hydrologically connected surface water and ground water resources. In order to avoid the need to begin anew the integrated management planning processes that had been commenced but not completed under Section 46-656.28, LB962 provided for the transition of those ongoing planning processes into the newly enacted process now codified as Sections 46-713 to 46-719. The MRNRD and NDNR agreed that preparation of a joint action plan had not been completed prior to July 16, 2004; therefore, subsection (3) of what is codified as Section 46-720, governs that transition. Completion of this plan proceeded under the new process and this plan was adopted in accordance with Section 46-718.

The MRNRD and the NDNR adopted an integrated management plan effective January 1, 2005, that contained ground water rules and regulations for the 2005-2007 period. That integrated management plan established an average ground water allocation of thirteen (13) inches per certified acre, certified all uses and included several other controls. A goal of the 2005 integrated management plan was to reduce water use by five percent (5%) from the 1998-2002 baseline. Since that time, efforts have been taken to implement or conduct incentive programs, studies, and research to further our understanding and ability to comply with the Republican River Compact and the FSS.

III. AGREEMENTS

The MRNRD and the NDNR wish to adopt and implement a revised IMP for the regulation of water resources within the District as required by the laws of the State of Nebraska. The MRNRD and the NDNR agree that the IMP for the District shall keep the District's average net depletions to an amount within thirty percent (30%) of the State's average allowable ground water depletions. Based upon its calculations during periods of average precipitation, the NDNR believes that a twenty percent (20%) reduction from the 98-02 pumping volume would be sufficient, without additional streamflow augmentation, to keep the District's average net depletions within the MRNRD's thirty percent (30%) share of the State's allowable ground water depletions through the year 2020.

The NDNR has determined the following pumping volumes, depletion volumes, and depletion percentages for the period 1998-2002 listed below and defined as "1998-2002 Baselines". The pumping volumes are used throughout this IMP and are referenced as the "98-02 pumping volume". NDNR, through the use of the Republican River Compact Administration Ground Water Model, has also determined each District's impact on streamflow for the baseline period and those impacts are listed below and defined as "98-02 depletion volume". Those depletion volumes have resulted in depletion percentages used throughout this IMP and are listed below and defined as "98-02 depletion percentages."

The pumping volumes used to make these determinations will be evaluated within the next five years to determine their accuracy as compared with metered pumping volumes. If the 98-02 pumping volumes are found to be in error, the pumping volumes for the 1998-2002 period will be revised and the percentage of depletions for this period will be readjusted based on the new pumping volumes.

The failure of any District to adopt, implement, or enforce an IMP adequate to meet their proportionate share of the responsibility to achieve and maintain Nebraska's compliance with the Compact shall not by itself require any additional action by the other Districts. Neither the MRNRD or NDNR will require the integrated management plan to be amended solely for the purpose of changing the responsibility of water users within the MRNRD based on the failure of the other Basin NRDs to implement or enforce an integrated management plan to meet their share of the responsibility to keep Nebraska in compliance with the Republican River Compact.

IV. DEFINITIONS

A. **1998-2002 Baselines** - The depletions to streamflow, in the Nebraska portion of the Republican River Basin, as a result of surface water and ground water uses in the years 1998-2002 inclusive.

98-02 Pumping Volume:
URNRD-531,763 acre-feet (AF), MRNRD-309,479 AF, LRNRD-242,289 AF
98-02 Depletion Volume:
URNRD-74,161 AF, MRNRD-52,168, LRNRD-43,954 AF
98-02 Depletion Percentage:
URNRD-44%, MRNRD-30%, LRNRD-26%

B. **Allowable Streamflow Depletions** - the maximum amount of streamflow depletion in the Republican River Basin that can occur in a given year without Nebraska exceeding its allocation. Allowable streamflow depletions are the sum of the allowable ground water depletions and the allowable surface water depletions.

C. **Allowable Surface Water Depletions** – the maximum level of depletions to streamflow that may occur as a result of accountable surface water uses, based on annual Republican River Compact Administration (RRCA) calculations, within the Republican River Basin in a given year without Nebraska exceeding its allocation.

D. **Allowable Ground Water Depletions** - the maximum level of depletions to streamflow that may occur as a result of ground water pumping of wells within the Republican River Basin that can occur in a given year without Nebraska exceeding its allocation.

E. **Allowable Ground Water Depletion for the MRNRD** - the depletions to streamflow resulting from the impact of ground water pumping in the MRNRD. These depletions shall average no greater than 30% of the allowable ground water depletion. The average shall be computed using the allowable annual ground water depletion for the same years as are used to determine the averages for Nebraska's compliance with the FSS.

F. **Supplemental Programs –** as used in this plan, refers to, but is not limited to; surface water or ground water augmentation projects, river flow enhancement projects, incentive programs, riparian management projects and other projects that may reduce the District's net depletions to streamflow.

G. **Compliance Standard** - the criteria that will be used to determine whether the controls, adopted as rules and regulations by the MRNRD, and adopted in this plan by the NDNR are sufficient to meet the goals and objectives of this integrated management plan pertaining to pumping volumes and depletions. Compliance will be measured in part using the RRCA Ground Water Model.

H. **Net Depletion** – the actual Ground Water Depletion for the MRNRD less any reduction in streamflow depletions or increase in accretions to the stream resulting from supplemental projects.

V. GOALS AND OBJECTIVES

Pursuant to Neb. Rev. Stat. § 46-715, the goals and objectives of an integrated management plan must have a purpose of sustaining a balance between water uses and water supplies so that the economic viability, social and environmental health, safety, and welfare of the Republican River Basin can be achieved and maintained for both the near term and the long term. The MRNRD will meet its responsibility under Neb. Rev. Stat. § 46-715, including meeting the obligations under the FSS, by adopting revised rules to implement the integrated management plan with regulations and other supplemental programs.

The following goals and objectives are adopted by the MRNRD and the NDNR to achieve the purpose stated above:

A. Goals:

1. In cooperation with the other Basin Natural Resources Districts and the Nebraska Department of Natural Resources, maintain compliance with the Republican River Compact as adopted in 1943 and as implemented in accordance with the FSS approved by the United States Supreme Court on May 19, 2003.

2. Ensure that ground water and surface water users within the MRNRD assume their share of the responsibility to keep Nebraska in compliance with the Republican River Compact.

3. Provide that MRNRD's share of that responsibility be distributed in an equitable manner and by minimizing, to the extent possible, adverse economic, social, and environmental consequences.

4. Reserve any streamflow available from regulation or supplemental programs, enacted or implemented to maintain Compact compliance, from any use that would negate the benefit of such regulation or programs.

5. Protect ground water users whose water wells are dependent on recharge from the river or stream and the surface water appropriators on such river or stream from streamflow depletions caused by surface water uses and ground water uses begun after the date the river basin was designated as fully appropriated.

B. Objectives:

1. With limited exceptions, prevent the initiation of new or expanded uses of water that increase Nebraska's computed beneficial consumptive use of water within the MRNRD.

2. Ensure that administration of surface water appropriations in the Basin is in accordance with the Compact and in full compliance with Nebraska law.

3. Achieve, on average, a twenty percent (20%) reduction in 98-02 pumping volume under average precipitation conditions.

4. Maintain the MRNRD net depletions at or within thirty percent (30%) of the allowable ground water depletion.

5. After taking into account any reduction in beneficial consumptive use achieved through District or basin-wide supplemental projects and other projects developed at the Basin or District level with the expressed purpose or result of reducing consumptive use or increasing streamflow, make such additional reductions in ground water use in water short years as are necessary to achieve a reduction in beneficial consumptive use in the MRNRD in an amount proportionate to the total reduction in consumptive use that is needed in Nebraska above Guide Rock in such years.

6. Cause the required reductions in water use to be achieved through a combination of regulatory and supplemental programs designed to reduce beneficial consumptive use, relying to the extent available funds allow, on incentive programs that are made available to as many MRNRD water users as possible.

7. The MRNRD and the NDNR will investigate or explore methods to manage the impact of vegetative growth on streamflow.

8. Develop a procedure to provide offsets for new consumptive uses of water so that economic development in the MRNRD may continue without producing an overall increase in ground water depletions as a result of new uses.

VI. MAP - see map 1.

The area subject to this integrated management plan is the geographic area within the boundaries of the Middle Republican Natural Resources District.

VII. FORECAST

Each year, in accordance with Neb. Rev. Stat. § 46-715(5), the NDNR, in consultation with the Republican River NRDs, shall forecast on an annual basis the maximum amount of water that may be available from streamflow for beneficial use in the short term and long term in order to determine if the ground water controls implemented by the MRNRD through rules and regulations and the surface water controls implemented by NDNR through the IMP are sufficient to ensure that the state of Nebraska will remain in compliance with the Republican River Compact.

VIII. GROUND WATER CONTROLS – Middle Republican NRD

In accordance with Neb. Rev. Stat. § 46-715, one or more of the ground water controls authorized by Neb. Rev. Stat. § 46-739 and Neb. Rev. Stat. § 46-740 shall be adopted for the purpose of implementing this plan. Other authorities, provided for in the Ground Water Management and Protection Act, may be used

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to supplement these controls. These controls, along with any applicable supplemental programs, shall be consistent with the goals and objectives of this plan and be sufficient to meet the compliance standards set forth below, ensure that the state will remain in compliance with the Republican River Compact, and protect the ground water users whose water wells are dependent on recharge from the river or stream and the surface water appropriators on such river or stream from streamflow depletion caused by surface and ground water uses begun after on July 16, 2004, the date the river basin was designated as fully appropriated, in accordance with Neb. Rev. Stat. §§ 46-720 and 46-713-46-715, If it is determined by NDNR and the MRNRD, that all of the Districts in the Basin met their proportional share of responsibility, but Nebraska is nonetheless out of compliance with the FSS, any further reductions in net depletions necessary shall be achieved by the Districts, as the District deems appropriate, based on the same proportions as contained in the 1998-2002 baseline depletion percentages.

The Rules and Regulations – Ground Water Management Area in the Middle Republican Natural Resources District contains the controls required by the FSS and other controls needed for the effective administration of a ground water management subarea for integrated management. The actions proposed by the FSS were rules and regulations for transfers, meters, and certification of acres. In addition, a well drilling moratorium and a ban on the increase of irrigated acres were also implemented. The compliance standard and management activities listed below will be or have been implemented to achieve and maintain Compact compliance.

Amendments dealing with the requirements of Neb. Rev. Stat. §46-715(3)(b), and §46-715(3)(c) shall have the concurrence of NDNR. The MRNRD may otherwise amend these regulations without the approval of the NDNR so long as the compliance standards listed below are met.

If the compliance standards listed below, including consideration of the averages as described in Section VII.A.3.b, are not met, the MRNRD, with the assistance of NDNR, shall formulate adequate rules and regulations, acceptable to NDNR, to meet the Compliance Standards. The revisions to the rules and regulations shall be such that the compliance standards will be achieved within two years from the determination that the compliance standards were exceeded if the State of Nebraska is within compliance with the FSS, or within one year of the determination that the compliance standards have been exceeded and the State of Nebraska is not within compliance with the FSS.

The Determination of whether the MRNRD is in compliance with the compliance standards shall be made in conjunction with the regular annual meeting of the RRCA and shall be based on each year's annual Compact accounting.

A. Compliance Standards

1. PURPOSE. These Compliance Standards are established by NDNR and MRNRD to assess whether the course of action taken by the MRNRD, with the intention of providing a proportionate share of assistance to the State, is sufficient for the State to maintain compliance with the FSS and the Compact. The action taken by the MRNRD shall be evaluated in connection with the action taken by the other Districts in the Republican River Basin and any other relevant considerations, including the information and data provided by NDNR and past action by the District.

2. DURATION. These Compliance Standards shall be used by the MRNRD commencing January 1, 2008 through January 1, 2013. During this period, the NDNR and MRNRD shall examine the sufficiency and effectiveness of the Compliance Standards to determine if amendments or revisions are necessary to ensure the State's compliance with the FSS and the Compact. Nothing contained herein shall prohibit or preclude any amendment or revision, at anytime, by the NDNR and MRNRD, when such action is necessary. Further, nothing contained in this subsection shall be construed as eliminating the review of the provisions of this IMP as allowed by Neb. Rev. Stat. §46-715.

3. STANDARDS. The MRNRD shall adopt and implement rules and regulations which shall meet the requirements of both the following compliance standards:

    a. Provide for a twenty percent (20%) reduction in pumping from the 98-02 pumping volume using a combination of regulation and supplemental programs so that the average ground water pumping volume is no greater than 247,580 acre-feet over the long term.
        i. If precipitation is lower than average for any given year, the ground water pumping volume for that year may be above 247,580 acre-feet.
        ii. If incentive or supplemental programs are implemented so that on average stream flow is increased, the ground water pumping volume may be increased above the 247,580 acre feet in proportion to that increased amount of streamflow as determined by the Republican River Compact Administration Ground Water Model (RRCAGWM).

    b. The District's net depletions shall average no greater than thirty percent (30%) of the State of Nebraska's allowable ground water depletions as accounted by the RRCAGWM. The average shall be computed using the annual allowable ~~annual~~ ground

water depletion for the same years as are used to determine the averages for Nebraska's compliance with the FSS.

B. OTHER CONTROLS AND MANAGEMENT ACTIVITIES

1. Maintain a moratorium on new uses with the exceptions noted in the FSS.
2. Limit or prevent the expansion of irrigation uses.
3. Maintain requirement for metering of all uses according to MRNRD standards.
4. Provide for transfers according to District standards.
5. The MRNRD shall provide NDNR with copies of District actions taken on variances and consult with NDNR to minimize or eliminate any impact, relating to Compact compliance, that may arise as a result of a variance granted by the District.
6. NDNR will consult with the MRNRD when considering applications for permits under the Municipal and Rural Domestic Ground Water Transfers Permit Act, the Industrial Ground Water Regulatory Act or other such permitting actions by the NDNR that will have an impact on water supplies of the Republican River Basin.
7. The MRNRD will work with NDNR to achieve the maximum amount of benefit in the accounting of leased or purchased water under the authority of River Flow Enhancement projects or in similar projects.
8. The MRNRD and the NDNR recognize that the required reductions in water consumption could be accomplished by means other than those adopted in this IMP. The IMP and associated controls may need to be amended in the future to implement any such revisions.

IX. SURFACE WATER CONTROLS - Department of Natural Resources

The authority for the surface water component of this integrated management plan is Neb. Rev. Stat. §46-715 and §46-716. The surface water controls that will be continued and/or begun by the NDNR are as follows:

A. NDNR will do the following additional surface water administration as required by the FSS:

1. To provide for regulation of natural flow between Harlan County Lake and Superior-Courtland Diversion Dam, Nebraska will recognize a priority date of February 26, 1948, for Kansas Bostwick Irrigation

District, the same priority date as the priority date held by the Nebraska Bostwick Irrigation District's Courtland Canal water right.

2. When water is needed for diversion at Guide Rock and the projected or actual irrigation supply is less than 130,000 acre-feet of storage available for use from Harlan County Lake as determined by the Bureau of Reclamation using the methodology described in Harlan County Lake Operation Consensus Plan attached as Appendix K to the FSS, Nebraska will close junior, and require compliance with senior, natural flow diversions of surface water between Harlan County Lake and Guide Rock.

3. Nebraska will protect storage water released from Harlan County Lake for delivery at Guide Rock from surface water diversions.

4. Nebraska, in concert with Kansas and in collaboration with the United States, and in the manner described in Appendix L to the FSS, will take actions to minimize the bypass flows at Superior-Courtland Diversion Dam.

B. Metering of all surface water diversions at the point of diversion from the stream will continue to be required. For surface water canals that are not part of a Bureau of Reclamation project, farm turnouts also will be required to be metered by the start of the 2005 irrigation season. All meters shall have a totalizer and shall meet NDNR standards for installation, accuracy and maintenance. All appropriators will be monitored closely to ensure that neither the rate of diversion nor the annual amount diverted exceeds that allowed by the applicable permit or by statute.

C. The NDNR's moratorium on the issuance of new surface water permits was made formal by Order of the Director dated July 14, 2004, and will be continued. Exceptions may be granted to the extent permitted by statute or to allow issuance of permits for existing reservoirs that currently do not now have such permits. Such reservoirs are limited to those identified through the FSS required inventory of over fifteen (15) acre-feet capacity reservoirs.

D. All proposed transfers of surface water rights shall be subject to the criteria for such transfers as found in Neb. Rev. Stat. §§46-290 to 46-294.04 and related NDNR rules or the criteria found in Neb. Rev. Stat. §§46-2,120 to 46-2,130 and related NDNR rules.

E. The NDNR completed the adjudication process for individual appropriators in the Republican River Basin upstream of Guide Rock in 2004. The results of that adjudication provided up-to-date records of the number and location of acres irrigated with surface water by such appropriators.

Those records will be used by the NDNR to monitor use of surface water and to make sure that unauthorized irrigation is not occurring. The NDNR also will be proactive in initiating subsequent adjudications whenever information available to the NDNR indicates the need for adjudication as outlined by state statutes..

F. At this time, due to the already limited availability of surface water supplies, the NDNR will not require that surface water appropriators apply or utilize additional conservation measures or that they be subject to other new restrictions on surface water use, except as may be necessary to meet the goals and objectives of this plan and to maintain compliance with the Compact. However, the NDNR reserves the right to request, in the future, that this IMP be modified to require any such additional measures. In the event such a request is made, the NDNR will "allow the affected surface water appropriators and surface water project sponsors a reasonable amount of time, not to exceed one hundred eighty days, unless extended by the NDNR, to identify the conservation measures to be applied or utilized, to develop a schedule for such application and utilization, and to comment on any other proposed restrictions." Neb. Rev. Stat. §46-716(2).

X. AUGMENTATION AND INCENTIVE PROGRAMS

The MRNRD and NDNR, alone or in cooperation with other parties, intend to establish and implement financial or other incentive programs to reduce beneficial consumptive use of water within the MRNRD. As a condition for participation in an incentive program, water users or landowners may be required to enter into and perform such agreements or covenants concerning the use of land or water as are necessary to produce the benefits for which the incentive program is established.

Such incentive programs may include any program authorized by state law and/or Federal programs such as the Conservation Reserve Enhancement Program (CREP) and Environmental Quality Incentives Program (EQIP) operated by the U.S. Department of Agriculture.

Projects that have a net effect of reducing consumptive use or increasing streamflow can originate from many sources. The MRNRD will initiate these types of projects when possible and participate in projects sponsored by other groups within our capabilities.

The MRNRD, through the Republican River Basin Coalition, intends to establish and implement river flow enhancement projects using the authorities available to the MRNRD by the enactment of LB 701 in 2007.

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Any reductions in depletions to streamflow generated through supplemental programs, including acreage retirement or other incentive programs undertaken through programs available throughout the Republican River Basin with the use of funds distributed by the State of Nebraska or the United States Government will be accounted as credits to the entire Republican River Basin and not to any District, regardless of the location or other conditions of the acreage included in the program or of the location of the effect of such water savings on the river system. Any reductions in depletions to streamflow resulting from any such basin-wide programs shall be considered in the calculation of each District's compliance with the 98-02 depletion percentages.

However, should any District establish, fund, and implement its own such conservation program, available only for acreage within such District, the accounting of credit for the resulting water savings shall be given exclusively to that District. Also, with agreement of the Districts involved, the benefits from a supplemental program may be allocated to each District based upon their share of the cost of the program.

XI. REPORTING REQUIREMENTS

The MRNRD and the NDNR will make all documents, reports, records, computer runs or other calculations or material necessary to determine compliance with the Compact available to each other, regardless of whether such documents are available under the Nebraska Public Records Act or otherwise, unless such materials are identified as confidential under Nebraska statutes or by a ruling of a court of competent jurisdiction. Specifically, and without limitation, the MRNRD agrees to continue to provide GIS coverage maps of all lands irrigated and to meter, record and provide to the NDNR its ground water usage records in a manner consistent with the requirements of the Republican River Compact Accounting Procedures; the NDNR agrees to provide to the MRNRD all reports and records of the other Districts necessary to determine their compliance with reductions, in accordance with procedures described above, as well as all documentation and reports utilized by the NDNR to determine the Basin's virgin water supplies and Nebraska's compliance with the Compact. In the event any materials are withheld by either NDNR or MRNRD under a claim of statutory confidentiality, the party withholding such materials shall describe the contents of the materials and reasons for the denial in accordance with Neb. Rev. Stat. § 84-712.04.

XII. PLAN TO GATHER AND EVALUATE DATA

Compact accounting and data exchanges among the states shall be done annually in accordance with the Final Settlement Stipulation, dated December 15, 2002, including the Republican River Compact Administration (RRCA) Accounting Procedures and Reporting Requirements which are contained in Appendix C thereof. An annual report of the RRCA is published each year. Ongoing programs and new studies or other projects may become a source of

information that can be used to evaluate the effectiveness of controls adopted by the by the MRNRD and the NDNR. This accounting and the forecast in accordance with Neb. Rev. Stat. § 46-715(5) will increase understanding and test the validity of the conclusions and information upon which this plan is based.

XIII. INFORMATION CONSIDERED

Information used in the preparation and to be used in the implementation of this integrated management plan can be found in the simulation runs of the Republican River Compact Administration Ground Water Model, the data tables of the Final Settlement Stipulation for the Republican River Compact, Chapters 2 and 3 of the 1994 Middle Republican NRD Ground Water Management Plan and additional data on file with the District and the NDNR of Natural Resources.

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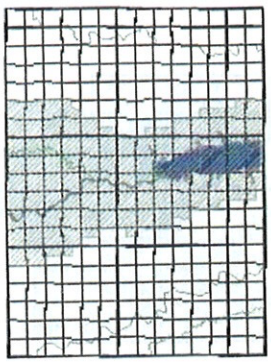
Map 2



Swanson Critical Unit

This map was created for informational purposes only.
Created 08/10/04

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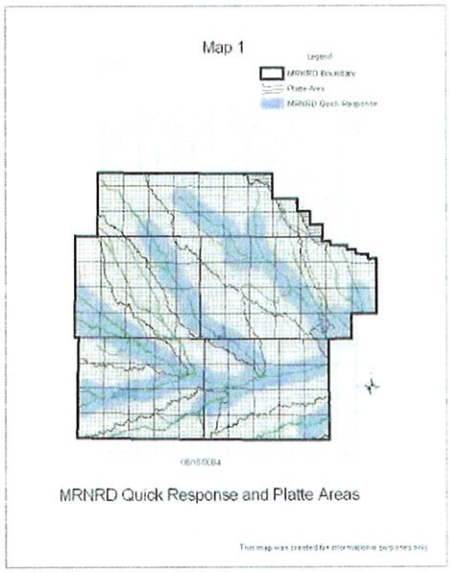
Map 1
Legend
MRNRD Boundary
Platte Area
MRNRD Quick Response
MRNRD Quick Response and Platte Areas

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Maximum Resonable Quantity of Water for Livestock and Poultry
October 2004

	Drinking water gallon/head/day	Servicing/Flushing gallons/head/day	Quantity/1000 head cbc=1000	
Cattle, beef	15	0 open lot	17	ac ft
	15	100 cbc	129	ac ft
Cattle, Dairy	35	100 cbc	151	ac ft
Swine				
Nursery	1	4 cbc	6	ac ft
Finishing	5	15 cbc	22	ac ft
Sow&Litter	8	35 cbc	48	ac ft
Gestating Sov	6	25 cbc	35	ac ft
Sheep	2	0 open lot	2.2	ac ft
	2	15 cbc	19	ac ft
Horses	12	0 open lot	13	ac ft
	12	100 cbc	125	ac ft
Poultry/100				
Chickens	9	200 cbc	2.3	ac ft
Turkeys	30	400 cbc	4.8	ac ft

Table 2.

Middle Republican NRD
October 2004

Community	2000 Census	Sq. mi.	Area Factor	Gallons/Person/Day 15"	14"	13"	12"
Bartley	355	0.7	3				
Culberston	594	0.9	4				
Curtis	832	1.3	6				
Danbury	127	0.9	4				
Hayes Center	240	0.7	3				
Indianola	642	1.2	5				
Lebanon	70	0.2	1				
Maywood	331	0.5	2				
McCook	7994	5.3	22				
Moorefield	52	0.2	1				
Palisade	386	0.4	2				
Stockville	36	0.3	2				
Stratton	396	0.4	2				
Trenton	507	0.6	3				
Wallace	329	0.7	3				
			4.20				
Average Town	859	0.95	4	873	814	756	698

mi. sq.	factor
0.1	1
0.26	2
0.51	3
0.76	4
1.01	5
1.26	6
1.51	7
1.76	8
2.01	9
2.26	10
2.51	11
2.76	12
3.01	13
3.26	14
3.51	15
3.76	16
4.01	17
4.26	18
4.51	19
4.76	20
5.01	21
5.26	22
5.51	23
5.76	24

Table 1.

Allocation	gal/yr/160 acres					
15"	65170000	1509	1408	1308	1207
14"	60825333	1202	1122	1042	962
13"	56480667	1288	1202	1116	1030
12"	52136000	5624	5249	4874	4499
		2232	2083	1934	1785
		1391	1298	1205	1112
		2551	2381	2211	2041
		1079	1007	935	863
		491	459	426	393
		3434	3205	2976	2747
		925	863	802	740
		9919	9258	8597	7935
Table 1.		902	842	782	721
		1056	986	916	845
		1628	1520	1411	1302
Total Town	12891	14.3	58	803	750	696	643

Appendix C: Upper Republican Natural Resources District

Integrated Management Plan

INTEGRATED MANAGEMENT PLAN
Jointly Developed by the
DEPARTMENT OF NATURAL RESOURCES
and the
UPPER REPUBLICAN NATURAL RESOURCES DISTRICT

I. AUTHORITY

This Integrated Management Plan (IMP) was prepared by the Board of Directors for the Upper Republican Natural Resources District (URNRD) and the Nebraska Department of Natural Resources (NDNR) in accordance with the Nebraska Ground Water Management and Protection Act, *Neb. Rev. Stat.* §§ 46-701 to 46-753 (Reissue 2004).

II. BACKGROUND

Commencing in 1978, the URNRD has adopted and enforced rules and regulations for the purpose of managing the ground water resources within the URNRD. On April 11, 2003, effective May 8, 2003, the URNRD, pursuant to applicable statutory rulemaking procedures and *Neb. Rev. Stat.* § 46-656.25 (Reissue 1998), adopted the *State of Nebraska Upper Republican Natural Resources District Amendments to Rules and Regulations for Ground Water Control – Order No. 26* and the *Upper Republican Natural Resources District Technical Manual of Policies and Procedures TM-26* (the "URNRD Rules" or "the Rules"). In the regular meeting, on July 6, 2004, the URNRD voted to extend Order No. 26 until September 1, 2005. Rule 9A of the Rules provides for a basic allocation of ground water to certified irrigated acres within the URNRD of 72.5 acre-inches for the five (5) year period between January 1, 2003 and December 31, 2007, an annualized allocation of 14.5 acre-inches. Since their adoption, the Rules have prohibited additional allocations for ground water use and additional well permits, except under limited circumstances. In addition, among other things, the Rules continued and recodified the URNRD's practice of allowing ground water users to carry forward the unused portion of their allocation, together with any remaining unused portions of allocations from previous years, into succeeding allocation periods and permitted the URNRD to approve pooling contracts, both in accordance with the URNRD Rules.

In 1943 the States of Colorado, Kansas and Nebraska entered into the Republican River Compact (the "Compact") with the approval of the United States Congress. The Compact provides for the allocation of the "virgin water supply" of the Republican River Basin (the "Basin") between the three States. Following several years of dispute about Nebraska's consumptive use of water within the Basin, Kansas filed an original action in the United States Supreme Court against the States of Nebraska and Colorado in 1998, seeking, among other things, to include ground water in the calculation of the virgin water supply and consumptive use. The United States Supreme Court appointed a Special Master who recommended that the depletions to stream flow from the use of ground water must be included in the virgin water supply and be part of the calculation of each State's beneficial consumptive use. The United

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States Supreme Court adopted the Special Master's recommendation. Subsequent to this determination, the States entered into a Settlement Agreement resolving the remaining issues in the case. The Settlement Agreement was approved by the United States Supreme Court on May 19, 2003.

Both prior and subsequent to the approval of the Settlement Agreement, the NDNR conducted and participated in several meetings with the URNRD, including several public meetings. During the course of those meetings the NDNR explained, in order for the State of Nebraska to achieve and maintain compliance with the terms of the Settlement Agreement, it would be necessary to (1) continue the moratorium on new surface water appropriations and new ground water wells, (2) reduce all ground water pumpage from historic levels across the entire Basin and (3) further reduce ground water pumping needed to comply with the Compact in water short years, to be accomplished to the extent possible through the use of incentive programs to reduce consumptive use of water. Ground water within the Basin is regulated by four Natural Resource Districts: the URNRD, the Middle Republican Natural Resources District (MRNRD) and the Lower Republican Natural Resources District (LRNRD) and the Tri-Basin Natural Resources District (the "Tri-Basin") (collectively hereinafter the "Districts"). Similar discussions were held between the NDNR and each of the Districts regarding the need (1) to accurately measure actual ground water pumpage and surface water diversions throughout the Basin and within each District, (2) for the Tri-Basin to maintain, at sufficient levels to offset depletions to the Republican River caused by ground water pumping within the Republican River Compact area within the Tri-Basin, the Compact Imported Water Supply that Nebraska receives because of discharges from the "ground water mound"; and, 3) for each of the Districts other than the Tri-Basin to reduce its ground water pumping from their 1998-2002 baseline pumping volumes, as defined below.

Since 1978, with adoption of its Order #1, the URNRD has required the metering, data collection and reporting of ground water use, resulting in actual pumping and use data, and has imposed allocations and regulation on ground water users within the URNRD, while the use of wells in the MRNRD and LRNRD were neither reported nor regulated during the same period. In order to estimate pumping in the MRNRD and LRNRD, other methods based on hours of operation using electrical power information and individual pumping rates were used. The NDNR has determined the following pumping volumes for the period 1998-2002: 531,763 acre-feet for the URNRD, 309,479 acre-feet for the MRNRD and 242,289 acre-feet for the LRNRD. These pumping volumes are used throughout this IMP and are referenced as the "1998-2002 baseline pumping volumes." NDNR, through the use of the Republican River Compact Administration Ground Water Model, has also determined each District's depletions to stream flow for the period 1998-2002 ("1998-2002 baseline depletion"): 74,161 acre-feet for the URNRD, 52,168 acre-feet for the MRNRD and 43,954 acre-feet for the LRNRD. Those depletion numbers have resulted in the following depletion proportions: 44% for the URNRD, 30% for the MRNRD and 26% for the LRNRD. These depletion proportions are used throughout this IMP and are referenced as the "1998-2002 baseline depletion proportions." The percentage of allowable ground water depletions for each Republican River District were based on the proportion of the average ground water depletions caused by ground water pumping within each District that occurred during the base-line period from 1998-2002 as determined by model runs of the Republican River Compact Administration Ground Water Model with ground water pumping in each District alternated turned off and then on. The pumping volumes used to

make these determinations will be evaluated within the next five years to determine their accuracy as compared with metered pumping volumes. If the baseline pumping volumes are found to be in error, the pumping volumes for the 1998-2002 period will be revised and the percentage of depletions for this period will be readjusted based on the new pumping volumes.

The URNRD and the NDNR adopted an integrated management plan on May 3rd, 2005, that contained groundwater rules and regulations for the 2005-2007 period. The integrated management plan provided for a groundwater allocation of 13.5 inches per certified acre, continued the pooling of allocations, and the carry forward of unused allocations, among other things. The goal of the 2005 integrated management plan was to reduce water use by 5% from the 1998-2002 baseline. Since that time, efforts have been taken to implement or conduct incentive programs, studies, and research to further our understanding and ability to comply with the Republican River Compact and Settlement. The URNRD and the NDNR wish to adopt and implement a revised IMP for the regulation of water resources within the District as required by the laws of the State of Nebraska.

The URNRD has agreed to meet its responsibility under *Neb. Rev. Stat.* §46-715, including meeting the obligations under the Settlement Agreement, by adopting revised rules to implement the integrated management plan with regulations and other augmentation programs sufficient to reduce the URNRD's depletions to streamflow to meet the District's proportional share of the requirements of the Republican River Settlement Agreement. To ensure each District within the Republican River Basin will be treated equally, the NDNR has agreed not to approve any plan, unless the plan would restrict the use of water by each District to within the allocation granted to it as determined by the 1998-2002 baseline pumping volumes and that each District shall be assigned its proportionate share of streamflow depletion as calculated by the 1998-2002 baseline depletion percentages. NDNR agrees the failure of any District to adopt, implement or enforce IMPs adequate to meet their proportionate share of the responsibility to achieve and maintain Nebraska's compliance with the Compact shall not in itself require any additional action by the other Districts.

The NRD and the NDNR agree that the IMP for the District shall keep the District's depletions including credits for streamflow augmentation to an amount within 44% of the State's allowable ground water depletions. Based upon its calculations, the NDNR believes that a 20% reduction in pumping from the 98-02 baseline would be sufficient without additional streamflow augmentation to keep the District's net depletions within the URNRD's 44% share of the State's allowable ground water depletions during periods of average precipitation throughout the basin, through the year 2020.

III. DEFINITIONS

A. Allowable Ground Water Depletions - the maximum level of depletions to streamflow from ground water pumping within the Republican River Compact area that can be allowed without exceeding the Compact allocation.

B. Allowable Ground Water Depletions for the URNRD - the depletions to stream flow from ground water pumping in the URNRD that are no greater than 44% of the total allowable ground water depletions.

C. Allowable Streamflow Depletions - the maximum amount of streamflow depletion in the Republican River Basin that can be allowed without violating the Compact.

D. Baseline Depletion Percentages - the annual mean depletions to stream flow in the Republican River Basin caused by surface water and ground water use in the years 1998-2002 inclusive. The baseline depletions are 74,161 acre feet for the URNRD, 52,168 acre feet for the MRNRD, and 43,954 acre feet for the LRNRD. The percentage depletions assigned to the Districts are: URNRD, 44%; MRNRD, 30%; and LRNRD, 26%.

E. Baseline Pumping Volumes - the annual mean ground water pumping from the period 1998 to 2002. The baseline pumping volumes are 531,763 acre-feet for the URNRD, 309,479 acre-feet for the MRNRD and 242,289 acre-feet for the LRNRD .

F. Compliance Standard - the criteria that will be used to determine whether URNRD's rules, regulations, and other programs are sufficient to meet the goals and objectives of this IMP pertaining to pumping volumes and depletions.

G. Net Depletions - a District's ground water depletions less any reduction in streamflow depletions or increase in allocation resulting from streamflow augmentation projects, including surface water leases.

IV. GOALS AND OBJECTIVES

Pursuant to *Neb. Rev. Stat.* § 46-715 (Reissue 2004), the goals and objectives of this IMP must have as a purpose "sustaining a balance between water uses and water supplies so that the economic viability, social and environmental health, safety, and welfare of the river basin ... can be achieved and maintained for both the near term and the long term." The following goals and objectives are also adopted by the URNRD and the NDNR to meet the additional requirements of *Neb. Rev. Stat.* §46-715.

A. Goals:

1. In cooperation with the State of Nebraska and the other Districts, maintain compliance with the Compact as adopted in 1943 and as implemented in accordance with the Settlement Agreement approved by the United States Supreme Court on May 19, 2003;

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2. Ensure that water users within the URNRD assume their share, but only their share, of the responsibility to maintain compliance with the Compact;

3. Provide the URNRD's share of compliance responsibility and impact be apportioned within the URNRD in an equitable manner and to the extent possible, minimize the adverse economic, social and environmental consequences arising from compliance activities.;

4. Protect ground water users whose water wells are dependent on recharge from the river or stream and the surface water appropriators on such river or stream from streamflow depletions caused by surface water uses and ground water uses begun after the date the river basin was designated as fully appropriated; and

5. Reserve any streamflow available from regulation, incentive programs, and purchased or leased surface water required to maintain compact compliance from any use that would negate the benefit of such regulations or programs.

B. Objectives:

1. With limited exceptions, prevent the initiation of new or expanded uses of water that increase Nebraska's computed beneficial consumptive use of water within the URNRD, as required for Compact compliance and by Nebraska law

2. Ensure administration of surface water appropriations in the Basin is in accordance with the Compact and Nebraska law;

3. Reduce existing ground water use within the URNRD by 20% from the 1998-2002 baseline pumping volumes under average precipitation conditions so that, when combined with streamflow augmentation and incentive programs, the URNRD's depletions are maintained within 44% of Nebraska's allowable ground water depletions as computed through use of the Republican River Compact Administration Ground Water Model;

4. After taking into account any reduction in beneficial consumptive use achieved through basin-wide incentive and streamflow augmentation programs, make such additional reductions in ground water use in water short years as are necessary to achieve a reduction in beneficial consumptive use in the URNRD in an amount proportionate to the total reduction in consumptive use required by the Republican River Settlement Agreement in Nebraska above Guide Rock in such years;

5. Cause the reductions in water use required for Compact compliance to be achieved through a combination of regulatory, incentive, and augmentation programs designed to reduce beneficial consumptive use, relying on incentive programs available to as many of the URNRD water users as possible;

6. Cooperate with the NDNR to investigate and explore methods to manage the impact of vegetative growth on stream flow: and

7. Develop a program to provide offsets for new consumptive uses of water so that economic development in the district may continue without producing an overall increase in ground water depletions as a result of new uses.

V. MAP - see map 1.

The area subject to this IMP is the geographic area within the boundaries of the URNRD.

VI. FORECAST OF MAXIMUM AMOUNT OF WATER THAT MAY BE AVAILABLE FROM STREAMFLOW DEPLETIONS

Each year in compliance with *Neb. Rev. Stat.* § 46-715(5) the NDNR in consultation with the Republican River NRDs shall forecast the maximum amount of water that may be available from streamflow for beneficial use in the short term and long term to comply with the Compact. This forecast will be used to assist the NDNR and the NRDs in ensuring compliance with the Compact.

VII. GROUND WATER CONTROLS

The URNRD will utilize the ground water controls as provided by *NEB.REV.STAT.* §§ 46-715, 46-739 and 46-740 to form the Ground Water Controls component of this IMP. The controls that the NDNR and URNRD agree are necessary and shall be continued are: 1) groundwater allocations and 2) a moratorium on new water wells and irrigated acre as are required by the RRSA. In order to provide the URNRD flexibility in addressing compliance, the URNRD may implement a reduction in irrigated acres and incentive programs targeting acres with a higher streamflow depletion factor as alternatives to District-wide reductions in allocation or irrigated acres. The controls shall be set forth in detail and implemented through the URNRD's Rules and Regulations and the provisions of the URNRD's Rules and Regulations shall be sufficient so as to meet the Compliance Standards set forth below. If it is determined by NDNR and the URNRD that all of the Districts in the basin have met their proportional share of responsibility, but Nebraska is nonetheless out of compliance with the RRSA, further reductions in net depletions will be necessary. Any further reduction in net depletions will be based on the same proportions as contained in the 1998-2002 baseline depletion percentages.

In addition to satisfying the compliance standards, the rules and regulations adopted by the URNRD shall contain provisions which adequately assure that no new ground water uses initiated after July 14, 2004, will adversely impact surface water appropriators or ground water users whose water wells are dependent upon recharge from the stream or river. If the Compliance Standards are met, the URNRD may amend or modify its rules and regulations without the approval of NDNR, except for the rules and regulations pertaining to the satisfaction of the requirements of *NEB.REV.STAT.* §46-715(3)(b) and 46-715(3)(c). In the event the Compliance Standards are not met, URNRD, with the assistance of NDNR, shall formulate adequate rules

and regulations, acceptable to NDNR, to meet the Compliance Standards. The necessary revisions to the rules and regulations shall place the District in a position where it meets the Compliance Standards within one (1) year from the date of determination the State is not in compliance with the RRSA, or within two (2) years from the date of determination the District has failed to meet the Compliance Standards, but the State is in compliance with the RRSA.

VIII. COMPLIANCE STANDARDS

1. PURPOSE. These Compliance Standards are established by NDNR and URNRD to assess whether the course of action taken by the URNRD, with the intention of providing their proportionate share of assistance to the State in order for the State to maintain compliance with the RRSA and Compact, are sufficient. The action taken by the URNRD shall be evaluated in connection with the action taken by the other Districts in the Republican River Basin and any other relevant considerations, including the information and data provided by NDNR and past action by the District.

2. DURATION. These Compliance Standards shall be used to assess the action taken by the URNRD commencing January 1, 2008 through January 1, 2013. Prior to January 1, 2013 the NDNR and URNRD shall reexamine the sufficiency and effectiveness of the Compliance Standards to determine if amendments or revisions are necessary to ensure the State's compliance with the RRSA and Compact. Nothing contained herein shall prohibit or preclude any amendment or revision, at anytime, by the NDNR and URNRD, when such action is necessary under the circumstances. Further, nothing contained in this subsection shall be construed as eliminating the review of the provisions of this IMP as required by *NEB.REV.STAT.* §46-715.

3. STANDARDS. The URNRD shall adopt and implement rules and regulations which shall provide that the following standards are met.

A. Provide for a 20% reduction in pumping from the 1998-2002 baseline ground water pumping volume so that the average ground water pumping volume is no greater than 425,000 acre feet over the long term. It is understood that if precipitation is lower than average for any given year, the ground water pumping volume for that year may be above 425,000 acre feet provided that Standard B is met. If incentive or augmentation programs are implemented so that on average stream flow is increased, the ground water pumping volume may be increased above the 425,000 acre feet by an amount that would cause streamflow depletions equivalent to the increased streamflow resulting from the incentive and augmentation programs as determined by the RRCAGWM.

B. Provide the URNRD's net depletions shall be no greater than 44% of the allowable ground water depletions as determined by the accounting by the RRCAGWM.

The procedures for determining whether the compliance standards are met will be based on the RRSA and the baseline ground water pumping volumes.

IX. SURFACE WATER CONTROLS – Nebraska Department of Natural Resources (NDNR)

The authority for the surface water component of this IMP is *Neb. Rev. Stat.* §§ 46-715 and 46-716 (Reissue 2004). The surface water controls that will be continued and/or begun by the NDNR are as follows:

1. The NDNR will do the following additional surface water administration as required by the Settlement Agreement:
    - To provide for regulation of natural flow between Harlan County Lake and Superior-Courtland Diversion Dam, Nebraska will recognize a priority date of February 26, 1948 for Kansas Bostwick Irrigation District, the same priority date as the priority date held by the Nebraska Bostwick Irrigation District's Courtland Canal water right.
    - When water is needed for diversion at Guide Rock and the projected or actual irrigation supply is less than 130,000 acre-feet of storage available for use from Harlan County Lake as determined by the Bureau of Reclamation using the methodology described in Harlan County Lake Operation Consensus Plan attached as Appendix K to the Settlement Agreement, Nebraska will close junior, and require compliance with senior, natural flow diversions of surface water between Harlan County Lake and Guide Rock.
    - Nebraska will protect storage water released from Harlan County Lake for delivery at Guide Rock from surface water diversions.
    - Nebraska, in concert with Kansas and in collaboration with the United States, and in the manner described in Appendix L to the Settlement Agreement, will take actions to minimize the bypass flows at Superior-Courtland Diversion Dam.

2. Metering of all surface water diversions at the point of diversion from the stream will continue to be required. For surface water canals that are not part of a Bureau of Reclamation project, farm turnouts will be required to install and maintain a NDNR approved measuring device by the start of the 2005 irrigation season. All measuring devices shall meet the NDNR standards for installation, accuracy and maintenance. All appropriators will be monitored to ensure that neither the rate of diversion nor the annual amount diverted exceeds that allowed by the applicable permit or by statute.

3. The NDNR's moratorium on the issuance of new surface water permits was made formal by Order of the Director dated July 14, 2004. Exceptions may be granted by the NDNR to the extent permitted by *Neb. Rev. Stat.* § 46-714(3) (Reissue 2004) or to allow issuance of permits for existing reservoirs that currently do not now have such

permits. Such reservoirs are limited to those identified through the Settlement Agreement required inventory of reservoirs with over 15 acre-feet capacity.

4. All proposed transfers of surface water rights shall be subject to the criteria for such transfers as found in *Neb. Rev. Stat.* §§ 46-290 to 46-294.04 (Reissue 2004) and related NDNR rules or the criteria found in *Neb. Rev. Stat.* §§ 46-2,120 to 46-2,130 (Reissue 2004) and related NDNR rules.

5. The NDNR completed adjudication of individual appropriators in the Republican River Basin upstream of Guide Rock in 2004. The results of that adjudication provided up-to-date records of the number and location of acres irrigated with surface water by such appropriators. Those records shall be used by the NDNR to monitor use of surface water and to make sure that unauthorized irrigation is not occurring. The NDNR will also be proactive in initiating subsequent adjudications whenever information available to the NDNR indicates the need for adjudication as outlined by state statutes.

6. At this time, due to the already limited availability of surface water supplies, the NDNR will not require that surface water appropriators apply or utilize additional conservation measures or that they be subject to other new restrictions on surface water use, except as may be necessary to meet the goals and objectives of this plan and to maintain compliance with the compact.

7. The Department also reserves the right to request, in the future, that this IMP be modified to require any such additional measures. In the event such a request is made, the NDNR will "allow the affected surface water appropriators and surface water project sponsors a reasonable amount of time, not to exceed one hundred eighty (180) days, unless extended by the NDNR, to identify the conservation measures to be applied or utilized, to develop a schedule for such application and utilization, and to comment on any other proposed restrictions." *Neb. Rev. Stat.* § 46-716(2) (Reissue 2004).

X. AUGMENTATION AND INCENTIVE PROGRAMS

Subject to the provisions of paragraph 5 under "Ground Water Regulations," above, the URNRD and the NDNR intend to develop augmentation projects and to establish and implement financial or other incentive programs to reduce beneficial consumptive use of water within the URNRD. As a condition for participation in an incentive program, water users, landowners or the URNRD may be required to enter into and perform such agreements or covenants concerning the use of land or water as are necessary to produce the benefits for which the incentive program is established. Such incentive programs may include, but shall not be limited to, any program authorized by state law and/or Federal programs operated by the United States Department of Agriculture.

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Any water savings generated through conservation programs, including acreage retirement or other conservation incentive programs undertaken through programs available throughout the Republican River Basin with the use of funds distributed by the State of Nebraska or the United States Government will be accounted as credits to the entire Republican River Basin and not to any District, regardless of the location or other conditions of the acreage included in the program or of the location of the effect of such water savings on the river system. Any water savings resulting from any such basin-wide programs shall be considered in the calculation of each District's depletions allocated to each of the Districts based upon the 1998-2002 baseline depletion proportions. However, should any District establish, fund, and implement its own such conservation program, the accounting of credit for the resulting water savings shall be given exclusively to that District. Also, if multiple Districts cooperate in a stream flow augmentation project, the benefits shall be allocated to each District based upon their share of the cost of the program.

XI. REPORTING REQUIREMENTS

The URNRD and the NDNR will make all documents, reports, records, computer runs or other calculations or material necessary to determine compliance with the Compact available to each other, regardless of whether such documents are available under the Nebraska Public Records Act or otherwise, unless such materials are identified as confidential under Nebraska statutes or by a ruling of a court of competent jurisdiction. Specifically, and without limitation, the URNRD agrees to continue to provide any existing GIS coverage maps of all lands irrigated and to meter, record and provide to the NDNR its ground water usage records in a manner consistent with the requirements of the Republican River Compact Accounting Procedures; this information will be for each irrigation season and provided to NDNR by March 1 of the following year. The NDNR agrees to provide to the URNRD all reports and records of the other Districts necessary to determine their compliance with reductions in accordance with the formula described above, as well as all documentation and reports utilized by the NDNR to determine the Basin's virgin water supplies and Nebraska's compliance with the Compact. In the event any materials are withheld by either NDNR or URNRD under a claim of statutory confidentiality, the party withholding such materials shall describe the contents of the materials and reasons for the denial in accordance with *Neb. Rev. Stat.* § 84-712.04 (Reissue 1999).

XII. PLAN TO GATHER AND EVALUATE DATA, INFORMATION AND METHODOLOGIES

The DNR and the URNRD shall develop a plan to gather and evaluate data, information, and methodologies that could be used to implement Neb.Rev.Stat. Sections 46-715 to 46-717, increase understanding of the surface water and hydrologically connected ground water system, and test the validity of the conclusions and information upon which the integrated management plan is based.

XIII. INFORMATION CONSIDERED

Information used in the preparation and to be used in the implementation of this IMP can be found in the simulation runs of the Republican River Compact Administration Ground Water Model, the formulae and data compliance tables of the Final Settlement Stipulation for the Compact, the URNRD's Rules, the URNRD's Ground Water Management Plan and additional data on file with the URNRD or the NDNR.

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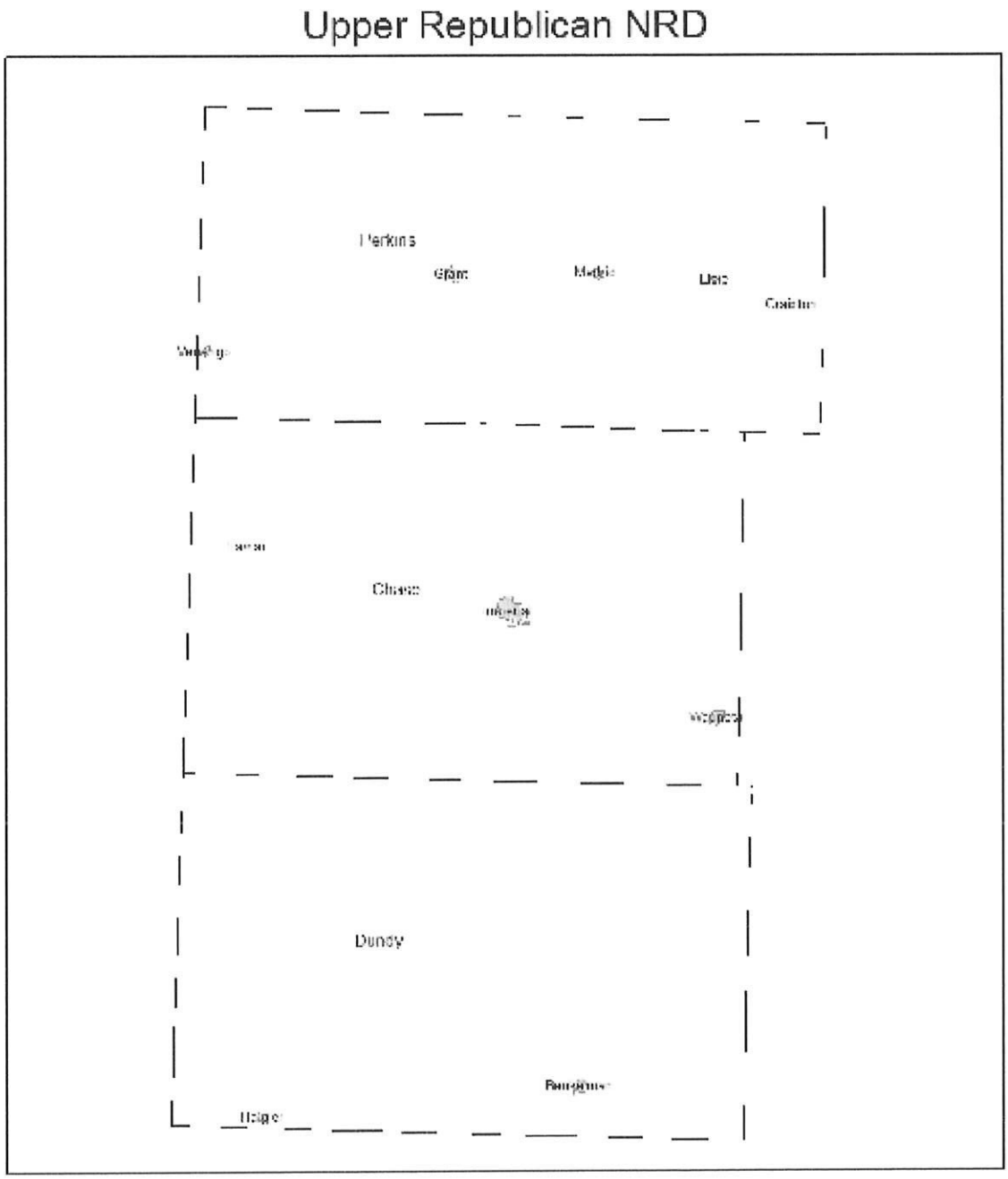
Map 1. Upper Republican Natural Resource District



Appendix D: December 2008 Annual Forecast

STATE OF NEBRASKA

Dave Heineman
Governor

DEPARTMENT OF NATURAL RESOURCES
Brian P. Dunnigan, P.E.
Director

December 30, 2008

IN REPLY TO:

Mike Clements
Lower Republican NRD
P.O. Box 618
Alma, NE 68920-0618

Dan Smith
Middle Republican NRD
P.O. Box 81
Curtis, NE 69025

Jasper Fanning
Upper Republican NRD
P.O. Box 1140
Imperial, NE 69033

John Thorburn
Tri-Basin NRD
1308 Second Street
Holdrege, NE 68949

SUBJECT: Transmittal of Forecast of Allowable Stream Flow Depletions In the Republican Basin

Dear NRD Managers:

The Nebraska Department of Natural Resources (NDNR) is providing the attached short-term and long-term forecast of the available water supply to comply with the requirements of Nebraska Statute 46-715. The forecast methodology was provided to the four primary Natural Resources Districts in the Republican Basin during a meeting in Cambridge, Nebraska on November 19, 2008, and discussed during subsequent meetings, telephone calls, and in email messages.

The short-term forecast is for the year 2009; the long-term forecast is for the year 2019. The estimated forecast is provided assuming dry conditions, which we have defined as precipitation at the 35th percentile:

- The available water supply during 2009 is forecasted to be 261,130 acre-feet;
- The available water supply during 2019 is forecasted to be 203,225 acre-feet.

Harlan County Lake is full and is expected to provide a full supply during 2009. Therefore water short year administration will not be in effect in 2009, and the forecast indicates that Nebraska will be in compliance with the 5-year average in 2009. However, the long-term forecast also suggests that the available water supply is expected to decline.

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I appreciate the efforts of your resource districts in working to keep the state compliant with our interstate agreements and your cooperation as we go forward. If you have questions regarding the technical basis for this forecast please call Jim Schneider in my office at (402) 471-3141.

Sincerely,

Brian P. Dunnigan, P.E.
Director

cc: Justin Lavene, Office of the Attorney General

Forecast of
Short-Term and Long-Term
Depletions in the Republican Basin

Nebraska Department of Natural Resources
December 2008

Pursuant to Nebraska State Statutes 46-715.5 and in consultation with the affected Natural Resources Districts, the Nebraska Department of Natural Resources (NDNR) is required to provide an annual short-term and long-term forecast of "the maximum amount of water that may be available from streamflow for beneficial use" that will ensure compliance with interstate compacts. In the context of the Republican River Compact, the available water supply amounts to Nebraska's allocation plus the Imported Water Supply (IWS) Credit. This document includes the forecast along with a description of the methodology and data the NDNR used to estimate available water supply in 2009 and 2019.

Methodology for Short-Term Forecast

The NDNR has estimated Nebraska's allocation, computed beneficial consumptive use (CBCU), and IWS Credit using information defined in Table 1. Ground water pumping in 2009 was assumed to be at 80% of 1998 to 2002 pumping, in line with Republican River basin integrated management plans. The resulting depletions from ground water to the stream and the IWS Credit were estimated using the Republican River Compact Administration (RRCA) Ground Water Model and estimated 2008 ending water table elevations. Stream flow and surface water diversions were based on likely volumes in the federal reservoirs and an estimate of gaged stream flow based on recent trends.

This information was input into the RRCA accounting spreadsheet to develop a conservative forecast of Nebraska's expected allocation, CBCU, and IWS Credit for 2009. **The available water supply (the allocation plus the IWS Credit) in 2009 is forecasted to be 261,130 acre-feet.**

Table 2 summarizes the estimated allocations, CBCU, and IWS Credit for the years 2005-2009. Note that based on the projected CBCU of 281,490 acre-feet, there is a forecasted deficit of approximately 20,000 acre-feet for 2009. However, the resulting five-year average compliance test for 2009 is positive by approximately 3,000 acre-feet. Actually, the sum of the annual balances for 2005-2008 is nearly 35,000 acre-feet, meaning that Nebraska's balance in 2009 could be as low as -35,000 acre-feet, while maintaining a five-year average of approximately zero. This does not mean that a negative balance in 2009 will not result in non-compliance in future years, but simply that a balance as low as -35,000 acre-feet will still result in compliance with the five-year average *in 2009*. Because the 2009 annual balance will continue to be used for future compliance period averages, the NDNR recommends that water use in 2009 be limited to the forecasted available water supply of 261,130 acre-feet.

Based on current reservoir contents and projected inflows for 2009, the likelihood of Reclamation projecting a Water-Short Year is remote at best. It is highly unlikely that Water-Short Year Administration (WYSA) will be in effect in 2009.

Methodology for Long-Term Forecast

The NDNR has estimated long-term allowable depletions (for the year 2019) by projecting the 35th percentile stream flow at Hardy (and the Courtland Canal diversion). The allocation was estimated by using this stream flow and a developed relationship between stream flows and the computed water supply. The imported water supply credit was assumed to be 10,000 acre-feet per year. **Using this method, the available water supply in the year 2019 was estimated to be 203,225 acre-feet.** However, the allowable CBCU for that year may be less than this value, depending on the balance from preceding years and the type of administration in effect (i.e. WSYA vs. normal year administration).

Table 1. Information Used for 2009 Forecast of Allowable Depletions.

Year	Item	Information Source
2005		Draft; Current Accounting Procedures (v. 2005)
2006		Draft; Current Accounting Procedures (v. 2005)
2007		Draft; Current Accounting Procedures (v. 2005)
2008 Provisional	Pumping	Meters/Power Records Estimate
	Surface Water Diversions	Estimated
	Stream Flow	Provisional Records through mid-November 2008 end of year estimated
2009 Forecast	Precipitation	35th percentile of record at each weather station
	Pumping	80% of 1998-2002 baseline pumping
	Stream Flow	Estimated based on known reservoir volumes and recent stream flow trends
	Surface Water Diversions	Estimated based on known reservoir volumes

Table 2. Summary of NE allocations, CBCU, and IWS Credit for 2005-2009, with resulting five-year averages (in acre-feet). The 2009 values are estimated as described in Table 1.

Year	Precipitation Percentile Rank	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2005	61	199,450	253,740	11,966	**(42,324)**
2006	58	189,390	233,120	12,218	**(31,512)**
2007	89	244,390	235,640	21,933	30,683
2008 Provisional	94	332,400	274,310	19,969	78,059
2009 Forecast	35	242,070	281,490	19,060	**(20,360)**
Five-year Rounded Average	Not Applicable	**241,540**	**255,660**	**17,030**	**2,910**

Appendix E: Future Impacts under Average Conditions

Future Compliance for Nebraska under Average Conditions

Special Meeting of the
Republican River Compact Administration
March 11 and 12, 2008
Kansas City, Missouri

The Nebraska Department of Natural Resources and the Republican River Natural Resources Districts (NRDs) have developed Integrated Management Plans (IMPs) based on average climate conditions. In order to determine the appropriate levels of groundwater use under these conditions, a future scenario was developed which simulates long-term average conditions. Additionally, an average conditions Compact accounting spreadsheet was developed for use in analyzing the results of the groundwater modeling. This document describes the model scenario development, the development of the average accounting spreadsheet, and the results.

GROUNDWATER MODEL

The data used to create the average conditions groundwater model scenario are described in Table A. The scenario was developed by calculating the long-term average precipitation for each of the Compact gages for the period 1918-2006. The use of 1988-1991 for the phreatophyte evapotranspiration and reservoir levels was arbitrary. The starting heads were based on the final heads from an early update of the groundwater model for 2007. All other inputs, with the exception of groundwater pumping volumes, were based on the input data for 2006.

Table A. Data used for early update of RRCA groundwater model for 2007

Model Input	Value
Phreatophyte ET	1988-1991 repeating
Precipitation	Mean 1918-2006 for each station
Reservoir Levels	1988-1991 repeating
Starting Heads	2007 early run
NE Surface Water Deliveries	2006 repeating
NE Canal Seepage	2006 repeating
NE GW Pumping Volume	80% of 1998-2002 NRD averages, repeating
NE GW Irrigated Acres	2006 repeating
NE SW Irrigated Acres	2006 repeating
NE Commingled Irrig. Acres	2006 repeating
CO GW Irrigated Acres	2006 repeating
CO SW Irrigated Acres	2006 repeating
KS GW Irrigated Acres	2006 repeating
KS SW Irrigated Acres	2006 repeating

The groundwater pumping depths used to calculate the pumping volumes were calculated for the three Republican River NRDs to be equal to the 80% of the baseline pumping (1998-2002 average), as prescribed in the IMPs. The volumes for each of the Republican River NRDs, as well as a total for Nebraska, that were used in this scenario can be found in Table B. The groundwater model impact spreadsheets for the year 2008-2012 generated from this model scenario can be found in Appendix A.

Table B. Groundwater pumping data for Average Conditions Scenario.

	80% 1998-2002 Average	Computed Volumes for Average Conditions Scenario
LR	193,831	193,820
MR	247,583	247,588
UR	425,410	425,406
Total Nebraska		1,649,632

ACCOUNTING

In order to have a basis for comparison for the results of the average conditions groundwater model, an average conditions accounting spreadsheet was developed. It was obviously not possible to generate average input data for the entire period of 1918-2006 used to obtain average precipitation for the groundwater modeling scenario. However, an analysis of recent precipitation revealed that the years 1996-2006 had an average precipitation that was almost identical to the long-term (1918-2006) average. Table C shows a station by station comparison for these time periods. The average precipitation during 1996-2006 was 21.06 inches, and the average long-term precipitation was 20.98 inches.

Therefore the surface water inputs for the years 1996-2006 were averaged to obtain input data for an average conditions accounting spreadsheet. Several minor adjustments were made to this data to better reflect conditions during and average year. For example, flood flows were removed—by definition flood flows are not going to occur during an average year. In addition, it is likely that some canal systems will have little or no operation in the future, and were adjusted accordingly. Accounting details included:

- Surface water pumping data—the 1996 – 2006 average was used
- Non-federal reservoir evaporation data—2004 – 2006 average was used
- Stream gage data—1996 – 2006 average was used, with the exception that a seven-year average (2000 – 2006) was used for the following streams:
    - South Fork Republican River
    - Beaver Creek
    - Sappa Creek, and
    - Prairie Dog Creek
- Flood flows were set to zero
- Canal Data—the 1996 – 2006 average was used, with the following exceptions:
    - Haigler Canal Diversions – Nebraska was set to 4,000 acre-feet
    - Culbertson Canal Extension was set to zero

Table C. Comparison of average precipitation during the periods 1996-2006 and 1918-2006.

Station number	Station Name	1996-2006 Average (In.)	1918-2006 Average (In.)
C050109	Akron 4 E	15.40	15.28
C051121	Burlington	16.68	16.23
C051564	Cheyenne Wells	16.58	15.68
C054082	Holyoke	17.61	17.28
C054413	Julesburg	16.46	16.85
C059243	Wray	16.09	16.92
C141179	Burr Oak 1 N	24.67	24.39
C141699	Colby 1SW	19.31	19.32
C143527	Hays 1 S	23.86	22.51
C143837	Hoxie	17.77	18.66
C145363	Minneapolis	30.64	28.18
C145856	Norton 9 SSE	21.96	21.57
C145906	Oberlin1 E	19.57	20.58
C146374	Phillipsburg 1 SSE	22.76	23.22
C147093	Saint Francis	16.16	18.51
C148495	Wakeeny	24.69	22.79
C250640	Beaver City	23.49	22.37
C250810	Bertrand	23.87	22.03
C252065	Culbertson	20.98	20.74
C252690	Elwood 8 S	21.27	21.87
C253365	Gothenburg	20.55	21.18
C253735	Hebron	29.32	27.91
C253910	Holdrege	25.21	23.79
C254110	Imperial	17.83	19.53
C255090	Madrid	20.24	19.78
C255310	McCook	21.17	20.42
C255565	Minden	23.16	23.6
C256480	Palisade	18.18	20.03
C256585	Paxton	20.78	18.68
C257070	Red Cloud	24.38	24.42
C258255	Stratton	18.03	19.94
C258320	Superior	26.20	26.01
C258735	Upland	24.38	23.86
C259020	Wauneta 3 NW	16.82	19.07
AVERAGE		**21.06**	**20.98**

RESULTS

The results of this analysis demonstrate that during a period of time with precipitation close to average, Nebraska depletions to stream flow will be less than Nebraska allocations, given the pumping volume limits incorporated in the Natural Resources District Integrated Management Plans. The estimated annual allocation and CBCU for each year from 2008 through 2012 are summarized in Appendix B. The average difference between allocation and the CBCU less the Imported Water Supply Credit is approximately 19,000 acre-feet.

APPENDIX A

GROUNDWATER MODEL IMPACT SHEETS

Impacts 2008 (acre-feet)

Location	Colorado Pumping	Kansas Pumping	Nebraska Pumping	Nebraska Mound
Arikaree	1308	73	78	0
Beaver	0	4512	3584	0
Buffalo	353	0	3320	0
Driftwood	0	0	1275	0
Frenchman	298	0	74698	0
North Fork	15023	10	1407	0
Above Swanson	-3869	118	7435	11
Swanson - Harlan	0	-772	35080	7768
Harlan - Guide Rock	0	0	26221	272
Guide Rock - Hardy	0	72	2023	0
Medicine	0	0	19504	9844
Prairie Dog	0	2773	0	0
Red Willow	0	0	6517	41
Rock	74	0	4112	0
Sappa	0	-469	1193	0
South Fork	11872	5177	909	0
Hugh Butler	0	0	1720	0
Bonny	1284	0	0	0
Keith Sebelius	0	603	0	0
Enders	0	0	4674	0
Harlan	0	37	803	19
Harry Strunk	0	0	312	0
Swanson	12	0	321	0
Mainstem	**-3868**	**-578**	**70760**	**8043**
Total	**26458**	**12142**	**195188**	**17954**

Impacts 2009 (acre-feet)

Location	Colorado Pumping	Kansas Pumping	Nebraska Pumping	Nebraska Mound
Arikaree	312	84	87	0
Beaver	0	3632	2495	0
Buffalo	367	0	3298	0
Driftwood	0	0	1216	0
Frenchman	432	0	73793	0
North Fork	15172	13	1428	0
Above Swanson	-2780	94	8565	12
Swanson - Harlan	0	94	29899	3230
Harlan - Guide Rock	0	0	26674	268
Guide Rock - Hardy	0	80	2354	-16
Medicine	0	0	19524	9701
Prairie Dog	0	1497	0	0
Red Willow	0	0	5914	29
Rock	78	0	4183	0
Sappa	0	-922	935	0
South Fork	11746	5269	842	0
Hugh Butler	0	0	1764	0
Bonny	1287	0	0	0
Keith Sebelius	0	608	0	0
Enders	0	0	4691	0
Harlan	0	34	793	20
Harry Strunk	0	0	308	0
Swanson	17	0	309	0
Mainstem	**-2780**	**274**	**67492**	**3494**
Total	**26647**	**10497**	**189072**	**13251**

Impacts 2010 (acre-feet)

Location	Colorado Pumping	Kansas Pumping	Nebraska Pumping	Nebraska Mound
Arikaree	788	94	89	0
Beaver	0	3523	2196	0
Buffalo	384	0	3316	0
Driftwood	0	0	1177	0
Frenchman	658	-13	73719	-14
North Fork	15537	0	1458	0
Above Swanson	-3144	105	8049	0
Swanson - Harlan	-15	-46	33259	5041
Harlan - Guide Rock	0	0	27008	289
Guide Rock - Hardy	0	75	2331	-15
Medicine	0	0	19950	9778
Prairie Dog	0	1849	0	0
Red Willow	0	0	6259	24
Rock	84	0	4281	0
Sappa	0	-928	693	0
South Fork	12073	5417	804	0
Hugh Butler	0	0	1810	0
Bonny	1288	10	0	0
Keith Sebelius	0	616	0	0
Enders	0	0	4724	0
Harlan	0	33	792	21
Harry Strunk	0	0	303	0
Swanson	15	0	298	0
Mainstem	**-3164**	**132**	**70647**	**5311**
Total	**27665**	**10741**	**192714**	**15119**

Impacts 2011 (acre-feet)

Location	Colorado Pumping	Kansas Pumping	Nebraska Pumping	Nebraska Mound
Arikaree	644	94	89	0
Beaver	0	3476	1994	0
Buffalo	400	0	3334	0
Driftwood	0	0	1147	0
Frenchman	681	0	74414	-32
North Fork	15777	14	1484	0
Above Swanson	-2501	163	8737	-25
Swanson - Harlan	-11	38	33868	3639
Harlan - Guide Rock	0	15	26930	307
Guide Rock - Hardy	0	91	2282	-25
Medicine	0	0	20437	10132
Prairie Dog	0	1706	0	0
Red Willow	0	0	6525	26
Rock	89	0	4372	0
Sappa	0	-1000	834	0
South Fork	12043	5614	835	-15
Hugh Butler	0	0	1856	0
Bonny	1303	11	0	0
Keith Sebelius	0	626	0	0
Enders	0	0	4756	0
Harlan	0	31	792	25
Harry Strunk	0	0	298	0
Swanson	15	0	288	0
Mainstem	**-2517**	**308**	**71817**	**3897**
Total	**28439**	**10877**	**195273**	**14037**

Impacts 2012 (acre-feet)

Location	Colorado Pumping	Kansas Pumping	Nebraska Pumping	Nebraska Mound
Arikaree	1116	73	71	0
Beaver	0	3535	1914	0
Buffalo	419	0	3372	0
Driftwood	0	0	1126	0
Frenchman	749	0	73205	-21
North Fork	16055	11	1513	0
Above Swanson	-3937	134	7052	-22
Swanson - Harlan	-16	-293	31030	4130
Harlan - Guide Rock	0	0	26943	291
Guide Rock - Hardy	0	87	2252	-33
Medicine	0	0	20804	9830
Prairie Dog	0	1743	0	0
Red Willow	0	0	6305	25
Rock	96	0	4475	0
Sappa	0	-892	794	0
South Fork	11834	4834	837	0
Hugh Butler	0	0	1909	0
Bonny	1315	12	0	0
Keith Sebelius	0	643	0	0
Enders	0	0	4805	0
Harlan	0	32	783	24
Harry Strunk	0	0	302	0
Swanson	14	0	283	0
Mainstem	**-3940**	**-71**	**67277**	**4366**
Total	**27664**	**9917**	**189574**	**14216**

APPENDIX B

COMPLIANCE RESULTS

BASED ON AVERAGE PRECIPITATION SCENARIO

RRCA Compact Accounting (based on Appendix C)
Assumes average precipitation
Assumes 20% pumping decrease from 1998 - 2002 volumes

Table 3A: Colorado's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2008	26,430	35,000	NA	(8,570)
2009	25,210	35,190	NA	(9,980)
2010	25,790	36,230	NA	(10,440)
2011	25,800	36,990	NA	(11,190)
2012	25,770	36,210	NA	(10,440)
Average	25,800	35,920		(10,120)

Table 3B: Kansas's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2008	204,550	57,400	NA	147,150
2009	203,310	55,740	NA	147,570
2010	204,580	56,000	NA	148,580
2011	206,550	56,150	NA	150,400
2012	202,870	55,180	NA	147,690
Average	204,370	56,090		148,280

Table 3C: Nebraska's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2008	266,620	265,450	17,954	19,124
2009	265,330	259,320	13,251	19,261
2010	266,660	262,950	15,119	18,829
2011	269,080	265,510	14,037	17,607
2012	265,510	259,810	14,216	19,916
Average	266,640	262,610	14,920	18,950

RRCA Compact Accounting (based on Appendix C)
Assumes average precipitation
Assumes 20% reduction in pumping from 1998 - 2002 volumes

Table 5C: Nebraska's Compliance During Water-Short Year Administration (Four Consecutive Two-Year Averages)

	Allocation			Computed Beneficial Consumptive Use			Imported Water Supply Credit above Guide Rock	Allocation - (CBCU - IWS above Guide Rock)
Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock		
2008	266,620	12,074	254,546	265,450	2,751	262,699	17,955	9,802
2009	265,330	12,650	252,680	259,320	3,082	256,238	13,244	9,686
Average	**265,980**	**12,360**	**253,610**	**262,390**	**2,920**	**259,470**	**15,600**	**9,740**
2009	265,330	12,650	252,680	259,320	3,082	256,238	13,244	9,686
2010	266,660	12,572	254,088	262,950	3,059	259,891	15,124	9,320
Average	**266,000**	**12,610**	**253,380**	**261,140**	**3,070**	**258,060**	**14,180**	**9,500**
2010	266,660	12,572	254,088	262,950	3,059	259,891	15,124	9,320
2011	269,080	12,632	256,448	265,510	3,010	262,500	14,032	7,980
Average	**267,870**	**12,600**	**255,270**	**264,230**	**3,030**	**261,200**	**14,580**	**8,650**

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Appendix F: Estimated compliance through 2012 using 1992 – 1995 climate for the years 2009 – 2012.

Table F.1. Nebraska's projected annual balance.

	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS)
2003	227,600	262,680	9,680	(25,420)
2004	205,870	253,340	10,447	(36,640)
2005	199,470	254,200	12,059	(42,325)
2006	187,200	228,460	12,085	(29,175)
2007	243,400	234,200	21,760	30,960
2008	332,400	274,310	19,969	78,059
2009	268,570	322,360	19,494	(34,296)
2010	418,200	328,250	28,783	118,733
2011	385,220	389,770	19,021	14,471
2012	336,060	323,090	21,727	34,697

Table F.2. Nebraska's projected five-year average.

	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation – (CBCU - IWS)
2003				
2004				
2005				
2006				
2007	212,708	246,576	13,206	(20,520)
2008	233,668	248,902	15,264	176
2009	246,208	262,706	17,073	645
2010	289,954	277,516	20,418	32,856
2011	329,558	309,778	21,805	41,585
2012	348,090	327,556	21,799	42,333

Appendix G: Future Impacts under Dry Conditions

Future Compliance for Nebraska under Dry Conditions

Special Meeting of the
Republican River Compact Administration
April 11, 2008
(Revised February 2009)
Kansas City, Missouri

The Nebraska Department of Natural Resources and the Republican River Natural Resources Districts (NRDs) have developed Integrated Management Plans (IMPs) based on average climate conditions. As a part of this process, a dry condition was also analyzed to help understand how dryer than average conditions may affect compliance efforts under these IMPs. Therefore, a future scenario was developed which simulates long-term below average ("dry") climate conditions. Additionally, a dry conditions Compact accounting spreadsheet was developed for use in analyzing the results of the groundwater modeling. This document describes the model scenario development, the development of the dry conditions accounting spreadsheet, and the results.

GROUNDWATER MODEL

The data used to create the dry conditions groundwater model scenario are described in Table A. The scenario was developed by calculating the 35th percentile precipitation for each of the Compact gages for the period 1918-2005. The use of 1988-1991 for the phreatophyte evapotranspiration and reservoir levels was arbitrary. The starting heads were based on the final heads from an early update of the groundwater model for 2007. All other inputs, with the exception of groundwater pumping volumes, were based on the input data for 2006.

Table A. Data used for dry precipitation conditions 2008-2047 future scenario

Model Input	Value
Phreatophyte ET	1988-1991 repeating
Precipitation	35th percentile 1918-2005 for each station
Reservoir Levels	1988-1991 repeating
Starting Heads	2007 early run
NE Surface Water Deliveries	2006 repeating
NE Canal Seepage	2006 repeating
NE GW Pumping Volume	80% of 1998-2002 NRD averages, repeating
NE GW Irrigated Acres	2006 repeating
NE SW Irrigated Acres	2006 repeating
NE Commingled Irrig. Acres	2006 repeating
CO GW Irrigated Acres	2006 repeating
CO SW Irrigated Acres	2006 repeating
KS GW Irrigated Acres	2006 repeating
KS SW Irrigated Acres	2006 repeating

The groundwater pumping depths used to calculate the pumping volumes were calculated for the three Republican River NRDs to be equal to the 80% of the baseline pumping (1998-2002 average), as prescribed in the IMPs. The volumes for each of the Republican River NRDs, as

well as a total for Nebraska, that were used in this scenario can be found in Table B. The groundwater model impact spreadsheets for the year 2008-2012 generated from this model scenario can be found in Appendix A.

Table B. Groundwater pumping data for Average Conditions Scenario.

	80% 1998-2002 Average	Computed Volumes for Average Conditions Scenario
LR	193,831	193,820
MR	247,583	247,588
UR	425,410	425,406
Total Nebraska		1,649,632

ACCOUNTING

In order to have a basis for comparison for the results of the dry conditions groundwater model, a dry conditions accounting spreadsheet was developed. It was obviously not possible to utilize input data for the entire period of 1918-2005 used to obtain 35th percentile precipitation for the groundwater modeling scenario. Furthermore, there is no way to know what the patterns of streamflow and surface water use would be in the future under extended below average climatic conditions. An analysis of recent precipitation revealed that the years 2000-2005 had precipitation that was similar to the long-term (1918-2005) 35th percentile precipitation. Table C shows a station by station comparison for these time periods. The median precipitation during 2000-2005 was 19.4 inches, and the median of the long-term 35th percentile precipitation for each station is 18.6 inches.

Therefore the surface water inputs for the years 2000-2005 were averaged to obtain input data for a dry conditions accounting spreadsheet. The resulting input data was analyzed, and for the most part, the data appear reasonable under a future below average condition. Several minor adjustments were made to this data to better reflect potential future conditions. For example, it is likely that some canal systems will have little or no operation in the future, and were adjusted accordingly. Accounting details included:

- Surface water pumping data—the 2000 – 2005 average was used
- Non-federal reservoir evaporation data—2004 – 2006 average was used
- Stream gage data—2000 – 2005 average was used for all gages except:
  - South Fork Republican River near Benkelman set to zero
  - Beaver Creek near Beaver City set to zero
  - Sappa Creek near Stamford set to zero
  - Prairie Dog Creek near Woodruff set to zero
- Canal Data—the 2000 – 2005 average was used, with the following exceptions:
  - Haigler Canal Diversions – Nebraska was set to 4,000 acre-feet
  - Culbertson Canal Extension was set to zero

Table D contains the final stream gage data used along with a comparison to the stream gage data used for the average conditions analysis.

Table C. Comparison of average precipitation during the periods 2000-2005 and 1918-2005.

Station number	Station Name	2000-2005 Average (In.)	1918-2005 35th Percentile (In.)
C050109	Akron 4 E	14.94	13.51
C051121	Burlington	14.37	14.21
C051564	Cheyenne Wells	15.53	14.11
C054082	Holyoke	16.04	15.04
C054413	Julesburg	14.78	15.16
C059243	Wray	15.45	15.06
C141179	Burr Oak 1 N	24.57	21.04
C141699	Colby 1SW	17.21	17.25
C143527	Hays 1 S	22.91	20.4
C143837	Hoxie	17.76	16.25
C145363	Minneapolis	27.15	24.7
C145856	Norton 9 SSE	19.39	18.54
C145906	Oberlin1 E	18.16	18.65
C146374	Phillipsburg 1 SSE	21.02	20.41
C147093	Saint Francis	15.52	16.11
C148495	Wakeeny	22.20	19.44
C250640	Beaver City	21.25	20.81
C250810	Bertrand	21.05	19.8
C252065	Culbertson	21.02	19.79
C252690	Elwood 8 S	20.25	19.71
C253365	Gothenburg	19.38	19.69
C253735	Hebron	29.73	25.63
C253910	Holdrege	22.27	21.14
C254110	Imperial	16.28	17.54
C255090	Madrid	18.37	17.24
C255310	McCook	20.62	18.46
C255565	Minden	21.11	19.97
C256480	Palisade	17.11	17.46
C256585	Paxton	18.93	16.39
C257070	Red Cloud	23.68	22.36
C258255	Stratton	16.12	17.8
C258320	Superior	24.92	22.96
C258735	Upland	23.57	21.21
C259020	Wauneta 3 NW	14.13	16.93
MEDIAN		**19.4**	**18.6**

RESULTS

The results of this analysis demonstrate that during a period of time with below average precipitation, Nebraska depletions to stream flow will be slightly greater than Nebraska allocations, given the pumping volume limits incorporated in the Natural Resources District Integrated Management Plans. The estimated annual allocation and CBCU for each year from 2008 through 2012 are summarized in Appendix B. The average difference between allocation and the CBCU less the Imported Water Supply Credit is approximately -1,800 acre-feet. Also, under this dry condition it is possible that water-short year administration would be in effect for some or all of this period. The average difference between allocation and the CBCU less the Imported Water Supply Credit under water short year administration is approximately -8,288 acre-feet[1].

Table D. Comparison of dry (2000-2005) and average (1996-2006) conditions streamflow values used in future accounting analysis.

Station Name	Dry conditions (acre-feet/yr)	Average Conditions (acre-feet/yr)
North Fork Republican River At Colorado-Nebraska State Line	18,935	20,121
Arikaree River At Haigler	1,161	2,317
Buffalo Creek Near Haigler	2,316	2,388
Rock Creek At Parks	5,530	5,871
South Fork Republican River Near Benkelman	0	1,491
Frenchman Creek At Culbertson	18,527	23,716
Driftwood Creek Near McCook	1,946	3,146
Red Willow Creek Near Red Willow	6,846	7,116
Medicine Creek Below Harry Strunk	26,214	27,851
Beaver Creek Near Beaver City	0	514
Sappa Creek Near Stamford	0	2,833
Prairie Dog Creek Near Woodruff	0	3,566
Republican River At Guide Rock	41,295	91,422
Republican River Near Hardy	72,476	128,884

[1] When originally published in April 2008, this document contained an erroneous number. The correct value references the average found on Table 5c at the end of this report.

APPENDIX A

GROUNDWATER MODEL IMPACT SHEETS

Impacts 2008 (acre-feet)

Location	Colorado Pumping	Kansas Pumping	Nebraska Pumping	Nebraska Mound
Arikaree	1258	72	77	0
Beaver	0	3949	3093	0
Buffalo	353	0	3311	0
Driftwood	0	0	1276	0
Frenchman	262	0	73617	0
North Fork	14937	10	1409	0
Above Swanson	-4274	183	6720	0
Swanson - Harlan	0	-558	33095	7507
Harlan - Guide Rock	0	0	26158	238
Guide Rock - Hardy	0	77	1971	-18
Medicine	0	0	19474	9762
Prairie Dog	0	2325	0	0
Red Willow	0	0	6412	39
Rock	74	0	4086	0
Sappa	0	-638	1105	0
South Fork	11154	4863	888	0
Hugh Butler	0	0	1719	0
Bonny	1289	0	0	0
Keith Sebelius	0	604	0	0
Enders	0	0	4678	0
Harlan	0	37	797	19
Harry Strunk	0	0	314	0
Swanson	12	0	319	0
Mainstem	-4286	-292	67945	7725
Total	25057	10940	190517	17538

Impacts 2009 (acre-feet)

Location	Colorado Pumping	Kansas Pumping	Nebraska Pumping	Nebraska Mound
Arikaree	219	84	87	0
Beaver	0	2351	1480	0
Buffalo	366	0	3276	0
Driftwood	0	0	1217	0
Frenchman	262	0	72491	-13
North Fork	15049	14	1441	0
Above Swanson	-3099	55	8009	26
Swanson - Harlan	-10	366	26497	2373
Harlan - Guide Rock	0	0	26625	272
Guide Rock - Hardy	0	85	2401	-17
Medicine	0	0	19516	9556
Prairie Dog	0	423	0	0
Red Willow	0	0	5743	21
Rock	78	0	4122	0
Sappa	0	-1178	749	0
South Fork	10333	4966	779	0
Hugh Butler	0	0	1765	0
Bonny	1292	0	0	0
Keith Sebelius	0	606	0	0
Enders	0	0	4699	0
Harlan	0	33	792	21
Harry Strunk	0	0	311	0
Swanson	16	0	307	0
Mainstem	-3112	516	63532	2654
Total	24504	7832	182306	12251

Impacts 2010 (acre-feet)

Location	Colorado Pumping	Kansas Pumping	Nebraska Pumping	Nebraska Mound
Arikaree	402	94	89	0
Beaver	0	1785	931	0
Buffalo	382	0	3284	0
Driftwood	0	0	1178	0
Frenchman	331	0	71940	0
North Fork	15382	0	1461	0
Above Swanson	-3307	129	7481	25
Swanson - Harlan	0	224	30175	3403
Harlan - Guide Rock	0	0	26874	295
Guide Rock - Hardy	0	82	2349	0
Medicine	0	0	19951	9592
Prairie Dog	0	388	0	0
Red Willow	0	0	6047	20
Rock	84	0	4192	0
Sappa	0	-1015	648	0
South Fork	11272	5377	824	0
Hugh Butler	0	0	1812	0
Bonny	1304	10	0	0
Keith Sebelius	0	608	0	0
Enders	0	0	4731	0
Harlan	0	31	792	22
Harry Strunk	0	0	303	0
Swanson	15	0	296	0
Mainstem	-3312	438	66879	3715
Total	25866	7730	185358	13351

Impacts 2011 (acre-feet)

Location	Colorado Pumping	Kansas Pumping	Nebraska Pumping	Nebraska Mound
Arikaree	277	91	87	0
Beaver	0	1422	518	0
Buffalo	382	0	3278	0
Driftwood	0	0	1148	0
Frenchman	269	-33	72571	0
North Fork	15606	11	1488	0
Above Swanson	-2599	79	8384	15
Swanson - Harlan	0	164	29088	2085
Harlan - Guide Rock	0	0	26607	312
Guide Rock - Hardy	0	83	2264	-15
Medicine	0	0	20446	9856
Prairie Dog	0	124	0	0
Red Willow	0	0	6264	24
Rock	89	0	4258	0
Sappa	0	-951	556	0
South Fork	10603	5450	795	0
Hugh Butler	0	0	1860	0
Bonny	1315	11	0	0
Keith Sebelius	0	608	0	0
Enders	0	0	4768	0
Harlan	0	30	788	23
Harry Strunk	0	0	300	0
Swanson	14	0	287	0
Mainstem	-2602	323	66344	2396
Total	25959	7091	185754	12306

Impacts 2012 (acre-feet)

Location	Colorado Pumping	Kansas Pumping	Nebraska Pumping	Nebraska Mound
Arikaree	510	73	71	0
Beaver	0	1268	377	0
Buffalo	367	0	3276	0
Driftwood	0	0	1128	0
Frenchman	259	-16	70506	0
North Fork	15862	10	1511	0
Above Swanson	-4380	157	6034	17
Swanson - Harlan	0	137	27093	2152
Harlan - Guide Rock	0	0	26490	290
Guide Rock - Hardy	0	88	2197	-19
Medicine	0	0	20610	9458
Prairie Dog	0	196	0	0
Red Willow	0	0	6007	23
Rock	95	0	4340	0
Sappa	0	-820	496	0
South Fork	10734	4874	794	0
Hugh Butler	0	0	1912	0
Bonny	1331	12	0	0
Keith Sebelius	0	610	0	0
Enders	0	0	4816	0
Harlan	0	31	780	22
Harry Strunk	0	0	298	0
Swanson	14	0	282	0
Mainstem	-4381	379	61815	2440
Total	24797	6621	179017	11939

APPENDIX B

COMPLIANCE RESULTS

BASED ON DRY PRECIPITATION SCENARIO

Table 3A: Colorado's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2008	23,580	33,430	NA	(9,850)
2009	21,810	32,890	NA	(11,080)
2010	22,430	34,230	NA	(11,800)
2011	21,960	34,330	NA	(12,370)
2012	21,940	33,170	NA	(11,230)
Average	22,340	33,610		(11,270)

Table 3B: Kansas's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2008	172,040	54,650	NA	117,390
2009	169,120	51,530	NA	117,590
2010	170,740	51,440	NA	119,300
2011	171,130	50,810	NA	120,320
2012	167,440	50,350	NA	117,090
Average	170,090	51,760		118,340

Table 3C: Nebraska's Five-Year Average Allocation and CBCU

Year	Allocation	Computed Beneficial Consumptive Use	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2008	233,320	252,750	17,992	(1,438)
2009	230,630	244,530	13,389	(511)
2010	231,650	247,570	15,345	(575)
2011	232,760	247,990	14,250	(980)
2012	228,420	241,240	14,617	1,797
Average	231,360	246,820	15,120	(340)

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

	Allocation			Computed Beneficial Consumptive Use				
Year	State-Wide Allocation	Allocation Below Guide Rock	Allocation Above Guide Rock	State-Wide CBCU	CBCU Below Guide Rock	CBCU Above Guide Rock	Imported Water Supply Credit above Guide Rock	Allocation - (CBCU - IWS above Guide Rock)
2008	233,320	9,267	224,053	252,750	3,102	249,648	17,547	(8,048)
2009	230,630	9,869	220,761	244,530	3,532	240,998	12,239	(7,998)
2010	231,650	9,807	221,843	247,570	3,480	244,090	13,357	(8,890)
2011	232,760	9,712	223,048	247,990	3,395	244,595	12,300	(9,247)
2012	228,420	9,707	218,713	241,240	3,328	237,912	11,943	(7,256)
Average	231,356	9,672	221,684	246,816	3,367	243,449	13,477	(8,288)

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Appendix H: Tables: Summary of Surface Water Leasing Activities

Table H.1. Summary of surface water leasing during 2006.

Agency Leasing Surface Water	Surface Water Irrigation District	Total Water Yield Above HCL (Acre Feet)
Nebraska Department of Natural Resources	Nebraska Bostwick Irrigation District—Natural Flow	5,000
Nebraska Department of Natural Resources	Nebraska Bostwick Irrigation District—Harlan County Lake	10,000
Nebraska Department of Natural Resources	Riverside Irrigation District	2,000
Nebraska Department of Natural Resources	Frenchman Valley Irrigation District	8,000
Total		25,000

Table H.2. Summary of surface water leasing during 2007.

Agency Leasing Surface Water	Surface Water Irrigation District	Total Water Yield Above HCL (Acre Feet)
Nebraska Department of Natural Resources	Nebraska Bostwick Irrigation District—Natural Flow	5,000
Nebraska Department of Natural Resources	Nebraska Bostwick Irrigation District—Harlan County Lake	12,500
Natural Resources Districts	Riverside Irrigation District	2,000
Natural Resources Districts	Frenchman Valley Irrigation District	8,000
Natural Resources Districts	Frenchman Cambridge Irrigation District	26,000
Total		53,500

Table H.3. Summary of surface water leasing during 2008.

Agency Leasing Surface Water	Surface Water Irrigation District	Total Water Yield Above HCL (Acre Feet)
Nebraska Department of Natural Resources	Riverside Irrigation District	2,000
Nebraska Department of Natural Resources	Frenchman Valley Irrigation District	8,000
Nebraska Department of Natural Resources	Frenchman Cambridge Irrigation District	5,000
Total		15,000

Appendix I: Incentive Programs

Table I.1. Summary of acreage idled in the Republican River Basin.

Program Name	Term of Retirement	No. of Contracts	No. of Acres
CREP	10-15 Years	374	39,946
EQIP	2005-2008	138	9,641
REP EQIP	Permanent	35	2,511
LRNRD EQIP	Permanent	2	196
TB EQIP	2007-2012	9	137

TAB 7

ARBITRATOR'S FINAL DECISION ON LEGAL ISSUES

NON-BINDING ARBITRATION

PURSUANT TO:
FINAL SETTLEMENT STIPULATION

Kansas v. Nebraska and Colorado
No. 126, Original, U.S. Supreme Court
Decree of May 19, 2003, 538 U.S. 720

ARBITRATOR'S FINAL DECISION ON LEGAL ISSUES

January 22, 2009

BACKGROUND

On December 15, 2003, the states of Kansas, Nebraska, and Colorado (the "States") executed the Final Settlement Stipulation (the "FSS") "... to resolve the currently pending litigation in the United States Supreme Court regarding the Republican River Compact by means of this Stipulation and the Proposed Consent Judgment ... ." FSS, Volume 1 of 5, at 1. The FSS was filed with the Special Master appointed by the U.S. Supreme Court (the "Court") in *Kansas v. Nebraska and Colorado*, No. 126, Original, who recommended entry of the proposed consent judgment which would approve the FSS. Second Report of the Special Master (Subject: Final Settlement Stipulation) at 77. On May 19, 2003, the Court entered a consent decree approving the FSS (the "Consent Decree").

By 2007, disputes arose between the States regarding compliance with the FSS and the Republican River Compact (the "Compact"). The disputes were submitted to the Republican River Compact Administration (the "RRCA") pursuant to the provision in the FSS for dispute resolution. *See* FSS, Volume 1 of 5, § VII., at 34-40. The RRCA addressed the disputes, but no resolution of certain disputes was reached. *See* Resolution of the RRCA dated May 16, 2008, Exhibit 1 to Arbitration Agreement dated October 23, 2008. The RRCA submitted these disputes to non-binding arbitration pursuant to the provisions of § VII. of the FSS, the States executed the Arbitration Agreement on October 23, 2008 (the "Arbitration Agreement"), and I was retained by the States to serve as the Arbitrator.

Exhibit 2 to the Arbitration Agreement sets forth the "Time Frame Designation" for the non-binding arbitration, Exhibit 3 to the Arbitration Agreement sets forth the disputed issues identified by the State of Kansas to be arbitrated, and Exhibit 4 to the Arbitration Agreement sets forth the disputed issues identified by the State of Nebraska to be arbitrated. The disputed issue originally raised by the State of Colorado with the RRCA, which the RRCA submitted to non-binding arbitration pursuant to the provisions of § VII. of the FSS (*See* Attachment 3 to Resolution of the RRCA dated May 16, 2008), has been withdrawn from this non-binding arbitration and is not included in the Arbitration Agreement.

From the issues set forth in Exhibit 3 and Exhibit 4 to the Arbitration Agreement, the States identified six legal issues to be decided by the Arbitrator by December 19, 2008, for the purpose of narrowing discovery and the hearing on the merits scheduled in mid-March of 2009. Based on a disagreement regarding the appropriate scope of the arbitration, the Arbitrator identified a seventh legal issue during a prehearing conference held telephonically on November 5, 2008. Each of the States filed opening briefs on these seven legal issues with the Arbitrator on November 10, 2008. (The State of Colorado briefed 3 arguments pertaining to only 4 of the legal issues.) Responsive briefs were filed on November 24, 2008, and reply briefs were filed on December 5, 2008. Oral argument on these legal issues was heard at the University of Denver, Strum College of Law, on December 10, 2008.

Each of the States stated the seven legal issues differently, and the Arbitrator has synthesized the statements of the States into the following seven questions. References to the argument or issue are from the opening briefs of each of the States.

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Question 1: Are Nebraska's proposed changes to the Republican River Compact Administration Accounting Procedures proper subjects of dispute resolution and for this arbitration?

(Kansas' Argument A., Nebraska's Issue I.A., Colorado's Argument I.)

Question 2: Is the evaporation from Non-Federal Reservoirs below Harlan County Lake required to be included in the Compact accounting?

(Kansas' Argument B., Nebraska's Issue I.B.)

Question 3: Do the current Republican River Compact Administration Accounting Procedures allocate evaporative losses from Harlan County Lake entirely to Kansas when the Kansas Bostwick Irrigation District is the only entity actually diverting stored water from Harlan County Lake for irrigation? If yes, how should evaporation from Harlan County Lake be allocated?

(Kansas' Argument C., Nebraska's Issue I.C.)

Question 4: If Nebraska has violated the Compact or the consent decree of May 19, 2003, causing damage to Kansas, is Nebraska subject to remedies for civil contempt of court, including disgorgement of Nebraska's gains as monetary sanctions, or should any damages awarded to Kansas be limited to actual damages suffered by Kansas?

(Kansas' Argument D., Nebraska's Issue III.B., Colorado's Argument II.)

Question 5: Is Kansas' proposed remedy for future compliance with the Republican River Compact and the Final Settlement Stipulation a proper subject for this arbitration, and can the U.S. Supreme Court formulate and mandate a remedy for future compliance?

(Kansas' Argument E., Nebraska's Issue II., Colorado's Argument III.)

Question 6: If Nebraska's alleged violations during both 2005 and 2006 are substantiated, is Kansas entitled to damages for both 2005 and 2006 or for 2006 only?

(Kansas' Argument F., Nebraska's Issue III.A.1.)

Question 7: Is Nebraska's issue of crediting payments for damages for violations from one year in determinations of compliance in subsequent years a proper subject for this arbitration?

(Kansas' Argument G., Nebraska's Issue III.A.2., Colorado's Argument I.)

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FINAL DECISION

The Arbitrator has treated the briefs filed by the States as being analogous to cross-motions for summary judgment under Rule 56 of the Federal Rules of Civil Procedure. "A party claiming relief may move, with or without supporting affidavits, for summary judgment on all or part of the claim." Fed. R. Civ. P. 56(a). "The judgment sought should be rendered if the pleadings, the discovery and disclosure materials on file, and any affidavits show that there is no genuine issue as to any material fact and that the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(c).

The Arbitrator has carefully considered the briefs of counsel for the States and has determined that there are no material facts genuinely at issue that would preclude decision of the seven legal issues set forth above as a matter of law. Therefore, the Arbitrator issues this decision on these seven legal issues, including a summary of his reasons for deciding each issue and supporting analysis. With minor corrections and the addition of supporting analysis for each of the seven issues, this decision is materially the same as the preliminary decision issued by the Arbitrator on December 19, 2008.

Question 1:

Are Nebraska's proposed changes to the Republican River Compact Administration Accounting Procedures proper subjects of dispute resolution and for this arbitration?

(Kansas' Argument A., Nebraska's Issue I.A., Colorado's Argument I.)

Decision: Nebraska's proposed changes to the Republican River Compact Administration Accounting Procedures are proper subjects of dispute resolution and for this arbitration. If any changes to the Accounting Procedures are determined to be warranted, the appropriate effective date for such changes will be determined following a hearing of the facts. Finding for Nebraska and Colorado; finding against Kansas.

Summary of Reasoning. The "equitable division" or "allocation" of the waters of the Republican River Basin between the States is set forth in Article IV of the Compact, subject to the proportionate adjustment required in Article III. This equitable division or allocation is the paramount reason for the Compact and cannot be enforced without accurate accounting of how the waters are actually distributed between the States. Significant flaws in accounting will result in significant differences between the enforceable allocations established in the Compact and the actual distributions of the waters between the States. Correcting errors in the Accounting Procedures used by the RRCA will help assure that the States actually receive the waters to which they are entitled pursuant to the Compact. Correcting such errors will not change the allocations set forth in the Compact, which cannot be changed unless the Compact is amended. Since the Court has jurisdiction to enforce the distribution of waters pursuant to the Compact, it must also have jurisdiction to require application of accurate accounting procedures used to determine whether the distribution of the waters as required by the Compact has in fact occurred.

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The Compact contains no explicit accounting procedures, but the FSS, which must be construed such that it is entirely consistent with the Compact, does provide detailed accounting procedures to be used by the RRCA (the "RRCA Accounting Procedures"). The FSS provides that: "The RRCA may modify the RRCA Accounting Procedures, or any portion thereof, in any manner consistent with the Compact and this Stipulation." *See* FSS, § I.F. *See also* RRCA Accounting Procedures and Reporting Requirements, § I. The FSS also sets forth a process for dispute resolution in a separate section. *See* FSS, § VII. This section of the FSS clearly states that the dispute resolution process applies to "Any matter relating to Republican River Compact administration, including administration and enforcement of the Stipulation in which a State has an Actual Interest ... ." *See* FSS, § VII.A., ¶ 1. and ¶ 7. The scope of "Any matter relating to Republican River Compact Administration ..." is broad and includes accounting procedures used to determine compliance with the Compact, unless such procedures are specifically excluded. The specific provisions for dispute resolution in the FSS do not exclude the RRCA Accounting Procedures. Similarly, the provisions in the FSS affirming that the RRCA may modify the RRCA Accounting Procedures do not specifically exclude disputes involving those procedures from the provisions in the FSS for dispute resolution.

Because the FSS specifies how the RRCA is to determine compliance with the Compact, the FSS must also be construed as rules and regulations of the RRCA, pursuant to Article IX of the Compact, unanimously adopted by the official in each State charged with the duty of administering the Compact, which duty is exclusively reserved to those officials in Article IX. Through § VII. of the FSS, the rules and regulations of the RRCA include provision for dispute resolution involving "Any matter relating to Republican River Compact administration, including administration and enforcement of the Stipulation in which a State has an Actual Interest" (FSS, § VII.A., ¶ 1.) and "any dispute submitted to the RRCA pursuant to this Section VII." FSS, § VII.A., ¶ 7.

Analysis. The Republican River Compact begins by stating in Article I:

> The major purposes of this compact are to provide for the most efficient use of the waters of the Republican River Basin (hereinafter referred to as the "Basin") for multiple purposes; to provide for an equitable division of such waters; to remove all causes, present and future, which might lead to controversies; to promote interstate comity; ... .

Republican River Compact, Pub. Law No. 78-60, 57 Stat. 86 (1943); codified at § 82a-518, K.S.A. (2007); App. § 1-106, 2A N.R.S. (1995); and § 37-67-101 C.R.S. (2008).

The "equitable division of such waters" is set forth in Article IV of the Compact, subject to the proportionate adjustment required in Article III.[1] This equitable division cannot be provided without accurate accounting of the waters so divided. Significant flaws in accounting will result in significant differences between the equitable division of the waters established in the Compact

[1] "Should the future computed virgin water supply of any source vary more than the [*sic*] (10) percent from the virgin water supply as hereinabove set forth, the allocations hereinafter made from such source shall be increased or decreased in the relative proportions that the future computed virgin water supply of such source bears to the computed virgin water supply used herein." Article III, 82a-518, K.S.A. (2007).

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and the actual distributions of the waters between the States. However, the Compact contains no explicit agreement or methodology for accounting procedures, but instead Article IX provides that:

> It shall be the duty of the three States to administer this compact through the official in each State who is now or may hereafter be charged with the duty of administering the public water supplies, and to collect and correlate through such officials the data necessary for the proper administration of the provisions of this compact. Such officials may, by unanimous action, adopt rules and regulations consistent with the provisions of this compact.

Id.

The FSS does include explicit, detailed RRCA Accounting Procedures[2] that although an integral part of the FSS approved and adopted by the Court through its decree dated May 19, 2003 ("Decree"), must also be "rules and regulations" adopted pursuant to Article IX of the Compact: "Such officials may, by unanimous action, adopt rules and regulations consistent with the provisions of this compact." *Id.* The reason why the FSS must also be "rules and regulations" adopted pursuant to Article IX of the Compact is because the FSS specifies how the RRCA is to determine compliance with the Compact and requires that the RRCA Accounting Procedures "... shall be used to determine supply, allocations, use and compliance with the Compact according to the Stipulation." FSS, Volume 1 of 5, App. C, § I., at C6. The Special Master appointed by the Court in *Kansas v. Nebraska and Colorado*, No. 126, Original ("Special Master McKusick"), recognized that the FSS embodied rules and regulations adopted pursuant to Article IX of the Compact when he described the FSS as including "Rules for the use and administration of water above Guide Rock, Nebraska ..."[3] since such rules can only be adopted pursuant to Article IX of the Compact.

Although the Court approved the FSS in its Decree, the FSS did not fix the RRCA Accounting Procedures in perpetuity. Under the Compact, rules and regulations consistent with the Compact can be adopted by unanimous action, and under the Compact those rules and regulations can certainly be changed by unanimous action. This is reflected in § I.F. of the FSS, which states: "The RRCA may modify the RRCA Accounting Procedures, or any portion thereof, in any manner consistent with the Compact and this Stipulation."

Kansas argues that: "Both the FSS, by its plain terms, and the Supreme Court's own pronouncements regarding the nature of its original jurisdiction, preclude the Court, and thus, by extension, an arbitrator, from passing on Nebraska's proposed changes to the accounting procedures in the FSS." Kansas' Opening Brief on Threshold Legal Issues at 7. Kansas seems to view changing the RRCA Accounting Procedures, absent unanimous action by the States, as one in the same with "modification or augmentation of the FSS". *Id.*, at 8. The FSS is an agreement between and among the States and with the Court's approval, the FSS is also a decree

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[2] Final Settlement Stipulation, Volume 1 of 5, Appendix C.

[3] *See* Second Report of the Special Master (Subject: Final Settlement Stipulation), ¶ (d), at 28.

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of the Court and can only be modified as provided for by the FSS itself or by action of the Court. Kansas' interpretation that changing the RRCA Accounting Procedures, absent unanimous action by the States, is the same as "modification or augmentation of the FSS" cannot be correct since the FSS explicitly provides for dispute resolution for: "Any matter relating to Republican River Compact administration, including administration and enforcement of the Stipulation in which a State has an Actual Interest, ..." FSS, § VII.A., ¶ 1. The term "Compact administration" clearly includes accounting procedures used to determine compliance with the Compact,[4] and the phrase "Any matter relating to Republican River Compact administration ..." is broad and inclusive. Since disputed matters relating to the RRCA Accounting Procedures are not explicitly excluded in the FSS, they should be considered disputed matters subject to the dispute resolution process set forth in § VII. of the FSS, including submittal of any disputed matter to non-binding arbitration pursuant to § VII.B. once a State has first submitted the disputed matter to the RCCA pursuant to § VII.A. and the disputed matter cannot be resolved by RRCA within the timeframes set forth in § VII.A.

This broad presumption that disputed matters not resolved by the RRCA pursuant to § VII.A. may be submitted to non-binding arbitration, unless specifically excluded from arbitration, is consistent with the Court's explanation that:

> An order to arbitrate the particular grievance should not be denied unless it may be said with positive assurance that the arbitration clause is not susceptible of an interpretation that covers the asserted dispute. Doubts should be resolved in favor of coverage.

United Steel Workers of America v. Warrior and Gulf Navigation Company, 363 U.S. 574, at 582-583.

> In the absence of any express provision excluding a particular grievance from arbitration, we think only the most forceful evidence of a purpose to exclude the claim from arbitration can prevail, particularly where, as here, the exclusion clause is vague and the arbitration clause quite broad.

Id., at 584-585.

To conclude otherwise would mean that the Court is powerless to consider accounting procedures "... used to determine supply, allocations, use and compliance with the Compact ..." when any one of the States only has to refuse to consider changes to the accounting procedures that may be warranted. FSS, App. C, § I., at C6.

Regarding the Supreme Court's pronouncements concerning the nature of its original jurisdiction, Kansas cites to *Texas v. New Mexico*, 462 U.S. 554 (1983). In addition to Texas seeking a decree from the Court commanding New Mexico to deliver water in accordance with the Pecos River Compact (*Id.*, at 562), Texas sought adoption of what it called a "Double Mass Analysis" as the method for determining when a shortfall in state-line flows has occurred. *Id.*, at 571. On the latter, the Court declined stating:

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[4] *Id.*, at 27-28.

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> The "Double Mass Analysis" represents a sharply different approach to how to go about measuring shortfalls at the state line, an approach which the Compact leaves the Commission free to adopt, but which this Court may not apply against New Mexico in the absence of Commission action.

Id., at 574.

However, the reason the Court declined to impose the "Double Mass Analysis" sought by Texas was not because the Court determined that it lacked authority to review accounting methodology, as suggested by Kansas, but because the Pecos River Compact itself specified the method for determining when a shortfall in state-line flows has occurred.[5] *Id.*, at 571-572. The Court further concluded that:

> ... the "Double Mass Analysis" is not close enough to what the Compact terms an "inflow-outflow method, as described in the Report of the Engineering Advisory Committee" to make it acceptable for use in determining New Mexico's compliance with its Art. III obligations.

Id., at 574.

The Republican River Compact has no such specificity in accounting methodologies or procedures. And if in this instance, as suggested by Kansas, the Court has no authority to resolve disputes regarding accounting procedures to ensure that accurate accounting is performed, then the Court cannot determine whether the apportionment of the waters of the Republican River Basin as set forth in Article IV of the Compact has accurately been made.

Special Master McKusick recognized the importance of accurate accounting procedures in determining the allocation of the waters of the Republican River Basin when he stated in his second report that:

> The importance of the States' collaboration in developing the more comprehensive RRCA Accounting Procedures cannot be overemphasized. Had the States not reached a final settlement and instead fully litigated their claims, accounting methods would of necessity (and with great delay and expense) have had to be determined as part of the trial for the purpose of establishing a methodology for determining water allocation and consumptive use figures for years after 1994.

Second Report of the Special Master (Subject: Final Settlement Stipulation), *Kansas v. Nebraska and Colorado*, No. 126, Original, at 48.

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[5] Citing Article III of the Pecos River Compact:

"(c) Unless and until a more feasible method is devised and adopted by the Commission the inflow-outflow method, as described in the Report of the Engineering Advisory Committee, shall be used to:

(i) Determine the effect on the state-line flow of any change in depletions by man's activities or otherwise, of the waters of the Pecos River in New Mexico."

NE0176261

Question 2:

Is the evaporation from Non-Federal Reservoirs below Harlan County Lake required to be included in the Compact accounting?

(Kansas' Argument B., Nebraska's Issue I.B.)

Decision: The evaporation from Non-Federal Reservoirs below Harlan County Lake is required to be included in the Compact accounting. Finding for Kansas; finding against Nebraska.

Summary of Reasoning. In § VI.A., the FSS affirmatively provides that: "For purposes of Compact accounting the States will calculate the evaporation from Non-Federal Reservoirs located in an area that contributes run-off to the Republican River above Harlan County Lake, in accordance with the methodology set forth in the RRCA Accounting Procedures." The provision is silent about how or whether evaporation from Non-Federal Reservoirs below Harlan County Lake is required to be included in the Compact accounting. Nebraska asserts that this provision should be read that because it includes evaporation from Non-Federal Reservoirs above Harlan County Lake, it implies exclusion of evaporation from Non-Federal Reservoirs below Harlan County Lake. However, the FSS must be read such that it is entirely consistent with the Compact. To be entirely consistent with Article II of the Compact, which defines "Beneficial Consumptive Use" as including "water consumed by evaporation from **any** reservoir" [*emphasis added*], § VI.A. of the FSS can not mean that evaporation from Non-Federal Reservoirs below Harlan County Lake is to be excluded in Compact accounting. Rather, § VI.A. of the FSS simply does not provide a specific requirement as to **how** evaporation from Non-Federal Reservoirs below Harlan County Lake is to be included in the Compact accounting [*emphasis added*]. Regarding the exclusion of reservoirs having a storage capacity of less than 15 acre-feet, this can only be consistent with Article II of the Compact because the evaporation from such small reservoirs is *de minimus*.

Analysis. In it's Opening Brief, Kansas asserts that evaporation from Non-Federal Reservoirs below Harlan County Lake is required to be included in the Compact accounting. Kansas' Opening Brief on Threshold Legal Issues at 13. Nebraska asserts that such evaporation should not be included in the Compact accounting. Nebraska's Opening Brief Re: Legal Issues at 58.

Section VI.A. of the FSS requires that:

> For the purposes of Compact accounting the States will calculate the evaporation from Non-Federal Reservoirs located in an area that contributes run-off to the Republican River above Harlan County Lake, in accordance with the methodology set forth in the RRCA Accounting Procedures.

Nebraska reads this provision to mean that evaporation from Non-Federal Reservoirs located downstream from Harlan County Lake should not be included in the Compact accounting stating that: "No provision is made for non-federal reservoirs below Harlan County Lake and none can be imputed." Nebraska's Opening Brief Re: Legal Issues at 58. In its responsive brief, Nebraska similarly contends: "... that by expressing an intent to include Non-Federal Reservoirs above

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Harlan County Lake, the parties intended to exclude those below Harlan County Lake." Nebraska's Responsive Brief Re: Legal Issues at 26.

Nebraska further asserts that: "Although the Compact and FSS generally refer to 'all' Non-Federal Reservoirs in various contexts, it is clear from the face of the FSS that 'all' does not mean 'all' because there already is an exclusion for reservoirs of less than 15 acre-feet in capacity." *Id.*

Kansas offers a different interpretation regarding inclusion of this provision together with a description of the history of including evaporation from Non-Federal Reservoirs located downstream from Harlan County Lake. However, neither is needed to properly decide this issue.

Section I.D. of the FSS provides that:

> The States agree that this Stipulation and the Proposed Consent Judgment are not intended to, nor could they, change the States' respective rights and obligations under the Compact. The States reserve their respective rights under the Compact to raise any issue of Compact interpretation and enforcement in the future.

This provision is an acknowledgement of the legal fact that the FSS cannot operate to change the Compact, which is both a contract between the States and a Federal statute. Article II of the Compact defines "Beneficial Consumptive Use" as follows:

> The term "Beneficial Consumptive Use" is herein defined to be that use by which the water supply of the Basin is consumed through the activities of man, and shall include water consumed by evaporation from any reservoir, canal, ditch, or irrigated area.

In § II. of the FSS, the term "Beneficial Consumptive Use" is defined as:

> That use by which the Water Supply of the Basin is consumed through the activities of man, and shall include water consumed by evaporation from any reservoir, canal, ditch, or irrigated area.

The definition for the term "Beneficial Consumptive Use" in § II. of the FSS is wholly consistent with the definition of that term in Article II of the Compact.

Again, § VI.A. of the FSS requires that:

> For the purposes of Compact accounting the States will calculate the evaporation from Non-Federal Reservoirs located in an area that contributes run-off to the Republican River above Harlan County Lake, in accordance with the methodology set forth in the RRCA Accounting Procedures.

This provision explicitly applies to Non-Federal Reservoirs located in an area that contributes run-off to the Republican River above Harlan County Lake. The provision is silent about how or whether evaporation from Non-Federal Reservoirs below Harlan County Lake is required to be included in the Compact accounting. However, the only way this provision can be read to be wholly consistent with Article II of the Compact is if Section VI.A. of the FSS does not mean

that evaporation from Non-Federal Reservoirs below Harlan County Lake is to be excluded in Compact accounting. Rather, Section VI.A. of the FSS does not provide a specific requirement as to **how** evaporation from Non-Federal Reservoirs below Harlan County Lake is to be included in the Compact accounting. [*emphasis added*]. Regarding the exclusion of reservoirs having a storage capacity of less than 15 acre-feet, this can only be consistent with Article II of the Compact because the evaporation from such small reservoirs is *de minimus*.

Question 3:

Do the current Republican River Compact Administration Accounting Procedures allocate evaporative losses from Harlan County Lake entirely to Kansas when the Kansas Bostwick Irrigation District is the only entity actually diverting stored water from Harlan County Lake for irrigation? If yes, how should evaporation from Harlan County Lake be allocated?

(Kansas' Argument C., Nebraska's Issue I.C.)

Decision: The current Republican River Compact Administration Accounting Procedures allocate evaporative losses from Harlan County Lake entirely to Kansas when the Kansas Bostwick Irrigation District is the only entity actually diverting stored water from Harlan County Lake for irrigation. However, the Accounting Procedures should be modified so that evaporation from Harlan County Lake is allocated between Kansas and Nebraska in proportion to each state's use of water from Harlan County Lake for all purposes. Finding in part for Nebraska and in part for Kansas; finding in part against Kansas and in part against Nebraska.

Summary of Reasoning. In § IV.A.2.e)(1) of the RRCA Accounting Procedures, evaporation from Harlan County Lake is expressly "charged to Kansas and Nebraska in proportion to the annual diversions made by the Kansas Bostwick Irrigation District and the Nebraska Bostwick Irrigation District" except "For any year in which no irrigation releases were made from Harlan County Lake ... ." The States could have chosen language that would have expressly apportioned the evaporation losses from Harlan County Lake between Nebraska and Kansas according to the use of water from Harlan County Lake by each state, whatever those uses might lawfully be, but they did not. Assuming Kansas' assertion of the underlying intent to be true, that the States would share the consumptive beneficial use associated with evaporation from Harlan County Lake on the basis of the relative amount of their uses, that intent cannot be used to ignore the plain meaning of the specific language actually adopted by the States. There is no ambiguity in the language of this provision, and its plain meaning must be applied until such time as this provision of the RRCA Accounting Procedures is modified, as it should be, as provided for in the FSS.

There is no dispute that Nebraska paid the Nebraska Bostwick Irrigation District to forgo its use of water from Harlan County Lake in 2006 and that the District did not use water from Harlan County Lake in 2006. By its own admission, Nebraska undertook this action in an effort to comply with the Compact. That is, so that Nebraska could continue beneficial consumptive uses that otherwise may have been subject to curtailment to comply with the Compact. Forgoing

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direct use of water from Harlan County Lake so that other uses of water in the Republican River Basin in Nebraska could continue is still a use of water in Nebraska. An apportionment of the evaporation from Harlan County Lake for such uses would be equitable and consistent with Article II and Article XI(a) of the Compact, which impliedly apportions evaporation based on where the associated beneficial use occurs not where the evaporation occurs, and the RRCA Accounting Procedures should be amended to provide this equity and consistency with the Compact when water is used for purposes other than irrigation.

Analysis. The last paragraph in § IV.A.2.e)(1) of the RRCA Accounting Procedures and Reporting Requirements provides that:

> The total annual net evaporation (Acre-feet) will be charged to Kansas and Nebraska in proportion to the annual diversions made by the Kansas Bostwick Irrigation District and the Nebraska Bostwick Irrigation District during the time period each year when irrigation releases are being made from Harlan County Lake. For any year in which no irrigation releases were made from Harlan County Lake, the annual net evaporation charged to Kansas and Nebraska will be based on the average of the above calculation for the most recent three years in which irrigation releases from Harlan County Lake were made. In the event Nebraska chooses to substitute supply for the Superior Canal from Nebraska's allocation below Guide Rock in Water-Short Year Administration years, the amount of the substitute supply will be included in the calculation of the split as if it had been diverted to the Superior Canal at Guide Rock.

Kansas' Opening Brief on Threshold Legal Issues, Appendix 3, at 23.

In 2006 and 2007, Nebraska reportedly purchased from the Nebraska Bostwick Irrigation District all of the water stored in Harlan County Lake on behalf of the District for the purpose of making it available to Kansas. The Nebraska NRDs reportedly made a similar purchase in 2007 from the Frenchman-Cambridge Irrigation District. *Id.*, at 21; Nebraska's Opening Brief Re: Legal Issues at 56. Kansas states that the intent of the States was to "... share the consumptive beneficial use associated with evaporation form Harlan County Lake on the basis of the relative amount of their uses." Kansas' Opening Brief on Threshold Legal Issues at 22. Consequently, Kansas asserts that "... [an] alternative use by Nebraska should not change the charge of evaporation to Nebraska." *Id.*, at 23. Nebraska counters that the plain language of the RRCA Accounting Procedures quoted above makes it clear that "... when one division of the Bostwick Irrigation District does not divert water, that State's [Nebraska's] share of the evaporation losses from Harlan County Lake is ***zero***." Nebraska's Opening Brief Re: Legal Issues at 57.

Kansas's description of the intent of the States to "...share the consumptive beneficial use associated with evaporation from Harlan County Lake on the basis of the relative amount of their uses" is consistent with the last sentence in the last paragraph of § IV.A.2.e)(1) of the RRCA Accounting Procedures and Reporting Requirements which states: "In the event Nebraska chooses to substitute supply for the Superior Canal from Nebraska's allocation below Guide Rock in Water-Short Year Administration years, the amount of the substitute supply will be included in the calculation of the split as if it had been diverted to the Superior Canal at Guide Rock." Kansas' Opening Brief on Threshold Legal Issues, Appendix 3, at 23. It is also reflected in the second sentence in the last paragraph of § IV.A.2.e)(1) of the RRCA Accounting

Procedures which states: "For any year in which no irrigation releases were made from Harlan County Lake, the annual net evaporation charged to Kansas and Nebraska will be based on the average of the above calculation for the most recent three years in which irrigation releases from Harlan County Lake were made." *Id.* It is worth noting that this second sentence was not originally included in the RRCA Accounting Procedures. *See* last paragraph of FSS, Volume 1 of 5, Appendix C, § IV.A.2.e.1.

Regardless of the intent of the States, the specific wording actually adopted by the States in the last paragraph of § IV.A.2.e)(1) of the RRCA Accounting Procedures is unambiguous and can not be ignored simply because this section "... does not expressly address how evaporation charges are to be allocated if one of the States changes the use of its water to a non-irrigation use." Kansas' Opening Brief on Threshold Legal Issues at 21. To address circumstances that were not envisioned when the RRCA Accounting Procedures were adopted, the Accounting Procedures can be changed by unanimous agreement between the States, as was done when the second sentence in the last paragraph of § IV.A.2.e)(1) was added, or pursuant to the dispute resolution process provided for in § VII of the FSS.

By its own admission, Nebraska paid the Nebraska Bostwick Irrigation District to forgo its use of water from Harlan County Lake in 2006 and 2007 "[i]n an effort to comply with the Compact and the FSS." Nebraska's Opening Brief Re: Legal Issues at 56. That is, water from Harlan County Lake was not used by the Nebraska Bostwick Irrigation District so that other beneficial consumptive uses could continue in Nebraska that otherwise may have been subject to curtailment to comply with the Compact. Forgoing direct use of water in Nebraska from Harlan County Lake so that other beneficial consumptive uses of water in the Republican River Basin in Nebraska could continue is still a beneficial use of water in Nebraska. An apportionment of the evaporation from Harlan County Lake for such uses would be equitable and consistent with Article II and Article XI(a) of the Compact, which impliedly apportions evaporation based on where the associated beneficial use occurs not where the evaporation occurs[6], and the RRCA Accounting Procedures should be amended to provide this equity and consistency with the Compact when water is used for purposes other than irrigation.

How evaporation from Harlan County Lake should be equitably apportioned between Kansas and Nebraska when water in Harlan County Lake is being directly used for irrigation purposes in only one of the states but is being used for other purposes by the other state is an accounting issue that is properly addressed in these arbitration proceedings. The issue was submitted to the RRCA for resolution. *See* Arbitration Agreement, Exhibit 1, Attachment 3 (Commissioner Dunnigan's letter to Commissioners Barfield and Wolfe dated April 15, 2008). The RRCA addressed the issue but no resolution was reached. *See* Arbitration Agreement, Exhibit 1. The issue was identified as an issue to be arbitrated. *See* Arbitration Agreement, Exhibit 3 at 1, and Exhibit 4 at 2.

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[6] Kansas incorrectly asserts that the Compact provisions "require evaporation occurring in a State to be allocated as consumptive beneficial use to that State." *See* Kansas' Opening Brief on Threshold Legal Issues at 21.

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Question 4:

If Nebraska has violated the Compact or the consent decree of May 19, 2003, causing damage to Kansas, is Nebraska subject to remedies for civil contempt of court, including disgorgement of Nebraska's gains as monetary sanctions, or should any damages awarded to Kansas be limited to actual damages suffered by Kansas?

(Kansas' Argument D., Nebraska's Issue III.B., Colorado's Argument II.)

Decision: Under the facts alleged by Kansas, the FSS, as a part of the Consent Decree of May 19, 2003, is properly enforced as a contract, like the Compact itself. Any damages awarded to Kansas are properly limited to the actual damages suffered by Kansas, and evidence pertaining to Nebraska's gains for its alleged overuse of water will not be considered. Finding for Nebraska and Colorado; finding against Kansas.

Summary of Reasoning. The FSS was approved by the Court in the Consent Decree and thus must be construed as part of the Consent Decree. But the FSS is first and foremost an agreement amongst the States, sovereigns who each agreed to "resolve litigation in the United States Supreme Court regarding the Republican River Compact by means of this Stipulation and the Proposed Consent Judgment ... ." FSS, § I.A. Because the FSS specifies how the RRCA is to determine compliance with the Compact, the FSS must also be construed as rules and regulations of the RRCA, pursuant to Article IX of the Compact, unanimously adopted by the official in each State charged with the duty of administering the Compact, which duty is exclusively reserved to those officials in Article IX. While the Court clearly has broad power to find contempt and to impose sanctions to remedy violations of its orders and decrees as asserted by Kansas, the Court also has the correlative power to limit or decline to impose contempt sanctions. Given the unique attributes of the FSS (i.e., consent decree, contract between the States, and rules and regulations of the RRCA) and given the purpose of the States in entering into the FSS (i.e., to resolve litigation regarding breach of the Republican River Compact, which itself is to be enforced as a contract between the States), the Arbitrator determines that the FSS as part of the Consent Decree should be enforced as a contract between the States, and any damages awarded to Kansas should be limited to the actual damages suffered by Kansas.

Limiting any damages awarded to Kansas to the actual damages suffered by Kansas is also consistent with the only provision in the FSS itself that provides a remedy for Nebraska's violation of § V.B.2.a. of the FSS, the very violation alleged by Kansas. This remedy, which is set forth in § V.B.2.f. of the FSS, limits Nebraska's compensation (in water) to Kansas in the first year after Water-Short Year Administration is no longer in effect, for Nebraska's exceedance of its annual allocation above Guide Rock in the previous year, to a maximum amount equal to Nebraska's exceedance in the previous year[7]; i.e., Kansas' actual loss.

[7] "Nebraska must either make up the entire amount of the previous year's Computed Beneficial Use in excess of its Allocation, or the amount of the deficit needed to provide a projected supply in Harlan County Lake of at least 130,000 Acre-feet, whichever is less." FSS, § V.B.2.f.

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Analysis. The FSS was executed by the Governors and Attorneys General for each of the States and filed with Special Master McKusick on December 16, 2002. *See Kansas v. Nebraska and Colorado*, No. 126, Original, 538 U.S. 720 (2003). The FSS was subsequently approved by Decree of the Court on May 19, 2003. *Id.* As part of the Consent Decree, the FSS should be construed like a contract.[8] As part of the Consent Decree, the FSS is also an enforceable decree of the Court.[9] Additionally, since the FSS specifies how the RRCA is to determine compliance with the Compact, the FSS must also be construed as rules and regulations of the RRCA.[10]

Kansas emphasizes the consent decree attribute of the FSS as controlling and asserts that: "The proper mechanism for enforcement of that decree is civil contempt, the goal of which is both to compensate Kansas for its injuries occasioned by Nebraska's violation and to ensure Nebraska's future compliance." Kansas' Opening Brief on Threshold Legal Issues at 24. As sanctions for civil contempt, Kansas seeks the disgorgement of ill-gotten gains from Nebraska, based on unjust enrichment, together with an additional amount for costs and attorney fees. *Id.*, at 26-30. Kansas further states that it seeks such "money damages as both compensation and as a means to

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[8] "While a consent decree is a judicial pronouncement, it is principally an agreement between the parties and as such should be construed like a contract." *Crumpton v. Bridgeport Education Assoc.*, 993 F.2d 1023, 1028 (2nd Cir. 1993).

[9] "A consent decree no doubt embodies an agreement of the parties and thus in some respects is contractual in nature. But it is an agreement that the parties desire and expect will be reflected in, and be enforceable as, a judicial decree that is subject to the rules generally applicable to other judgments and decrees." *Rufo v. Inmates of Suffolk County Jail*, 502 U.S. 367, 112 S.Ct. 748 (1992).

[10] Article IX of the Compact provides:

> It shall be the duty of the three states to administer this compact through the official in each state who is now or may hereafter be charged with the duty of administering the public water supplies, and to collect and correlate through such officials the data necessary for the proper administration of the provisions of this compact. Such officials may, by unanimous action, adopt rules and regulations consistent with the provisions of this compact.

The Compact itself reserves "the duty ... to administer this compact" to "the official in each state who is now or may hereafter be charged with the duty of administering the public water supplies" (collectively the RRCA) including the "adopt[ion of] rules and regulations consistent with the provisions of this compact." Special Master McKusick recognized the FSS as embodying "rules and regulations" of the RRCA when he described § V of the FSS as "Rules for the use and administration of water above Guide Rock, Nebraska ... ." Second Report of the Special Master (Subject: Final Settlement Stipulation) at 28. The Court's Consent Decree, which includes the FSS, can not alter or supersede this provision of the Compact.

> Under the Compact Clause, two States may not conclude an agreement such as the Pecos River Compact without the consent of the United States Congress. However, once given, "congressional consent transforms an interstate compact within this Clause into a law of the United States." One consequence of this metamorphosis is that, unless the compact to which Congress has consented is somehow unconstitutional, no court may order relief inconsistent with its express terms. [*internal citations omitted*]

Texas v. New Mexico, No. 65 Original, 462 U.S. 554, 103 S.Ct. 2558 (1983), at 564.

Thus, for the FSS to govern how the RRCA is to administer and determine compliance with the Compact, the FSS must be construed as rules and regulations unanimously adopted by the three state members of the RRCA.

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coerce compliance with the Court's decree. A fine payable to the state of Kansas can serve as both compensation to the state of Kansas and as a means to coerce Nebraska into compliance." Kansas' Reply Brief on Threshold Legal Issues at 25. Kansas cites numerous cases to support its assertions. However, when asked during oral arguments whether Kansas was aware of any case that included a finding of contempt when a consent decree entered as part of an enforcement proceeding for compact compliance was violated, Kansas could not cite to any such case stating "You don't find states doing this."[11]

Nebraska and Colorado both emphasize the contractual attribute of the FSS as controlling and assert that any damages awarded to Kansas are limited to actual damages suffered by Kansas. *See* Nebraska's Opening Brief Re: Legal Issues at 60-63; Colorado's Opening Brief on Legal Issues at 11-17.

Clearly, the Court has broad power to find contempt and to impose sanctions to remedy violations of its orders and decrees, as asserted by Kansas. However, the FSS is first and foremost an agreement amongst the sovereign States and must be construed within "its four corners."[12] When asked during oral arguments whether any of the States interpreted the FSS to contain an implied remedy, all three States answered that the FSS did not contain any remedy other than the dispute resolutions in § VII.[13] However, ¶ f. of § V.B.2., the very section of the FSS that Kansas alleges Nebraska has violated, provides as follows:

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11 ARBITRATOR DREHER: I haven't been able to find any case where there was a consent decree entered as part of an enforcement proceeding for compact compliance that then, upon violation, there was ever any sort of contempt. Well, number one, I haven't found that fact pattern anywhere. This -- and this proceeding seems to be unique in that case. Is that fair or not?

MR. DRAPER: That's very fair. That is, I think, a pretty accurate description of the case law as we see it, as we understand it to exist. You don't find states doing this.

Transcript of Proceedings, In re: Non-Binding Arbitration Pursuant to the Final Settlement Stipulation, *Kansas v. Nebraska and Colorado*, December 10, 2008, at 67:4-16.

12 "... the scope of a consent decree must be discerned within its four corners, and not by reference to what might satisfy the purposes of one of the parties to it. ... the instrument must be construed as it is written ... ." *United States v. Armour & Co.*, 402 U.S. 673, 91 S.Ct. 1752 (1991), at 682.

13 ARBITRATOR DREHER: Okay. I'm going to ask this as a question and I obviously have my own answer kind of what I'm beginning to formulate. But do any of the States see any implied remedies in the Final Settlement Stipulation?

MR. DRAPER: Well, answering for Kansas first, we don't, we think that this -- this set the standards for compliance in a very detailed way, but in terms of what -- what do you do if a State does not comply with the FSS? We don't see that is in there and that, therefore, has to go to the Supreme Court and you, as the first instance. I'm not -- I don't -- I'm not aware of any guidance that is given in the FSS or the Compact, for that matter.

ARBITRATOR DREHER: Okay. Nebraska?

MR. WILMOTH: I think as far as remedy goes, the dispute resolution process is the remedial provision, if you will, for how you resolve disputes.

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> If, in the first year after Water-Short Year Administration is no longer in effect, the Compact accounting shows that Nebraska's Computed Beneficial Consumptive Use as calculated above Guide Rock in the previous year exceeded its annual Allocation above Guide Rock, and, for the current year, the expected or actual supply from Harlan County Lake, calculated pursuant to Subsection V.B.1.A., is greater than 119,000 Acre-feet but less than 130,000 Acre-feet, then Nebraska must either make up the entire amount of the previous year's Computed Beneficial Consumptive Use in excess of its Allocation, or the amount of the deficit needed to provide a projected supply in Harlan County Lake of at least 130,000 Acre-feet, whichever is less.

Thus under the clear meaning of its own terms, the FSS provides that the **most** Nebraska is required to provide Kansas in water during the first year after Water-Short Administration is no longer in effect, when in the previous year Nebraska exceeded its annual Allocation above Guide Rock, is an amount equal to the previous year's Computed Beneficial Consumptive Use in excess of Nebraska's Allocation. This amount of water would equal Kansas' actual deficit of water and is the same as Kansas' actual loss. The award of any monetary damages must be consistent with the FSS and equal Kansas' actual loss, not Nebraska's gain. To base a remedy on Nebraska's gain rather than Kansas' actual loss, would impermissibly expand the burdens to which the States committed when they agreed to the terms of the FSS.

Kansas asserts that it should be awarded more than Kansas' actual loss for Nebraska's alleged violations of the FSS "as a means to coerce Nebraska into compliance." *See* Kansas' Reply Brief on Threshold Legal Issues at 25. After considering Kansas' position, the Arbitrator agrees with the principal expressed by the Special Master in *Kansas v. Colorado*, No. 105, Original. The Special Master in that proceeding cited to *Texas v. New Mexico*:

> It might also be said that awarding only a sum of money would permit New Mexico to ignore its obligation to deliver water as long as it is willing to suffer the financial penalty. But in light of the authority to order remedying shortfalls to be made up in kind, with whatever additional sanction might be thought necessary for deliberate failure to perform, that concern is not substantial in our view.

482 U.S. 124, 107 S.Ct. 2279 (1987) at 132.

> MR. LAVENE: First administrative step that must be taken and completed before moving on to Supreme Court, if that is what you are getting at, I think, or is there something else?
>
> ARBITRATOR DREHER: There is something else there, but rather than come out with that at this point, I'm just asking the question at this point, I think, to get your perspective.
>
> MR. AMPE: As far as the FSS stating a specific remedy for any type of compact breach, no, it does not. It's analogous to the Court in Texas versus New Mexico that the Compact simply does not state any remedies for that.

Transcript of Proceedings, In re: Non-Binding Arbitration Pursuant to the Final Settlement Stipulation, *Kansas v. Nebraska and Colorado*, December 10, 2008, at 77:20-79:2.

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The Special Master then stated:

> I do not see the measure of damages suggested by Kansas as being an effective deterrent to compact violations. Interstate water cases are simply too complex to be guided by the potential form of remedy. And I have no doubt about the power of equity to provide complete relief, perhaps even looking to upstream gain under appropriate circumstances.

Special Master Second Report (September 1997) at 82.

Although *Kansas v. Colorado* involved violations of a compact rather than alleged violation of a consent decree entered by the Court, as Kansas correctly points out, the principal set forth in *Kansas v. Colorado* is valid for interstate water cases generally. Assuming Kansas' allegations to be true, that Nebraska has violated the FSS and future violations of the FSS by Nebraska are likely (*See* Kansas' Opening Brief on Threshold Legal Issues at 31), it is the Arbitrator's opinion that money damages to coerce compliance are less likely to actually result in compliance with the Compact and the FSS than would an effective, operating, compliance plan. Since the latter is also a proper subject for this arbitration (*see* Question 5 below), it is appropriate, at least at this juncture, to enforce the FSS as a contract, like the Compact itself. For the reasons stated above, any damages awarded to Kansas are limited to the actual damages suffered by Kansas.

Question 5:

Is Kansas's proposed remedy for future compliance with the Republican River Compact and the Final Settlement Stipulation a proper subject for this arbitration, and can the U.S. Supreme Court formulate and mandate a remedy for future compliance?

(Kansas' Argument E., Nebraska's Issue II., Colorado's Argument III.)

Decision: Kansas' proposed remedy for future compliance with the Republican River Compact and the Final Settlement Stipulation is a proper subject for this arbitration; however, Kansas can not mandate its proposed remedy. Any alternative remedy to that proposed by Kansas can also be considered during this arbitration, and the U.S. Supreme Court can formulate and mandate a remedy for future compliance, as it determines to be necessary. Finding for Kansas and finding in part for Nebraska and Colorado; finding in part against Nebraska.

Summary of Reasoning. The FSS sets forth a specific process for dispute resolution. *See* FSS, § VII. The FSS clearly states that the dispute resolution process applies to "Any matter relating to Republican River Compact administration, including administration and enforcement of the Stipulation in which a State has an Actual Interest ... ." *See* FSS, § VII.A., ¶ 1. and ¶ 7. The remedy proposed by Kansas for future compliance with the Compact and the FSS is a proper subject for this arbitration provided it was first submitted to the RRCA (FSS, § VII.A., ¶ 1.), the RRCA was unable reach unanimous agreement or resolution (FSS, § VII.A., ¶ 7.), and Kansas desires to proceed with resolution by submitting to non-binding arbitration, unless otherwise agreed to by all States with an Actual Interest (*Id.*). As documented in the May 16, 2008, Resolution of the RRCA (Exhibit 1 to the Arbitration Agreement), Kansas has followed all three procedural steps.

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Kansas presented its proposed remedy for future Compact compliance and compliance with the FSS in its letter to Nebraska dated December 19, 2007. The mere act of presenting a proposed remedy for Nebraska's consideration did not impose the remedy, nor could Kansas impose any remedy on a coequal sovereign. However, once the facts are heard at hearing regarding Nebraska's alleged violations of the Compact and the FSS, and both Kansas' and Nebraska's proposed plans for future compliance are presented and considered, it is appropriate for the Arbitrator to recommend actions that may be necessary for future compliance. If this matter is eventually submitted to the Court, the Court certainly can impose equitable relief in the form of an injunction or in other form as determined to be necessary to enforce future compliance with the Compact and the FSS. However, in enforcing the FSS, the Court should not impose any greater burdens than what the States have consented to in the FSS.

Analysis. Kansas asserts that "Nebraska has shown itself to be incapable of meeting its obligations as set out in the Republican River Compact and the Final Settlement Stipulation" and therefore, "Nebraska needs to be told by the Court, and thus by the Arbitrator, what measures need to be taken in order to meet Nebraska's obligations." Kansas' Opening Brief on Threshold Legal Issues at 31. Nebraska asserts that "it is improper for Kansas to assume Nebraska will fail to comply with its obligations under the Compact" and that "Kansas seeks to dictate to Nebraska the means by which Nebraska must comply with the mandates of the Compact and the FSS to ensure against future Compact violations anticipated by Kansas." Nebraska's Opening Brief Re: Legal Issues at 64. Nebraska also asserts that it "has relentlessly pursued plans and programs designed to ensure Compact compliance ... ."[14] Nebraska's Responsive Brief Re: Legal Issues at 10. Colorado offers the opinion that: "Although Nebraska has violated the terms of the Compact, there is no indication that such violations were willful or intentional." Colorado's Opening Brief on Legal Issues at 18.

Kansas and Nebraska are co-equal sovereigns, and neither can impose specific performance on the other. However, the States do not dispute the authority of the Court to formulate and impose a remedy to ensure future compliance with the Compact and the FSS, although Nebraska states that the remedy for future compliance with the Compact and the FSS proposed by Kansas in its letter to Nebraska dated December 19, 2007, "is no longer relevant to this Arbitration." Nebraska's Consolidated Reply Brief at 15. Given the propensity of Kansas and Nebraska to disagree on matters related to compliance with the Compact and the FSS, a compliance plan that would further "remove all causes, present and future, which might lead to controversies"[15] and reduce the likelihood for a series of future original jurisdiction actions before the Court is appropriate for this arbitration.

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[14] Nebraska's Opening Brief Re: Legal Issues contains numerous factual allegations regarding hydrologic conditions and Nebraska's efforts to ensure compliance with the Compact and the FSS. Kansas disputes many of these allegations. Because Nebraska's factual allegations were not presented under oath, were not subject to cross-examination, and the other States have not been afforded the opportunity to submit countervailing evidence, the Arbitrator has not considered or given any weight to the factual allegations of Nebraska in this decision.

[15] Republican River Compact, Article I.

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The Arbitrator notes that an attribute of the FSS that increases the likelihood of disputes between the States is that compliance with the Compact and the FSS is only determined after-the-fact, rather than during the course of each year. It may be appropriate to formulate a compliance plan that provides for taking certain actions during each year based on projected water supplies and projected uses of both surface water and groundwater by the States, together with after-the-fact compliance accounting and a system of credits and debits that carry forward, consistent with the Compact and the FSS. Such a plan may reduce the potential for future disputes regarding compliance and further "the most efficient use of the waters of the Republican River Basin" and "interstate comity."[16]

Question 6:

If Nebraska's alleged violations during both 2005 and 2006 are substantiated, is Kansas entitled to damages for both 2005 and 2006 or for 2006 only?

(Kansas' Argument F., Nebraska's Issue III.A.1.)

Decision: If Nebraska's alleged violations during both 2005 and 2006 are substantiated, Kansas is entitled to damages for both 2005 and 2006, but not based on the methodology set forth by Kansas, i.e., not two times the average of the shortages from 2005 and from 2006. Nebraska's compliance with the Compact in 2005 will be determined based on the evidence presented at hearing. Finding in part for Kansas and in part for Nebraska; finding in part against Nebraska and in part against Kansas.

Summary of Reasoning. By the plain wording of the FSS, the States waived "all claims against each other relating to the use of the waters of the [Republican River] Basin pursuant to the Compact with respect to activities or conditions occurring before December 15, 2002," (FSS, § I.C.) but not "[w]ith respect to activities or conditions occurring after December 15, 2002 ... ." FSS, § I.D. Further, the "States agree[d] that this Stipulation and the Proposed Consent Judgment are not intended to, nor could they, change the States' respective rights and obligations under the Compact." *Id.* The States also agreed "to implement the obligations and agreements in this Stipulation in accordance with the schedule attached hereto as Appendix B." FSS, § I.B. Appendix B of the FSS unambiguously sets the "First year Water-Short Year Administration compliance" as 2006, not 2005. The FSS also prescribes that "any Water-Short Year Administration year [is] treated as the second year of the two-year running average and using the prior year as the first year." FSS, § V.B.2.e.i. The common meaning of a two-year running average is the average value for a parameter calculated by adding the value for that parameter in a given year to the value for that same parameter from the preceding year and dividing the sum by two. The calculations shown in Table 5C of the RRCA Accounting Procedures for determining Nebraska's compliance during Water-Short Year Administration are wholly consistent with this meaning. Therefore, since Appendix B of the FSS sets 2006 as the first year for Water-Short Year Administration compliance, the only purpose for the 2005 calculations of

[16] *Id.*

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Nebraska's Computed Beneficial Consumptive Use above Guide Rock, Nebraska's Allocation from sources above Guide Rock, Nebraska's share of any unused portion of Colorado's Allocation, and credits for imported water, pursuant to § V.B.2.a. of the FSS and Table 5C of the RRCA Accounting Procedures, is for calculation of the corresponding two-year running averages for 2006. Nebraska's compliance with § V.B.2.a. of the FSS in 2005 would require calculation of two-year running averages using parameter values from 2004 and 2005, but is not relevant since the FSS plainly established 2006 as the first year for Water-Short Year Administration compliance.

While compliance with § V.B.2.a. of the FSS in 2005 is not required by the implementation schedule set forth in Appendix B to the FSS, this does not relieve Nebraska from any actual damages to Kansas resulting from noncompliance with the Compact in 2005.

Analysis. Kansas asserts that:

> Applying the methodology for determining Nebraska compliance in a Water Short Year, as set out in Section V.B.2.e.i [of the FSS], to 2006, one must determine the two-year running average for the year 2006 and the prior year, 2005. The amount of violation for Water Short-Year 2006 is therefore that same amount doubled.

Kansas' Opening Brief on Threshold Legal Issues at 35.

Nebraska contends that:

> The Implementation Schedule [in FSS, Volume 1 of 5, App. B, at B1], provides a list of dates by which various compliance mechanisms become applicable. The Implementation Schedule expressly identifies 2006 as the "First year Water-Short Year Administration compliance."
> ...
>
> It is not possible to read into this language a requirement that Nebraska comply with the WSY Administration accounting in 2005.

Nebraska's Responsive Brief Re: Legal Issues at 28.

Nebraska further contends that "the FSS specifically was designed to allow Nebraska time to come into compliance with the new order of things, which included a new mandate to regulate table land wells. The provision of such a grace period was part of the bargained for exchange embodied in the FSS ... ." *Id.*, at 29.

Neither Kansas nor Nebraska is correct. Kansas' interpretation of the provision in § V.B.2.e.i. of the FSS, which states "with any Water-Short Year Administration year treated as the second year of the two-year running average and using the prior year as the first year," is inconsistent with the plain wording of the provision and the plain meaning of "two-year running average." Nebraska's contention that there was to be a "grace period" directly contradicts § I.D. of the FSS which provides that: "With respect to activities or conditions occurring after December 15, 2002, the dismissal will not preclude a State from seeking enforcement of the provisions of the

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Compact ... ." There is no explicit mention of the "grace period" that Nebraska suggests was intended anywhere within the FSS or its appendices.

Using the hypothetical constructed by Kansas in its Opening Brief on Threshold Legal Issues at 35, together with the plain wording of the provision in § V.B.2.e.i. of the FSS and the plain meaning of "two-year running average," if the 2005 accounting of allocation-less-beneficial-consumptive-use in Nebraska showed a negative 40,000 acre-feet, and the 2006 accounting showed a positive 20,000 acre-feet, the Water-Short Year violation for 2006 would be 10,000 acre-feet ((-40,000 + 20,000) / 2). Appendix B to the FSS does not provide for "Water-Short Year Administration compliance" prior to 2006 or "normal year compliance" prior to 2007. Therefore, any alleged Compact violations occurring after December 15, 2002, but before 2006 for "Water-Short Year Administration compliance" or 2007 for "normal year compliance" must be separately determined based on the evidence presented at hearing.

Question 7:

Is Nebraska's issue of crediting payments for damages for violations from one year in determinations of compliance in subsequent years a proper subject for this arbitration?

(Kansas' Argument G., Nebraska's Issue III.A.2., Colorado's Argument I.)

Decision: Nebraska's issue of crediting payments for damages for violations from one year in determinations of compliance in subsequent years is not a proper subject for this arbitration at this time, since the issue has not been directly and fully submitted together with supporting materials to the RRCA. However, this issue can be addressed at hearing and in post-hearing briefs to the extent it must be addressed in considering Kansas' proposed remedy, or other alternative remedies or plans that may be considered at hearing, for future compliance with the Compact and the Final Settlement Stipulation. Alternatively, since this issue was identified in Exhibit 4 to the Arbitration Agreement, once directly and fully submitted with supporting materials to the RRCA and if the RRCA is unable to resolve this issue, it would then be a proper subject as an issue in this arbitration. Finding in part for Kansas, Nebraska, and Colorado; finding in part against Kansas, Nebraska, and Colorado.

Summary of Reasoning. In Nebraska's Opening Brief Re: Issue III.A.2., illustrative information is presented (*See* Table 1 in Nebraska's Opening Brief) to show "the importance of providing Nebraska with a credit for damages paid for violations in 2006 (a WSY Administration year)." Nebraska's Opening Brief Re: Issue III.A.2. at 8-9. While this information is helpful to the Arbitrator for context, there is no indication in the Arbitration Agreement or the States' opening, responsive, or reply briefs that demonstrates Nebraska's Issue III.A.2. was previously and specifically defined for the RRCA, that the type of supporting information presented in Table 1 of Nebraska's Opening Brief regarding this issue was supplied to the RRCA, or that Nebraska designated a schedule for the RRCA to attempt resolution of this issue, as expressly required by § VII.A.6. of the FSS.

Nebraska's Issue III.A.2. may very well need to be addressed in a limited manner while considering the formulation of any plan for ongoing compliance with the Compact and the FSS that is determined to be necessary, and to the limited extent required to address other issues that have been properly submitted to but unresolved by the RRCA. To the limited extent necessary to address issues specifically set forth in the May 16, 2008, Resolution of the RRCA (Exhibit 1 to the Arbitration Agreement), Nebraska's Issue III.A.1. can be considered in this arbitration. While the Arbitrator agrees with the principal of judicial economy in addressing related issues in a broader context, that principal cannot defeat the specific requirements of the FSS set forth in §§ VII.A.1. and 6. Therefore, if Nebraska desires to have its Issue III.A.2. fully addressed in this arbitration, Nebraska must first directly submit this issue to the RRCA as a separate issue with a specific definition, supporting materials, and a schedule for resolution.

Analysis. Nebraska asserts that it is entitled to have its issue of crediting payments for damages for violations from one year in determinations of compliance in subsequent years ("crediting issue") addressed in this arbitration because Exhibit 4 to the Arbitration Agreement executed by the States on October 23, 2008, specifically identifies the crediting issue as an issue to be arbitrated (Exhibit 4 at 3) and because ¶ 5. of § A. in the Arbitration Agreement provides:

> The Arbitration is for the purpose of, and shall result in, the determination by the Arbitrator of the legal and factual issues set out in Exhibit 3 (Kansas issues) and Exhibit 4 (Nebraska's issues), as may be further refined by the States and the Arbitrator.

Arbitration Agreement at 1-2.

Nebraska further contends that the crediting issue arises directly from Kansas' submittal to the RRCA by letter dated February 8, 2008. *See* Nebraska's Opening Brief Re: Issue III.A.2 at 4-6.

Even though Kansas is a signatory to the Arbitration Agreement, which included Exhibit 4 identifying the crediting issue as an issue for arbitration, Kansas contends that:

> Prior to October 21, 2008, Nebraska had never raised this issue with Kansas, and Nebraska has never presented this issue to the RRCA. Nebraska has never given Kansas a proposal as to how this matter could be resolved, and the matter has not been discussed by Nebraska and Kansas. Because Kansas has never seen Nebraska's proposal on how to resolve this matter, it is unknown whether a dispute even exists on this issue.

Kansas' Opening Brief on Threshold Legal Issues at 40.

Colorado states that: "Nebraska has the right to bring forth any issues for which it has followed the dispute resolution process [§ VII. of the FSS] and identified those issues within the Arbitration Agreement. Colorado's Opening Brief on Legal Issues at 7. Colorado also suggests that: "The significance that enforcement damages will have upon future compliance with the Final Settlement Stipulation is useful information to the states and is intrinsically related to the other issues that the states are already briefing." Colorado's Response Brief on Legal Issues at 20.

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As already discussed for Question 1, the broad presumption that disputed matters not resolved by the RRCA pursuant to § VII.A. of the FSS may be submitted to non-binding arbitration, unless specifically excluded from arbitration, is consistent with the Court's explanation that:

> An order to arbitrate the particular grievance should not be denied unless it may be said with positive assurance that the arbitration clause is not susceptible of an interpretation that covers the asserted dispute. Doubts should be resolved in favor of coverage.

United Steel Workers of America v. Warrior and Gulf Navigation Company, 363 U.S. 574, at 582-583.

> In the absence of any express provision excluding a particular grievance from arbitration, we think only the most forceful evidence of a purpose to exclude the claim from arbitration can prevail, particularly where, as here, the exclusion clause is vague and the arbitration clause quite broad.

Id., at 584-585.

However, although the Arbitration Agreement executed by the States on October 23, 2008, specifically identified the crediting issue as an issue to be arbitrated, § VII.A.1. of the FSS approved as part of the Consent Decree unequivocally requires that: "Any matter relating to Republican River Compact administration, including administration and enforcement of the Stipulation in which a State has an Actual Interest, **shall first be Submitted to the RRCA**." [*emphasis added*] Exhibit 1 to the Arbitration Agreement is a Resolution of the RRCA dated May 16, 2008, and identifies the disputes that have been addressed by the RRCA, as required by § VII.A.1. of the FSS, where no resolution was reached. Included in the disputes where no resolution was reached is Nebraska's submittal to the RRCA by Commissioner Dunnigan's letter dated April 15, 2008, which is attached to Exhibit 1 of the Arbitration Agreement. That letter sets forth nine issues Nebraska has identified as "fast-track" issues in accordance with § VII.A.3. of the FSS as follows: (1) Estimation of Beneficial Consumptive Use of Nebraska's Virgin Water Supply; (2) Division of Evaporative Loss from Harlan County Lake when Only One State Utilizes Reservoir Storage for Irrigation; (3) Non-Federal Reservoir Evaporation below Harlan County Lake; (4) Return Flow; (5) Haigler Canal Diversion/Arikaree Return Flows; (6) Haigler Canal Computed Beneficial Consumptive Use Calculations for Nebraska; (7) Arikaree Sub-basin Virgin Water Supply Calculations; (8) Discrepancies Between the Accounting Points for Surface Water Computed Beneficial Consumptive Uses and Ground Water Beneficial Consumptive Uses Used in the Accounting Procedures for Calculating Sub-basin Virgin Water Supplies and Beneficial Consumptive Uses; and (9) Riverside Canal Issues. None of these issues have any direct or intrinsic relationship with the crediting issue.

The requirement in § VII.A.1. of the FSS that any disputed matter or issue must first be submitted to the RRCA before it can be submitted to arbitration is unequivocal. Nebraska did not submit the crediting issue to the RRCA when it could have in its letter of April 15, 2008, even though it had received Kansas' proposed remedy for Nebraska's alleged violations of the FSS nearly 4 months earlier,[17] from which Nebraska claims the crediting issue arises. Nebraska

[17] Letter from David Barfield of Kansas to Ann Bleed of Nebraska, dated December 17, 2007.

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has not subsequently provided documentation showing the crediting issue has been submitted to the RRCA and that the RRCA has not been able to resolve this issue. Therefore, the broad presumption afforded disputed issues eligible for arbitration, even those issues identified in Exhibit 4 of the Arbitration Agreement, does not apply. The crediting issue is specifically excluded by lack of submittal to the RRCA pursuant to § VII.A.1. of the FSS. Additionally, because Nebraska did not submit this issue to the RRCA when it clearly could have, the Arbitrator determines that the crediting issue does not fall within § VII. C. 1. of the FSS as one or more "unforeseen issues" that may be added "at the discretion of the arbitrator."

The crediting issue may or may not have bearing on other issues that have been submitted to but unresolved by the RRCA. To the limited extent that the crediting issue must be considered to appropriately address issues specifically set forth in the May 16, 2008, Resolution of the RRCA (Exhibit 1 to the Arbitration Agreement) the crediting issue will be considered in this arbitration. Otherwise, the crediting issue will be excluded unless that issue is fully submitted to the RRCA and the RRCA determines it is unable to resolve the issue during the pendency of this arbitration.

Dated: January 22, 2009

Karl J. Dreher
Arbitrator

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CERTIFICATE OF SERVICE

I, Karl J. Dreher, hereby certify that I caused a copy of the foregoing Arbitrator's Final Decision on Legal Issues to be placed in the U.S. Mail, postage paid, on this 23rd day of January, 2009, addressed to each of the following:

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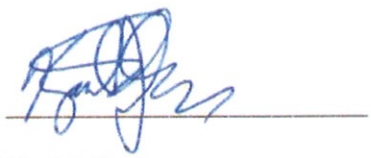

Karl J. Dreher

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TAB 8

ARBITRATOR'S FINAL DECISION

NON-BINDING ARBITRATION
Pursuant to Arbitration Agreement of October 23, 2008

IN ACCORDANCE WITH:
FINAL SETTLEMENT STIPULATION

Kansas v. Nebraska and Colorado
No. 126, Original, U.S. Supreme Court
Decree of May 19, 2003, 538 U.S. 720

ARBITRATOR'S FINAL DECISION

June 30, 2009

BACKGROUND

On December 15, 2002, the states of Kansas, Nebraska, and Colorado (the "States") executed the Final Settlement Stipulation (the "FSS") "... to resolve the currently pending litigation in the United States Supreme Court regarding the Republican River Compact by means of this Stipulation and the Proposed Consent Judgment ... ." FSS, Volume 1 of 5, at 1. The FSS was filed with the Special Master appointed by the U.S. Supreme Court (the "Court") in *Kansas v. Nebraska and Colorado*, No. 126, Original, who recommended entry of the proposed consent judgment which would approve the FSS. Second Report of the Special Master (Subject: Final Settlement Stipulation) at 77. On May 19, 2003, the Court entered a consent decree approving the FSS (the "Consent Decree").

By 2007, disputes arose between the States regarding compliance with the FSS and the Republican River Compact (the "Compact"). The disputes were submitted to the Republican River Compact Administration (the "RRCA") pursuant to the provision in the FSS for dispute resolution. *See* FSS, Volume 1 of 5, § VII., at 34-40. The RRCA addressed the disputes, but no resolution of certain disputes was reached. *See* Resolution of the RRCA dated May 16, 2008; Exhibit 1 to Arbitration Agreement dated October 23, 2008. The RRCA submitted these disputes to non-binding arbitration pursuant to the provisions of § VII. of the FSS, the States executed the Arbitration Agreement on October 23, 2008 (the "Arbitration Agreement"), and I was retained by the States to serve as the Arbitrator.

Exhibit 2 to the Arbitration Agreement sets forth the "Time Frame Designation" for the non-binding arbitration, Exhibit 3 to the Arbitration Agreement sets forth the disputed issues identified by the State of Kansas to be arbitrated, and Exhibit 4 to the Arbitration Agreement sets forth the disputed issues identified by the State of Nebraska to be arbitrated. The disputed issue originally raised by the State of Colorado with the RRCA, which the RRCA submitted to non-binding arbitration pursuant to the provisions of § VII. of the FSS (*See* Attachment 3 to Resolution of the RRCA dated May 16, 2008), has been withdrawn from this arbitration and is not included in the Arbitration Agreement.

From the issues set forth in Exhibit 3 and Exhibit 4 to the Arbitration Agreement, the States identified six legal issues to be decided by the Arbitrator by December 19, 2008, for the purpose of narrowing discovery and the hearing on the merits. Based on a disagreement regarding the appropriate scope of the arbitration, the Arbitrator identified a seventh legal issue during a prehearing conference held telephonically on November 5, 2008. Each of the States filed opening briefs on these seven legal issues with the Arbitrator on November 10, 2008. (The State of Colorado briefed 3 arguments pertaining to only 4 of the legal issues.) Responsive briefs were filed on November 24, 2008, and reply briefs were filed on December 5, 2008. Oral argument on these legal issues was heard at the University of Denver, Strum College of Law, on December 10, 2008.

The Arbitrator treated the briefs filed by the States as being analogous to cross-motions for summary judgment under Rule 56 of the Federal Rules of Civil Procedure. "A party claiming relief may move, with or without supporting affidavits, for summary judgment on all or part of the claim." Fed. R. Civ. P. 56(a). "The judgment sought should be rendered if the pleadings, the

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discovery and disclosure materials on file, and any affidavits show that there is no genuine issue as to any material fact and that the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(c).

The Arbitrator issued his preliminary decision on these seven legal issues, including a summary of his reasons for deciding each issue, on December 19, 2008. On January 22, 2009, the Arbitrator issued his final decision on these seven legal issues. With minor corrections and the addition of supporting analysis for each of the seven issues, the final decision is materially the same as the preliminary decision issued on December 19, 2008. The *Arbitrator's Final Decision on Legal Issues* is attached hereto[1] and fully incorporated herein by reference.

The States submitted expert reports on the remaining issues to the Arbitrator in lieu of extensive direct testimony on February 23, 2009. The Arbitrator subsequently conducted a hearing on those issues at the Byron Rogers U. S. Courthouse in Denver, Colorado, beginning on March 9, 2009. The hearing was recessed on March 19, 2009, and reconvened and concluded on April 14, 2009. The Arbitrator has carefully considered the reports and testimony of the expert witnesses for the States together with post-hearing briefs submitted by counsel for the States and issues the following decision.

FINDINGS

Accounting Procedures – Estimating Computed Beneficial Consumptive Use for Groundwater and Imported Water Supply

1. The Final Settlement Stipulation (the "FSS") executed by the States on December 15, 2002, and approved by the U. S. Supreme Court on May 19, 2003, incorporates detailed Accounting Procedures and Reporting Requirements ("Accounting Procedures"), which were subsequently adopted and revised by the Republican River Compact Administration (the "RRCA")[2], as provided in § I.F. of the FSS. The adopted Accounting Procedures, as revised, include procedures for estimating Computed Beneficial Consumptive Use ("CBCU") for groundwater and determining the Imported Water Supply Credit ("IWS").

2. In their respective post-hearing briefs (each titled *Post-Trial Brief*),[3] counsel for the states of Colorado and Kansas assert that the issue of estimating CBCU of groundwater and determining the IWS is not a proper subject for this arbitration because Nebraska's expert

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[1] The date in the first line of the attached Arbitrator's *Final Decision on Legal Issues*, dated January 22, 2009, has been corrected to December 15, 2002.

[2] Final Settlement Stipulation, Volume 1 of 5, Appendix C, as revised (July 2005) and adopted (August 10, 2006) by the RRCA.

[3] Counsel for Colorado, Kansas, and Nebraska signed and submitted briefs by FedEx sent on April 24, 2009.

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report on this issue[4] has not been submitted to the RRCA for its consideration,[5] and therefore, the Arbitrator should not consider the issue.

3. Exhibits 1, 3, and 4 of the Arbitration Agreement executed by each of the States on October 23, 2008, identify the procedures used to estimate CBCU of groundwater and determine the IWS as a disputed issue "which may be taken to the next step in the dispute resolution process"[6] and an issue "to be Arbitrated."[7]

4. The difference between what Colorado and Kansas contend was submitted to the RRCA and included in the Arbitration Agreement, as compared with what is before the Arbitrator, is the weighting coefficients proposed by Nebraska to be applied to results from 8 differences calculated using 16 runs of the RRCA Groundwater Model.[8] Although the weighting coefficients involved in the proposal currently before the Arbitrator are different than the equal weighting coefficients resulting from averaging the 8 differences, which was the approach presented to the RRCA in August of 2008,[9] Nebraska's proposal to use 8 differences calculated using 16 runs of the RRCA Groundwater Model is essentially the same as it was in August of 2008.

5. Prior to submitting their respective post-hearing briefs, neither Colorado nor Kansas asserted that because Nebraska's expert report on this issue had not been submitted to the RRCA for its consideration, the issue of estimating CBCU of groundwater and determining the IWS was not a proper subject for this arbitration. Neither Colorado nor Kansas timely made this assertion when they submitted their respective expert reports[10, 11] in response to Nebraska's expert report on this issue, and neither timely raised this assertion during the hearing conducted from March 9 through March 19 and on April 14, 2009. Therefore, Nebraska's

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[4] Nebraska Exhibit 30, Expert Report of Dr. David P. Ahlfeld, Michael G. McDonald, and James C. Schneider, *Estimating Computed Beneficial Consumptive Use for Groundwater and Imported Water Supply under the Republican River Compact*, January 20, 2009.

[5] *State of Colorado's Post-Trial Brief* at 30-33; *Kansas' Post-Trial Brief* at 65-66.

[6] Exhibit 1 of the Arbitration Agreement, *see* Attachment 2: Commissioner Dunnigan's letter to Commissioners Barfield and Wolfe dated April 15, 2008.

[7] Exhibit 3 and Exhibit 4 of the Arbitration Agreement.

[8] *State of Colorado's Post-Trial Brief* at 32; *Kansas' Post-Trial Brief* at 65; *State of Nebraska's Post-Hearing Brief* at 43 and 49.

[9] *Id.*

[10] Colorado Exhibit 7, Expert Report of Willem A. Schreüder, Ph.D., *Report in Response to: Estimating Computed Beneficial Consumptive Use for Groundwater and Imported Water Supply under the Republican River Compact, Ahfed [sic] et al. (January 20, 2009)*, February 16, 2009.

[11] Kansas Exhibit 28, Expert Report of David W. Barfield, Steven P. Larson, and Dale E. Book, *Kansas's Expert Response to Nebraska's Expert Report, "Estimating Computed Beneficial Use for Groundwater and Imported Water Supply under the Republican River Compact,"* February 17, 2009.

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issue of estimating CBCU of groundwater and determining the IWS, as presented in its expert report,[4] is properly included as an issue in this arbitration.

6. Subsection III.A.1. of the Accounting Procedures specifies how the annual Virgin Water Supply for each sub-basin is to be determined as follows:

> The annual Virgin Water Supply for each Sub-basin will be calculated by adding: a) the annual stream flow in that Sub-basin at the Sub-basin stream gage designated in Section II., b) the annual Computed Beneficial Consumptive Use above that gaging station, and c) the Change in Federal Reservoir Storage in the Sub-basin; and from that total subtract any Imported Water Supply Credit. The Computed Beneficial Consumptive Use will be calculated as described in Subsection III. D.

7. Subsection III.A.2. of the Accounting procedures specifies how the annual Virgin Water Supply for main stem is to be calculated as follows:

> The annual Virgin Water Supply for the Main Stem will be calculated by adding: a) the flow at the Hardy gage minus the flows from the Sub-basin gages listed in Section II, b) the annual Computed Beneficial consumptive Use in the Main Stem, and c) the Change in Federal Reservoir Storage from Swanson Lake and Harlan County Lake; and from that total subtract any Imported Water Supply Credit for the Main Stem.

8. Section II. of the Accounting Procedures define the terms Virgin Water Supply, Computed Beneficial Consumptive Use, and Imported Water Supply Credit as follows:

> **Virgin Water Supply:** the Water Supply within the Basin undepleted by the activities of man;
>
> **Computed Beneficial Consumptive Use:** for purposes of Compact accounting, the stream flow depletion resulting from the following activities of man:
>
> Irrigation of lands in excess of two acres;
> Any non-irrigation diversion of more than 50 Acre-feet per year;
> Multiple diversions of 50 Acre-feet or less that are connected or otherwise combined to serve a single project will be considered as a single diversion for accounting purposes if they total more than 50 Acre-feet;
> Net evaporation from Federal Reservoirs;
> Net evaporation form Non-federal Reservoirs within the surface boundaries of the Basin;
> Any other activities that may be included by amendment of these formulas by the RRCA;
>
> **Imported Water Supply Credit:** the accretions to stream flow due to water imports from outside of the Basin as computed by the RRCA Groundwater Model. The Imported Water Supply Credit of a State shall not be included in the Virgin Water Supply and shall be counted as a credit/offset against the Computed Beneficial Consumptive Use of water allocated to that State …

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9. Subsection III.D.1. of the Accounting Procedures specifies how Computed Beneficial Consumptive Use of groundwater is to be determined for an accounting year as follows:

> Computed Beneficial Consumptive Use of groundwater shall be determined by use of the RRCA Groundwater Model. The Computed Beneficial Consumptive Use of groundwater for each State shall be determined as the difference in streamflows using two runs of the model:
>
> The "base" run shall be the run with all groundwater pumping, groundwater pumping recharge, and surface water recharge within the model study boundary for the period 1940 to the current accounting year "on".
>
> The "no State pumping" run shall be the run with the same model inputs as the base run with the exception that all groundwater pumping and pumping recharge of that State shall be turned "off."

10. Subsection III.A.3. of the Accounting Procedures specifies how the Imported Water Supply Credit is to be determined for an accounting year as follows:

> The amount of Imported Water Supply Credit shall be determined by the RRCA Groundwater Model. The Imported Water Supply Credit of a State shall not be included in the Virgin Water Supply and shall be counted as a credit/offset against the Computed Beneficial Consumptive Use of water allocated to that State. Currently, the Imported Water Supply Credits shall be determined using two runs of the RRCA Groundwater Model:
>
> a. The "base" run shall be the run with all groundwater pumping, groundwater pumping recharge, and surface water recharge within the model study boundary for the period 1940 to the current accounting year turned "on." This will be the same "base" run used to determine groundwater Computed Beneficial Consumptive Uses.
>
> b. The "no NE import" run shall be the run with the same model inputs as the base run with the exception that surface water recharge associated with Nebraska's Imported Water Supply shall be turned "off."
>
> The Imported Water Supply Credit shall be the difference in stream flows between these two model runs.

11. Nebraska has proposed essentially three changes in the Accounting Procedures adopted by the RRCA involving computation of CBCU for groundwater and IWS that would modify (1) the annual calculation of Virgin Water Supply ("VWS") in each Sub-basin and the Main Stem; (2) the annual determination of CBCU in each Sub-basin and the Main Stem; and (3) the annual determination of the IWS in each Sub-basin and the Main Stem.[4] None of these changes have been adopted by the RRCA, as provided in § I.F. of the FSS , and are at issue in this arbitration pursuant to § VII.A., ¶ 1. and ¶ 7., of the FSS.

12. The calculation of annual VWS for any Sub-basin, as specified in § III.A.1. of the Accounting Procedures and described in Finding 6 is:

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$VWS = Gage + CBCU + \Delta S - IWS.$

Alternatively, this relationship can be written:

$VWS = Gage + CBCU_S + CBCU_G + \Delta S - IWS$

or

$VWS = Gage + CBCU_S + (CBCU_C + CBCU_K + CBCU_N) + \Delta S - IWS$

In these relationships, "Gage" is the annual streamflow in that Sub-basin measured at the stream gage designated in § II. of the Accounting Procedures, CBCU is the computed depletion of streamflow in that Sub-basin from all Beneficial Consumptive Use, and ΔS is the Change in Federal Reservoir Storage. Using the notation of Nebraska,[4] $CBCU_S$ is the computed depletion of streamflow in that Sub-basin from all Beneficial Consumptive Use of surface water, $CBCU_G$ is the computed depletion of streamflow in that Sub-basin from all Beneficial Consumptive Use of groundwater, $CBCU_C$ is the computed depletion of streamflow in that Sub-basin from all Beneficial Consumptive Use of groundwater by Colorado, $CBCU_K$ is the computed depletion of streamflow in that Sub-basin from all Beneficial Consumptive Use of groundwater by Kansas, and $CBCU_N$ is the computed depletion of streamflow in that Sub-basin from all Beneficial Consumptive Use of groundwater by Nebraska.

13. The calculation of annual VWS for the Main Stem, as specified in § III.A.2. of the Accounting Procedures and described in Finding 7 is the same as shown in Finding 12 except the from the "Gage" (which for the Main Stem is the annual streamflow measured at the Hardy gage), the sum of the annual streamflows measured at all Sub-basin gages upstream of the Hardy gage is subtracted.

14. The first change proposed by Nebraska in the Accounting Procedures pertaining to $CBCU_G$ and IWS would modify the determination VWS in Finding 12 to:

$VWS = VWS_S + VWS_G$

where

$VWS_G = (\theta - CKMN).$

In these relationships, again using the notation of Nebraska,[4] VWS_S is the surface-water-related portion of VWS, VWS_G is the groundwater-related portion of VWS, θ is the annual base flow in a Sub-basin or the Main Stem determined from running the RRCA Groundwater Model with all groundwater pumping, groundwater pumping recharge, and surface water recharge within the model study boundary for the period 1940 to a particular accounting year "off," and CKMN, is the base flow in a Sub-basin or the Main Stem determined from running the RRCA Groundwater Model with all Colorado groundwater pumping and recharge (C),

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Kansas groundwater pumping and recharge (K), all surface water recharge from Imported Water Supply (M), and all Nebraska groundwater pumping and recharge (N) within the model study boundary for the period 1940 to a particular accounting year "on."

15. The reason stated by Nebraska for the proposed change in determining VWS is: "This independently-computed value of VWS_G is the best estimate of the impact of all groundwater-related human activity on streamflow and should be viewed as the true value of this property."[12]

16. While the independently-computed value of VWS_G (θ – CKMN) may be the best estimate of base flow discharged from the groundwater system to surface water sources "undepleted by the activities of man" over the period 1940 to a particular accounting year, it is an estimated value derived from running the RRCA groundwater model and should not be viewed as the "true value" as suggested by Nebraska. Although the RRCA Groundwater Model has presumably been properly designed and calibrated and can provide reliable estimates of base flow, the RRCA groundwater model is still an idealization of a complex hydrogeologic system, and the results derived from running the model are not necessarily the true values.

17. The second and third changes proposed by Nebraska in the Accounting Procedures pertaining to $CBCU_G$ and IWS would modify the determination of $CBCU_C$, $CBCU_K$, and $CBCU_N$ specified in § III.D.1. of the Accounting Procedures as described in Finding 9 and the determination of IWS specified in § III.A.3. of the Accounting Procedures described in Finding 10 such that:

$$CBCU_C + CBCU_K + CBCU_N - IWS = (\theta - CKMN) = VWS_G$$

under all conditions.

18. As described in Findings 9 and 10, the current Accounting Procedures require differencing the results from two runs of the RRCA Groundwater Model (requiring 5 runs of the RRCA Groundwater Model) to determine each of the four man-caused stresses to the groundwater system; i.e., Colorado groundwater consumptive use ($CBCU_C$), Kansas groundwater consumptive use ($CBCU_K$), Nebraska groundwater use ($CBCU_N$), and recharge from imported surface water (IWS). Nebraska proposes differencing the results from 16 runs of the RRCA Groundwater Model (8 differences) for each of the four man-caused stresses to the groundwater system and summing the 8 differences using weighting factors, which weighting factors sum to one, for each of the four man-caused stresses such that the relationship in Finding 17 is satisfied.[13]

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[12] Nebraska Exhibit 30, Expert Report of Dr. David P. Ahlfeld, Michael G. McDonald, and James C. Schneider, *Estimating Computed Beneficial Consumptive Use for Groundwater and Imported Water Supply under the Republican River Compact*, January 20, 2009, p. 9.

[13] *Id.*, p. 48. Also, *see* Nebraska Exhibit 33.

19. The reasons stated by Nebraska for the proposed changes in determining $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS include:

> ... the current Accounting Procedures assume that VWS_G can be computed using the individually-computed impacts in a sub-basin ($CBCU_C$, $CBCU_K$, $CBCU_N$ and IWS) as $VWS_G = CBCU_C + CBCU_K + CBCU_N - IWS$[14]
>
> ... under some stream drying conditions, the current Accounting Procedures do not produce values that combine to the independently-computed value of VWS_G. This leads to the conclusion that the values of $CBCU_C$, $CBCU_K$, $CBCU_N$ and IWS computed using the current Accounting Procedures are in error.[15]
>
> The deviation from additivity can be substantial and is of critical importance since this additivity is assumed to hold under the current Accounting Procedures.[16]
>
> The selection of the additional model runs to be used is based on the idea that using a base condition with any one human activity either on or off may bias the results for or against one state. ... As a result, analysis should be performed using all possible base conditions in which human activities are either on or off.[17]
>
> The proposed method provides values for impact that satisfy the expectation that individual impacts will sum to the total impact of human activity for a given sub-basin.[18]

20. In the context of the changes proposed by Nebraska, "additivity" means that the relationship described in Finding 17 is valid under all conditions. The "error" or "deviation from additivity" asserted by Nebraska occurs when modeled groundwater use by any of the three States, individually or in combination, fully depletes streamflow. That is, so long as groundwater-caused depletions to a flowing stream do not cause streamflow to approach zero, an increase or decrease in the use of groundwater that is hydraulically connected to the stream will result in a decrease or increase in streamflow, respectively, that essentially is linearly proportionate[19] to the increase or decrease in groundwater use. The modeled response of the stream is basically linear and the condition of "additivity" holds when $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS are determined in accordance with the current Accounting Procedures as described in Findings 9 and 10. However, when modeled groundwater use is increased such that groundwater-caused depletions result in stream drying and a break in the hydraulic connection between the groundwater system and the stream,

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[14] *Id.*, p. 9.

[15] *Id.*

[16] *Id.*, p. 12.

[17] *Id.*, p. 47.

[18] *Id.*, p. 51.

[19] Ignoring minor nonlinearities from unrelated factors.

there is no remaining streamflow to deplete. Under such conditions, the modeled response of the stream becomes nonlinear, and the condition of "additivity" no longer holds when $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS are determined in accordance with the current Accounting Procedures.

21. As described in Finding 19, Nebraska contends that the current Accounting Procedures assume that VWS_G, defined by Nebraska as (θ – CKMN), can be computed using the individually-computed impacts in a sub-basin. That is: $CBCU_C + CBCU_K + CBCU_N - IWS$ would equal (θ – CKMN) under all conditions. However, careful readings of the Accounting Procedures[20] and the Final Report of the Special Master,[21] which includes a detailed description of the significant attributes of the RRCA Groundwater Model and use of the Model output, do not reveal that the assumption of "additivity" to (θ – CKMN) under all conditions was made by either the representatives of the States that developed the Accounting Procedures or the representatives of the States that developed the RRCA Groundwater Model.

22. One of the co-authors of Nebraska's expert report on estimating CBCU for groundwater and IWS, Michael McDonald, was a member of the Technical Groundwater Modeling Committee that developed the RRCA Groundwater Model.[22] However, Nebraska did not offer any testimony during the hearing on this issue that would corroborate the assertion that the Technical Groundwater Modeling Committee intended that $CBCU_C + CBCU_K + CBCU_N - IWS$ would equal (θ – CKMN) under all conditions. The fact that this "additivity" holds when streamflow response to groundwater depletions is linear does not establish that the representatives of the States that developed the RRCA Groundwater Model and the Accounting Procedures assumed or intended that this condition of additivity would hold when streamflow response to groundwater depletions is nonlinear.

23. The description of the significant attributes of the RRCA Groundwater Model and use of the Model output contained in the Final Report of the Special Master specifically includes a description of how the Model is used to calculate $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS,[23] which is the same as specified in the Accounting Procedures as described in Findings 9 and 10.

24. The fact that "[t]he 'base' run is the simulation with all groundwater pumping, groundwater pumping recharge, and surface water recharge within the model study boundary for the

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[20] Final Settlement Stipulation, Volume 1 of 5, Appendix C, as revised (July 2005) and adopted (August 10, 2006) by the RRCA.

[21] Final Report of the Special Master With Certificate of Adoption of RRCA Groundwater Model, *Kansas v. Nebraska and Colorado*, No. 126, Original, September 17, 2003.

[22] *See* Kansas Exhibit 72.

[23] *See* Final Report of the Special Master With Certificate of Adoption of RRCA Groundwater Model, *Kansas v. Nebraska and Colorado*, No. 126, Original, September 17, 2003, pp. 49-50.

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period 1918 to the current accounting year 'on',"[24] and that this base run would likely simulate stream drying at some locations during certain years, resulting in nonlinear response, suggests that such an outcome was anticipated by the Technical Groundwater Modeling Committee that developed the RRCA Groundwater Model. This is supported by the testimony of both Kansas' expert witness on this issue, Mr. Steve Larson,[25] and Colorado's expert witness on this issue, Dr. Willem Schreüder,[26] both of whom served on the Technical Groundwater Modeling Committee that developed the RRCA Groundwater Model.

25. Using flows in Beaver Creek in 2003 as an example, Nebraska correctly points out that:

> ... increasing pumping by either Kansas or Nebraska alone or both states together causes baseflow at the Beaver Creek accounting point to drop to zero after a threshold is reached. Baseflow remains zero beyond this threshold as pumping is further increased. Clearly, increasing pumping beyond this point by either state must have some impact on the groundwater/stream system. Where in the system is this impact felt?[27]

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[24] *Id.*

[25] MR. DRAPER: Was it clear to you that the model, the groundwater model, has nonlinear features related to stream depletions?

MR. LARSON: Yes, it was. There were several nonlinear features in the model that were, in my view, pretty obvious. And one of them -- that is, the changes in saturated thickness with changes in water levels -- there were some idealizations made, primarily for computational stability reasons, to at least linearize that feature; but there were other nonlinear features that were pretty obvious. Evapotranspiration, function is a method of piecewise linear; but, overall, similiarly [*sic*] the rain is nonlinear, similarly the stream-drying-sort-of feature, if you will, is a piecewise linear feature as well.

Transcript of Arbitration Proceedings, March 17, 2009, Volume VII at 1233:23-1234:13.

[26] DR. SCHREÜDER: The first point is that Nebraska is using 2003 as an example of how the modeling is not behaving in an appropriate way.

That is not correct.

In the first place, 2003 is a fairly extreme year; but, nevertheless, none of the behavior that we observe in 2003 -- wasn't known to the committee at the time that the model was put together. ...

But we looked in great detail at the period prior to 2000 and this similar kind of behavior did, in fact, occur and was well known to many members.

MR. AMPE: Doctor, when did you first become aware of the nonlinearity of the model?

DR. SCHREÜDER: About 15 minutes after I saw it the first time.

Transcript of Arbitration Proceedings, March 18, 2009, Volume VIII at 1388:13-1389:3.

[27] Nebraska Exhibit 30, Expert Report of Dr. David P. Ahlfeld, Michael G. McDonald, and James C. Schneider, *Estimating Computed Beneficial Consumptive Use for Groundwater and Imported Water Supply under the Republican River Compact*, January 20, 2009, p. 22.

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Increasing groundwater consumption by either Kansas or Nebraska after base flow drops to zero will result in additional reductions in groundwater storage than would have occurred had the base flow not been fully depleted, unless streamflow other than from base flow is available for depletion by the increased groundwater consumption. Obviously, once the consumptive use of groundwater from a groundwater system that is hydraulically connected to a stream has fully depleted the flow in that stream, any additional consumption of groundwater from that system cannot be supplied from depletions to streamflow, but has to be supplied from other sources including much larger increases in withdrawals from groundwater storage.

26. While Nebraska's experts clearly understand the response described in Finding 25,[28] its proposed changes to calculate $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS are based on depletions to streamflow that cannot occur once streamflow has been fully depleted. Using Beaver Creek in 2003 as an example, differencing results from the RRCA Groundwater Model as described in Finding 9 produces an estimate of the base flow in 2003 subject to depletion by consumptive groundwater use in Kansas of 323 acre-feet, with full groundwater use in Nebraska. Because of consumptive groundwater use in Nebraska during the period 1940 through 2003, the estimated 323 acre-feet is the most amount of base flow that consumptive groundwater use in Kansas could deplete from Beaver Creek. Once flows in Beaver Creek are depleted, the consumptive use of groundwater in Kansas that would cause additional depletions to streamflow in Beaver Creek, if such flow existed, must be satisfied with groundwater from other sources, primarily groundwater storage. Similarly, with full groundwater use in Kansas the estimated base flow in 2003 subject to depletion by consumptive groundwater use in Nebraska is 727 acre-feet. Because of consumptive groundwater use in Kansas during the period 1940 through 2003, the estimated 727 acre-feet is the most base flow that consumptive groundwater use in Nebraska could deplete from Beaver Creek. As for Kansas, the consumptive use of groundwater in Nebraska that would cause additional depletions to streamflow in Beaver Creek, if such flow existed, must be satisfied with groundwater from other sources, primarily groundwater storage. The estimated streamflow in 2003 that can be depleted by Kansas with full groundwater use in Nebraska added to the estimated streamflow in 2003 that can be depleted by Nebraska with full groundwater use in Kansas is 1,050 acre-ft.

    Nebraska contends that the "true total impact" is 6,445 acre-feet, calculated as $(\theta - KN)$,[29] and that "[t]he difference between the true total impact, 6,445 ac-ft, and the total impact estimated by summing individual impacts is 5,395 acre-feet." Nebraska further contends that "[t]his amount of streamflow depletion is occurring but not being accounted for in the current procedure."[30] Nebraska's contention is flawed because although the consumptive beneficial

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[28] *Id.*, p. 22-24.

[29] Historically, there have not been any effects on streamflow in Beaver Creek other than from consumptive use of groundwater in Kansas (K) and in Nebraska (N).

[30] *Id.*, p. 19.

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use of groundwater in Kansas and Nebraska during 2003 must have been significantly greater than 1,050 acre-feet, the sum of $CBCU_K$ and $CBCU_N$, there could not have been 6,445 acre-feet of base flow from groundwater discharge that could have been depleted from Beaver Creek in 2003. The additional consumptive beneficial use of groundwater by Kansas and Nebraska beyond what would deplete streamflow to zero had to have consumed groundwater from other sources, primarily groundwater storage. Historically, there have obviously been significant groundwater consumptive uses in both Kansas and Nebraska that have reduced groundwater storage, lowered groundwater levels, and largely depleted the base flow that was available in 2003. The Beaver Creek base flow in 2003 estimated by Nebraska to have been 6,445 acre-feet would be a viable estimate only if there had never been consumptive groundwater use in Kansas or Nebraska, which obviously is not what has actually occurred.

27. Nebraska terms the difference between VSW_G, calculated as (θ – CKMN), and the sum of $CBCU_C$, $CBCU_K$, and $CBCU_N$, less IWS, a residual.[31] As described in Finding 17, Nebraska's proposed changes to the procedures for calculating $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS, result in the sum of $CBCU_C$, $CBCU_K$, and $CBCU_N$, less IWS, equaling (θ – CKMN), and a residual of zero.

28. One result from the analysis in Finding 26 is that Nebraska's proposed procedure for determining VWS, whereby

    $VWS = VWS_S + VWS_G$

    and

    $VWS_G = (\theta - CKMN)$, also referred to by Kansas as the "virgin water supply metric,"[32]

    is more consistent with the definition of VWS established in the Compact and adopted in the Accounting Procedures (*see* Finding 8) than is summing $CBCU_C$, $CBCU_K$, and $CBCU_N$, less IWS, each determined in accordance with the existing Accounting Procedures, to compute what Nebraska terms VWS_G.

29. While Nebraska's proposal for determining what it terms VWS_G, or what Kansas terms the virgin water supply metric, is more consistent with the definition of VWS established in the Compact and adopted in the Accounting Procedures, than is the definition implied by summing $CBCU_C$, $CBCU_K$, and $CBCU_N$, less IWS, Nebraska's proposed changes to calculate $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS are problematic. Again using flows in Beaver Creek in 2003 as an example, Nebraska's proposed methodology results in a value for $CBCU_K$ of 3,021 acre-feet and a value for $CBCU_N$ of 3,425 acre-feet for a total VWS_G of

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[31] *Id.* at 46.

[32] Nebraska Exhibit 36, *Kansas' Review of Nebraska's Request for Change in Accounting Procedure*, September 18, 2007, p. 2.

6,445 acre-feet.[33] These values are equivalent to adding one-half of the residual (one-half of 5,395 acre-feet) to $CBCU_K$ (323 acre-feet) and one-half of the residual to $CBCU_N$ (727 acre-feet), when $CBCU_K$ and $CBCU_N$ are calculated using the methodology prescribed in the existing Accounting Procedures as described in Finding 9.[34] The residual of 5,395 acre-feet is essentially the amount of groundwater consumptive use beyond the sum of 323 acre-feet and 727 acre-feet from streamflow depletion that must come from other groundwater sources, primarily groundwater storage, and is equally divided between Kansas and Nebraska using Nebraska's proposed methodology.[35]

30. Equally dividing what are primarily additional withdrawals from groundwater storage between Kansas and Nebraska, when streamflow is depleted and there is no longer a hydraulic connection with the groundwater system, to determine $CBCU_K$ and $CBCU_N$ without regard to the decrease in groundwater storage caused by groundwater use in each state is not appropriate. Similarly, equally dividing what are primarily additional withdrawals from groundwater storage between Colorado and Nebraska in the case of Frenchman Creek, when streamflow is depleted and there is no longer a hydraulic connection with the groundwater system, to determine $CBCU_C$ and $CBCU_N$ without regard to the decrease in groundwater storage caused by groundwater use in each state is problematic given that "the majority of the Frenchman Basin is in Nebraska and Nebraska pumping can be expected to have the largest influence."[36]

31. Using the examples of Beaver Creek and Frenchman Creek, equally dividing what are primarily additional withdrawals from groundwater storage between two states when streamflow is depleted and there is no longer a hydraulic connection with the groundwater system to determine CBCU, without regard to the decrease in groundwater storage caused by groundwater use in each state, is also inconsistent with there being "very little propagation of head change across statelines."[37]

32. When the groundwater being consumptively used involves all three states, or when there is significant IWS, the residual described in Finding 27 is divided in "a more complicated way"[38] but the residual must still be related to changes in groundwater storage.

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[33] Nebraska Exhibit 30, Expert Report of Dr. David P. Ahlfeld, Michael G. McDonald, and James C. Schneider, *Estimating Computed Beneficial Consumptive Use for Groundwater and Imported Water Supply under the Republican River Compact*, January 20, 2009, p. 50.

[34] Transcript of Arbitration Proceedings, March 17, 2009, Volume VII at 1148:19-1149:4 (Ahlfeld).

[35] Transcript of Arbitration Proceedings, March 19, 2009, Volume IX at 1466:9-1470:8 (Ahlfeld).

[36] Nebraska Exhibit 30, Expert Report of Dr. David P. Ahlfeld, Michael G. McDonald, and James C. Schneider, *Estimating Computed Beneficial Consumptive Use for Groundwater and Imported Water Supply under the Republican River Compact*, January 20, 2009, p. 30.

[37] Transcript of Arbitration Proceedings, March 17, 2009, Volume VII at 1173:8-9 (Ahlfeld).

[38] *Id.*at 1149:7 (Ahlfeld).

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33. Groundwater consumptively used from groundwater storage is not streamflow depletion, and inclusion of the consumptive use of groundwater storage in the calculation of $CBCU_C$, $CBCU_K$, and $CBCU_N$ is inconsistent with the definition of CBCU as set forth in § II. of the Accounting Procedures. Similarly, including the base flow in VWS_G that would be discharged from groundwater as though groundwater storage had not been reduced by consumptive groundwater use, or θ, results in overstating the Computed Water Supply (the "CWS") that is available to be allocated to each state in any drainage basin during a year where simulated stream drying in that basin occurs and there is no hydraulic connection between the groundwater system and the stream.

34. Nebraska's proposed procedure for determining IWS has a related problem. Half of the model runs and differences, and half of the weighting, proposed for determining IWS do not include any simulated groundwater use by Nebraska. This means that for half of the model runs, groundwater storage is undepleted by Nebraska groundwater use and simulated groundwater levels are higher than historical levels. As a result, IWS determined as proposed by Nebraska will generally be greater than IWS determined using the existing procedure specified in § III.A.3. of the Accounting Procedures as described in Finding 10.[39] In fact, the Main Stem IWS and the total IWS determined using Nebraska's proposed method is greater than the corresponding IWS determined using the existing procedure described in Finding 10 for all years from 1981 through 2006, except for 1993.[40] The reason for the anomaly in the 1993 IWS is unknown, but may be the result of computational error.

35. Colorado's expert on this issue, Dr. Willem A. Schreüder, identified another concern with Nebraska's proposed changes. In his report, Dr. Schreüder states that: "The method proposed by Nebraska, on the other hand, ***does*** included the consumption of imported water."[41] Dr. Schreüder shows that $CBCU_N$ calculated "... for the Swanson-Harlan reach are greater with imported water than without imported water"[42] and further states that: "As shown in Figure 10, any simulation where surface water imports are on will include consumption of imported water."[43] Thus, the current Accounting Procedures for calculating $CBCU_C$, $CBCU_K$, $CBCU_N$, as described in Finding 9, may also include consumption of imported water, since both the "base" run and the "no State pumping" run include surface

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[39] *See* testimony of Mr. Steve Larson, Transcript of Arbitration Proceedings, March 17, 2009, Volume VII at 1240:25-1241:5.

[40] *See* Tables 1a through 1z in Colorado Exhibit 7, Expert Report of Willem A. Schreüder, Ph.D., *Report in Response to: Estimating Computed Beneficial Consumptive Use for Groundwater and Imported Water Supply under the Republican River Compact, Ahfed [sic] et al. (January 20, 2009)*, February 16, 2009.

[41] *Id.* at 18.

[42] *Id.*

[43] *Id.* at 19.

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water imports.[44] Including the consumption of imported water in the calculation of CBCU is not consistent with § IV.F. of the FSS, which specifically provides that: "Beneficial Consumptive Use of Imported Water Supply shall not count as Computed Beneficial Consumptive Use or Virgin Water Supply Credit."[45]

36. Although Nebraska's proposed changes to calculate $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS are problematic, the RRCA should consider reconvening the Technical Groundwater Modeling Committee to thoroughly re-evaluate the nonlinear response of the RRCA Groundwater Model when simulated stream drying occurs, re-evaluate the existing procedures for determining CBCU and IWS described in Findings 9 and 10, and document its conclusions and any recommendations in a report to the RRCA.

Accounting Procedures – Haigler Canal

37. Nebraska has proposed three changes in the Accounting Procedures adopted by the RRCA involving the Haigler Canal that would modify (1) the annual determination of water diverted from the North Fork Republican River in Colorado into the Haigler Canal[46] for irrigation in Nebraska; (2) the annual apportionment of return flows from irrigation in Nebraska between the Main Stem, measured at the USGS stream gage near Hardy, Nebraska, station 06853500 (the "Hardy Gage"), and the Arikaree River, measured at the USGS stream gage at Haigler, Nebraska, station 06821500 (the "Arikaree Gage); and (3) the annual calculation of VWS for the North Fork of Republican River in Colorado and the Arikaree River.

38. Under the current Accounting Procedures, the Nebraska CBCU attributable to the annual diversions from the North Fork Republican River to the Haigler Canal for irrigation in Nebraska is based on using the total amounts of water diverted as measured at the Haigler Canal Stateline Gage, station 00061400.[47] The first change to the Accounting Procedures involving the Haigler Canal proposed by Nebraska would reduce the amount of these annual diversions from the North Fork Republican River by an amount equal to the annual discharges from the Haigler Canal to the Arikaree River, as measured by Nebraska at the Haigler Canal Spillback gage, station 00061500, which is located approximately one-half mile west of the point of discharge to the Arikaree River,[48] less some adjustments for

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[44] Colorado's expert, Willem A. Schreüder, proposed alternative methodology using differences between 5 runs of the RRCA Groundwater Model to calculate $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS, which do not include imported water in the calculation of $CBCU_C$, $CBCU_K$, and $CBCU_N$, *Id.*, p. 7. However, there is no evidence that this alternative methodology has been presented to the RRCA as required by the FSS.

[45] Final Settlement Stipulation, Volume 1 of 5, p. 25.

[46] The Pioneer Canal in Article V, Republican River Compact.

[47] *Republican River Compact Administration Accounting Procedures and Reporting Requirements*, revised July 2005 (on title page, revised August 10, 2006), § IV.B.3. [*sic*], p. 26.

[48] Transcript of Arbitration Proceedings March 17, 2009, Volume VII at 1226:23-1227:1 (Williams).

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precipitation inflow to the canal.[49] Nebraska has maintained the Haigler Canal Spillback gage and recorded the flow in the canal at this location for approximately the last 20 years.[50]

39. Nebraska's proposed change to subtract the amount of water measured annually at the Haigler Canal Spillback gage from the amount of water measured annually at the Haigler Canal Stateline Gage to determine the amount of water diverted from the North Fork of the Republican River for irrigation in Nebraska assumes that much if not all of the water measured at the Haigler Canal Spillback gage is discharged from the Haigler Canal to the Arikaree River and is surface water in the Arikaree River that can be measured at the Arikaree Gage.[51]

40. Nebraska's expert witness on this issue, Mr. James Williams, testified that "... we have seen much of the [Haigler Canal Spillback] water, if not all, in past six or seven years showing up at the Arikaree gage ... ."[52] Beginning in about 2001, streamflows measured at the Arikaree Gage decreased significantly. During the years 2002, 2003, 2004, and 2005, the annual amounts of water measured at the Haigler Canal Spillback gage exceeded the actual annual amounts of water measured at the Arikaree Gage by 58 acre-feet (20 percent of spillback), 610 acre-feet (37 percent of spillback), 314 acre-feet (48 percent of spillback), and 187 acre-feet (14 percent of spillback), respectively.[53] Thus contrary to Mr. Williams' testimony, significant portions of the Haigler Canal Spillback water did not reach the Arikaree Gage during the years 2002 through 2005.

41. When asked whether analyses of losses and gains had been made between the Haigler Canal Spillback gage and the point of discharge to the Arikaree River and between the point of discharge and the Arikaree Gage, Mr. Williams testified: "No, we did not."[54]

42. In its post-hearing brief, Nebraska asserts:

> There is no dispute that the Arikaree is now frequently dry and that spillback/return water may not get to the Arikaree gage – but that doesn't change the fact that North Fork water

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[49] *Id.* at 1206:23-1207:11 (Williams).

[50] *Id.* at 1193:3-5 (Williams).

[51] *Id.* at 1193:8-14; 1222:23-1223:3.

[52] *Id.*

[53] Nebraska Exhibit 31, Expert Report of James C. Schneider and James R. Williams, *Expert Report on Accounting Issues: Haigler Canal and Groundwater Model Accounting Points*, January 20, 2009, Table 1 (p. 4) and Table 2 (p. 7); Kansas Exhibit 29, Expert Report of David Barfield and Scott Ross, *Kansas's Responsive Expert Report Concerning Haigler Canal and Groundwater Modeling Accounting Points*, February 17, 2009, Table 1 (Arikaree gage value).

[54] Transcript of Arbitration Proceedings, March 17, 2009, Volume VII at 1208:4-13.

> is nevertheless discharged into the Arikaree River and thereby directly or indirectly inflates the VWS.[55]

The calculation for the Arikaree River VWS specified in the Accounting Procedures is:

VWS = Arikaree Gage at Haigler Stn. No. 06821500 + CBCUc + CBCUk + CBCUn – IWS.[56]

For VWS for the Arikaree River to increase, flows at the Arikaree Gage must increase and/or CBCU must increase. As described in Finding 40, during four of the six years from 2001 through 2006, significant portions of the flows from the Haigler Canal Spillback did not reach the Arikaree River Gage and could not have increased VWS. Also, there is no evidence that CBCU has increased as a result of the Haigler Canal Spillback. Therefore, Nebraska's assertion is flawed.

43. In its post-hearing brief, Nebraska also asserts:

> The diminished streamflows [at the Arikaree Gage] could be the result of many different human activities but it is clear that any discharge [from the Haigler Canal Spillback] into the stream, is a direct credit to that stream whether it is lost to seepage or not.[57]

This assertion would hold if the amount of the Haigler Canal Spillback lost to seepage resulted in an equivalent amount of groundwater discharge to the Arikaree River. However as described in Findings 55 and 56, the prevalent direction of groundwater flow, at least on the north side of the Arikaree River, is to the north towards the Main Stem, not towards the Arikaree River, which is consistent with Finding 40 that during recent years significant portions of the Haigler Canal Spillback water did not reach the Arikaree Gage.

44. Based on the available information, a significant portion of the water measured at the Haigler Canal Spillback gage, at least during the years since about 2001, does not remain in the Arikaree River as measurable surface water at the Arikaree Gage. While some of the water measured at the Haigler Canal Spillback gage undoubtedly reaches the Arikaree Gage under certain conditions, there is insufficient information to justify changing the Accounting Procedures to reduce the diversions from the North Fork Republican River into the Haigler Canal by the amount of water measured at the Haigler Canal Spillback gage.

45. As a result, the changes proposed by Nebraska to the Accounting Procedures involving VWS calculations for the North Fork of Republican River in Colorado and the Arikaree River are not justified.

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[55] *State of Nebraska's Post-Hearing Brief* at 54.

[56] *Republican River Compact Administration Accounting Procedures and Reporting Requirements*, revised July 2005 (on title page, revised August 10, 2006), § IV.B.4. [*sic*], p. 26.

[57] *State of Nebraska's Post-Hearing Brief* at 54.

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46. Under the current Accounting Procedures, the Nebraska CBCU attributable to the annual diversions from the North Fork Republican River to the Haigler Canal for irrigation in Nebraska is calculated as 60 percent of the total amounts of water diverted as measured at the Haigler Canal Stateline Gage.[58] The remaining 40 percent of the total amounts of water diverted is return flow,[59] which is accounted for as returning to the Main Stem in the calculation of VWS.[60] The second change to the Accounting Procedures involving the Haigler Canal proposed by Nebraska would apportion the return flows from irrigation in Nebraska between the Main Stem, calculated at the Hardy Gage, and the Arikaree River, calculated at the Arikaree Gage, in proportion to the acreage irrigated using water from the Haigler Canal in the Main Stem drainage (51 percent) and the Arikaree River drainage (49 percent).[61]

47. Nebraska proposes the change described in Finding 46 to implement the directive in § IV.B.3. [*sic*][62] of the Accounting Procedures which states:

> The RRCA will investigate whether return flows from the Haigler Canal diversion in Colorado may return to the Arikaree River, not the North Fork of the Republican River, as indicated in the formulas. If there are return flows from the Haigler Canal to the Arikaree River, these formulas will be changed to recognize those returns.

48. The term "return flow" is not defined in the Accounting Procedures but as commonly used, return flow is that part of a diverted flow that is not consumptively used and is returned to its original source or another source of water.[63] In the context of the Accounting Procedures, return flow is that part of a diverted flow returned to the Main Stem and its tributaries as surface water by overland flow or through groundwater discharge.

49. Nebraska's proposal to apportion return flows returned to the Main Stem and the Arikaree River from irrigation in Nebraska in proportion to the acreage irrigated using water from the Haigler Canal in the Main Stem drainage (51 percent) and the Arikaree River drainage (49 percent) is appropriate for that portion of the return flows comprised by overland flow, since overland flow would remain within the drainage where the associated irrigation occurred.

50. Nebraska's proposal to apportion return flows returned to the Main Stem and the Arikaree River in proportion to the acreage irrigated using water from the Haigler Canal in the Main

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[58] *Republican River Compact Administration Accounting Procedures and Reporting Requirements*, revised July 2005 (revised date on title page: August 10, 2006), § IV.B.3. [*sic*], p. 26.

[59] *Id.* at § IV.A.2.a)., p. 20.

[60] *Id.* at § IV.B.3. [*sic*], p. 26; § IV.B.15 [*sic*], p 36.

[61] Nebraska Exhibit 31, Expert Report of James C. Schneider and James R. Williams, *Expert Report on Accounting Issues: Haigler Canal and Groundwater Model Accounting Points*, January 20, 2009, p. 5-6.

[62] § IV.B.1. in Final Settlement Stipulation, Volume 1 of 5, Appendix C.

[63] *See* USGS Water Science Glossary of Terms, http://ga.water.usgs.gov/edu/dictionary.html#main.

Stem drainage and the Arikaree River drainage is not necessarily appropriate for that portion of the return flows comprised by groundwater discharge, since groundwater flow is not constrained to the drainage where the associated irrigation occurs because groundwater level gradients do not necessarily conform to the overlying topographical gradients.

51. Nebraska's expert witness on this issue, Mr. James Williams, did not provide any testimony or other evidence regarding the portion of return flows from irrigation in Nebraska returning to the Main Stem or the Arikaree River as overland flow.

52. Mr. Williams did testify that the soils in the Arikaree drainage near Haigler "tend to be somewhat sandy."[64] Colorado's expert on this issue, Mr. James Slattery, testified that the soils in the Arikaree drainage near Haigler are "extremely sandy" and that because "the majority of this land has been converted over to center pivot sprinklers ... there is just very little surface water runoff ... ."[65] This suggests that there may be minimal return flow to the Arikaree River comprised by overland flow.

53. During the period of years from 1995 through 2006, the annual amounts of water returning to the Arikaree River from irrigation using water from the Haigler Canal, as estimated in accordance with only this change to the Accounting Procedures as proposed by Nebraska,[66] exceeded the actual annual amounts of water measured at the Arikaree Gage by 515 acre-feet (48 percent of the proposed return flow), 767 acre-feet (77 percent of the proposed return flow), 70 acre-feet (6 percent of the proposed return flow), and 385 acre-feet (53 percent of the proposed return flow) for the years 2001, 2002, 2003, and 2004, respectively.[53] Thus, significant portions of the annual amounts of return flow estimated in accordance with Nebraska's proposed change to the Accounting Procedures did not reach the Arikaree Gage during the years 2001 through 2004.

54. When asked whether he knew the direction of groundwater flow in the Haigler area, Mr. Williams testified: "No, I do not."[67]

55. Simulations using the RRCA Groundwater Model indicate that the prevalent direction of groundwater flow under lands irrigated using water from the Haigler Canal in the Haigler area (on the north side of the Arikaree River) is to the north towards the Main Stem, not the Arikaree River.[68]

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[64] Transcript of Arbitration Proceedings, March 17, 2009, Volume VII at 1210:20-1211:8.

[65] Transcript of Arbitration Proceedings, March 18, 2009, Volume VIII at 1360:9-18.

[66] Without reducing the amounts of water measured at the Haiglar Canal Stateline Gage by the amounts of water from the Haiglar Canal Spillback.

[67] *Id.* at 1210:1-3.

[68] *Id.* at 1365:24-1366:7; Colorado Exhibit 11, Expert Report of James E. Slattery, *State of Colorado's Response to Nebraska's Expert Report on Accounting Issues: Haigler Canal and Groundwater Model Accounting Points*, February 16, 2009, p. 5.

56. In its post-hearing brief, Nebraska contends:

> Such a determination [that the prevalent direction of groundwater flow is to the north towards the Main Stem] seems doubtful given that the Groundwater Model uses one-mile cells and the distance between the Haigler Canal and the Republican River is less than one mile. If the Haigler Canal and Republican River are in the same model cell, or even in adjacent cells, no gradient would likely be determined.[69]

However, it is not the location of Haigler Canal that is pertinent to the direction of groundwater flow for that portion of return flows that return from groundwater discharge. Rather, it is the location of the lands irrigated that is pertinent, and the lands irrigated with water from the Haigler Canal are located from one to three miles south of the Republican River. Thus, results from simulations using the RRCA Groundwater Model can be used to estimate the prevalent direction of groundwater return flow under lands irrigated with water from the Haigler Canal.

57. Based on the available information, most of the return flow comprised by groundwater discharge from irrigation in Nebraska using water from the Haigler Canal returns to the Main Stem, not the Arikaree River, at least during the years since 2001. While some of the water measured at the Arikaree Gage may be comprised of return flow from groundwater discharge under certain conditions, there is insufficient information to justify changing the Accounting Procedures to apportion any of the return flow to the Arikaree River.

Accounting Procedures – Groundwater Model Accounting Points

58. Article II of the Republican River Compact defines the Republican River Basin as follows:

> The Basin is all the area in Colorado, Kansas, and Nebraska, which is naturally drained by the Republican River, and its tributaries, to its junction with the Smoky Hill River in Kansas. The main stem of the Republican River extends from the junction near Haigler, Nebraska, of its North Fork and the Arikaree River, to its junction with Smoky Hill River near Junction City Kansas.[70]

59. The "equitable division" or "allocation" of the waters of the Republican River Basin between the States is set forth in Article IV of the Compact, subject to the proportionate adjustment required in Article III. Article IV of the Compact specifies the amounts of water allocated to each state from each source of water in the Republican River Basin and identifies each source of water from which an allocation is made as a named "drainage basin."

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[69] *State of Nebraska's Post-Hearing Brief* at 55.

[70] Republican River Compact, Pub. Law No. 78-60, 57 Stat. 86 (1943); codified at § 82a-518, K.S.A. (2007); App. § 1-106, 2A N.R.S. (1995); and § 37-67-101 C.R.S. (2008).

60. The term "drainage basin" is not defined in the Compact but as commonly used, a drainage basin is a land area where precipitation runs off into streams, rivers, lakes, and reservoirs.[63] A drainage basin ends where there is no longer an area from which precipitation runs off, which corresponds to the lowest point in elevation above which a delineated area is drained. The end of a drainage basin is also located at the point where the collected precipitation runoff discharges into another surface water feature, which is termed the "confluence" when one stream or river joins another stream or river.

61. The "equitable division" or "allocation" of the waters of the Republican River Basin set forth in Article IV of the Compact for a named "drainage basin" is derived from the "computed average annual virgin water supply"[71] originating in that drainage basin, which ends at the confluence of the stream draining that basin and the main stem of the Republican River,[72] as set forth in Article III of the Compact.

62. In § II. of the Accounting Procedures, the term "Designated Drainage Basins" is defined as "the drainage basins of the specific tributaries and the Main Stem of the Republican River as described in Article III of the Compact." The term "Sub-basin" is defined as:

> [T]he Designated Drainage Basins, except for the Main Stem, identified in Article III of the Compact. For purposes of Compact accounting the following Sub-basins will be defined as described below:
>
> > North Fork of the Republican River in Colorado drainage basin is that drainage area above USGS gaging station number 06823000, North Fork Republican River at the Colorado-Nebraska State Line,
> >
> > Arikaree River drainage basin is that drainage area above USGS gaging station number 06821500, Arikaree River at Haigler, Nebraska,
> >
> > Buffalo Creek drainage basin is that drainage area above USGS gaging station number 06823500, Buffalo Creek near Haigler, Nebraska,
> >
> > Rock Creek drainage basin is that drainage area above USGS gaging station number 06824000, Rock Creek at Parks, Nebraska,
> >
> > South Fork of the Republican River drainage basin is that drainage area above USGS gaging station number 06827500, South Fork Republican River near Benkelman, Nebraska,

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[71] Pursuant to the Accounting Procedures, the "computed average annual virgin water supply" is termed the Computed Water Supply (the "CWS"), which equals the VWS reduced by changes in Federal reservoir storage and flood flows. The CWS is used to calculate the allocations between the States (*See Republican River Compact Administration Accounting Procedures and Reporting Requirements*, revised July 2005 [revised date on title page: August 10, 2006], p. 10).

[72] Or the North Fork of the Republican River in Nebraska for the drainage basins specified in the Compact as the "North Fork of the Republican River drainage basin in Colorado" and the "Arikaree River drainage basin."

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> Frenchman Creek (River) drainage basin in Nebraska is that drainage area above USGS gaging station number 06835500, Frenchman Creek in Culbertson, Nebraska,
>
> Driftwood Creek drainage basin is that drainage area above USGS gaging station number 06836500, Driftwood Creek near McCook, Nebraska,
>
> Red Willow Creek drainage basin is that drainage area above USGS gaging station number 06838000, Red Willow Creek near Red Willow, Nebraska,
>
> Medicine Creek drainage basin is that drainage area above the Medicine Creek below Harry Strunk Lake, State of Nebraska gaging station number 06842500; and the drainage area between the gage and the confluence with the Main Stem,
>
> Sappa Creek drainage basin is that drainage area above USGS gaging station number 06847500, Sappa Creek near Stamford, Nebraska and the drainage area between the gage and the confluence with the Main Stem; and excluding the Beaver Creek drainage basin area downstream from the State of Nebraska gaging station number 06847000 Beaver Creek near Beaver City, Nebraska to the confluence with Sappa Creek,
>
> Beaver Creek drainage basin is that drainage area above State of Nebraska gaging station number 06847000, Beaver Creek near Beaver City, Nebraska, and the drainage area between the gage and the confluence with Sappa Creek,
>
> Prairie Dog Creek drainage basin is that drainage area above USGS gaging station number 06848500, Prairie Dog Creek near Woodruff, Kansas, and the drainage area between the gage and the confluence with the Main Stem;

63. In § II. of the Accounting Procedures, the term "Main Stem" is defined as:

> [T]he Designated Drainage Basin identified in Article III of the Compact as the North Fork of the Republican River in Nebraska and the main stem of the Republican River between the junction of the North Fork and the Arikaree River and the lowest crossing of the river at the Nebraska-Kansas state line and the small tributaries thereof, and also including the drainage basin Blackwood Creek;

This definition for "Main Stem" differs from the description of the main stem in Article II of the Compact, as set forth in Finding 58, in that it includes the North Fork of the Republican River in Nebraska and ends at "the lowest crossing of the river at the Nebraska-Kansas state line" rather than at "its junction with the Smoky Hill River in Kansas." However, this definition for "Main Stem" is wholly consistent with the designated drainage basin defined in the next to the last full paragraph in Article III of the Compact.

64. The Accounting Procedures, § III.D.1., specify that CBCU of groundwater

> ... for each Sub-basin will include all depletions and accretions upstream of the confluence with the Main Stem. The values for the Main Stem will include all depletions and accretions in stream reaches not otherwise accounted for in a Sub-basin.

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This is consistent with the allocations made by named drainage basin in Article IV of the Compact as described in Finding 61.

65. In § III.D.2. of the Accounting Procedures, the procedure for determining CBCU of surface water is specified as follows:

> For Sub-basins where the gage designated in Section II. is near the confluence with the Main Stem, each State's Sub-basin Computed Beneficial Consumptive Use of surface water shall be the State's Computed Beneficial Consumptive Use of surface water above the Sub-basin gage. For Medicine Creek, Sappa Creek, Beaver Creek and Prairie Dog Creek, where the gage is not near the confluence with the Main Stem, each State's Computed Beneficial Consumptive Use of surface water shall be the sum of the State's Computed Beneficial Consumptive Use of surface water above the gage, and its Computed Beneficial Consumptive Use of surface water between the gage and the confluence with the Main Stem.

This is consistent with the allocations made by named drainage basin in Article IV of the Compact as described in Finding 61, assuming there is no significant CBCU of surface water downstream from the Sub-basin gages, other than for Medicine Creek, Sappa Creek, Beaver Creek, and Prairie Dog Creek, where CBCU of surface water downstream from each Sub-basin gage is added to the CBCU of surface water above each Sub-basin gage. However, since the CBCU of surface water below the gage in each of these four sub-basins is already included in the amount of water measured at the gage for each Sub-basin, the CBCU of surface water below the gage for each Sub-basin is subtracted from the VWS for that Sub-basin and added to the VWS for the Main Stem,[73] to avoid a double-accounting of water in that Sub-basin.

66. Nebraska has identified four sub-basins where the stream gaging station designated in § II. of the Accounting Procedures is located several miles upstream of the confluence with the Main Stem, where the cell in the RRCA Groundwater Model is used to simulate base flow for determining CBCU of groundwater (the "accounting point"): Frenchman Creek (River) drainage basin in Nebraska, North Fork of the Republican River in Colorado drainage basin, South Fork of the Republican River drainage basin, and Driftwood Creek drainage basin. Nebraska contends that: "A discrepancy is introduced because VWS is calculated by adding streamflow at one location to estimated groundwater impacts at a separate location."[74] Nebraska further contends that this results in "... the potential for some of the surface water passing that gage to then be consumed by the groundwater [pumping] and, in effect, a double-accounting."[75]

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[73] *Republican River Compact Administration Accounting Procedures and Reporting Requirements*, revised July 2005 (revised date on title page: August 10, 2006), § IV.B.11.-14. [*sic*], pp. 30-33.

[74] Nebraska Exhibit 31, Expert Report of James C. Schneider and James R. Williams, *Expert Report on Accounting Issues: Haigler Canal and Groundwater Model Accounting Points*, January 20, 2009, p. 9.

[75] Transcript of Arbitration Proceedings, March 17, 2009, Volume VII at 1220:7-9 (Williams).

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67. Because stream gages must be sited where the hydraulic characteristics of a stream channel are suitable for accurate measurements of streamflow in that channel, stream gages in the named drainage basins for the Republican River are generally not located at their confluences with the Main Stem.[76]

68. Nebraska notes that § II. of the Accounting Procedures defines the "Frenchman Creek (River) drainage basin in Nebraska," "North Fork of the Republican River in Colorado drainage basin," "South Fork of the Republican River drainage basin," and "Driftwood Creek drainage basin," in each instance as being that drainage area above the corresponding gage designated for each Sub-basin. Nebraska asserts that the "accounting points must be moved to match the locations of the gages, and thus the Sub-basin definitions from Appendix C."[77]

69. As described in Findings 60 and 61, the allocations of water made to the States, as specified by the Compact, are made for individual drainage basins, and each drainage basin implicitly ends at the confluence between the stream associated with a particular drainage basin and the Main Stem. The Accounting Procedures provided for by the FSS cannot change the definitions of individual drainage basins implicit in the Compact.[78] For the stated purposes of Compact accounting, the sub-basins as defined in § II. of the Accounting Procedures are appropriate provided adjustments are made such that the VWS is correctly estimated for the drainage basin above the confluence between the stream associated with a particular drainage basin and the Main Stem.

70. For the "Frenchman Creek (River) drainage basin in Nebraska," "South Fork of the Republican River drainage basin," and "Driftwood Creek drainage basin," moving the accounting points for determining the CBCU of groundwater to correspond to the locations of the gages designated in § II. of the Accounting Procedures would result in the CBCU of groundwater between a designated gage and the confluence of that Sub-basin's stream with the Main Stem being included in the CBCU for the Main Stem rather than in the CBCU for the tributary drainage basins. These changes would be inconsistent with the definitions of these drainage basins implicit in Article III of the Compact and are not appropriate.

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[76] Colorado Exhibit 11, Expert Report of James E. Slattery, *State of Colorado's Response to Nebraska's Expert Report on Accounting Issues: Haigler Canal and Groundwater Model Accounting Points*, February 16, 2009, p. 7.

[77] Nebraska Exhibit 31, Expert Report of James C. Schneider and James R. Williams, *Expert Report on Accounting Issues: Haigler Canal and Groundwater Model Accounting Points*, January 20, 2009, p. 9.

[78] *See* § I.D. of the FSS, which provides that:

> The States agree that this Stipulation and the Proposed Consent Judgment are not intended to, nor could they, change the States' respective rights and obligations under the Compact. The States reserve their respective rights under the Compact to raise any issue of Compact interpretation and enforcement in the future.

71. However, to the extent groundwater pumping causes depletions to streamflows downstream of the gages designated in § II. of the Accounting Procedures for the "Frenchman Creek (River) drainage basin in Nebraska," "South Fork of the Republican River drainage basin," and "Driftwood Creek drainage basin," and upstream of the confluence of each associated stream with the Main Stem, the current Accounting Procedures for estimating VWS result in a double-accounting of these depletions. The measured streamflow at each of these Sub-basin gages already includes the amount of the streamflow depletion between the gage for each Sub-basin and the confluence of the stream for each Sub-basin with the Main Stem. Adding the CBCU of groundwater between the gage for a particular Sub-basin and the confluence of that Sub-basin's stream with the Main Stem to the measured streamflow at that gage counts the same water twice in calculating VWS,[79] and is not appropriate.

72. While it is not appropriate to move the accounting points as described in Finding 70, the RRCA should modify the Accounting Procedures for the "Frenchman Creek (River) drainage basin in Nebraska," "South Fork of the Republican River drainage basin," and "Driftwood Creek drainage basin," to subtract the CBCU of groundwater below the designated gage for each Sub-basin and above the confluence of that Sub-basin's stream with the Main Stem from the VWS for that Sub-basin, to avoid double-accounting, and add that increment of groundwater CBCU in the VWS for the Main Stem, such as is currently done in accounting for the CBCU of surface water below the Sub-basin gages for Medicine Creek, Sappa Creek, Beaver Creek, and Prairie Dog Creek.

73. At the hearing and in its post-trial brief, Colorado asserts that the Special Master appointed by the Court in *Kansas v. Nebraska and Colorado*, No. 126, Original, made a specific finding that the Republican River is formed at the junction of the Arikaree River and the North Fork of the Republican River, near Haigler, Nebraska,[80] which Colorado uses as the basis for its contention that the current accounting point for the North Fork of the Republican River is at the correct location. The statement made by the Special Master quoted by Colorado occurs in the First Report of the Special Master (Subject: Nebraska's Motion to Dismiss) at the beginning of § II. titled "BACKGROUND" (on page 6) and is simply a restatement of the description of the Republican River Basin from Article II of the Compact, as partially set forth in Finding 58. The Special Master's statement can not be a "finding" that the Main Stem of the Republican River begins at the junction of the Arikaree River and the North Fork of the Republican River for Compact accounting purposes pursuant to the FSS when Article III of the Compact explicitly defines two separate drainage basins, from which allocations of water are made in Article IV that include the North Fork: "North of the Republican River drainage basin in Colorado" and "The North Fork of the Republican River in Nebraska and the main stem of the Republican River between the junction of the North Fork and Arikaree River and the lowest crossing of the river at the Nebraska-Kansas state line and the small tributaries thereof ... ." The latter drainage basin is the Main Stem in § II. of the Accounting

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[79] *Republican River Compact Administration Accounting Procedures and Reporting Requirements*, revised July 2005 (revised date on title page: August 10, 2006), § IV.B.7.-9. [*sic*], pp. 28-29.

[80] Transcript of Arbitration Proceedings, March 17, 2009, Volume VII at 1205:2-22 (Williams); *State of Colorado's Post-Trial Brief* at 54.

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Procedures, which were incorporated in the FSS and as part of the FSS were found by the Special Master to be "... in all respects compatible with the controlling provisions and purposes of the Compact."[81]

74. The accounting point currently used to determine the CBCU of groundwater in the "North Fork of the Republican River in Colorado drainage basin" is not located at the confluence with the Main Stem, as the Main Stem is defined in Section II. of the Accounting Procedures and set forth in Finding 63. This is inconsistent with the explicit meaning of the "North Fork of the Republican River drainage basin in Colorado" in Article III of the Compact and results in CBCU of groundwater in Kansas and Nebraska that should be included in the CBCU for the Main Stem being included instead in the CBCU for the "North Fork of the Republican River in Colorado drainage basin."

75. The accounting point used to determine the CBCU of groundwater in the "North Fork of the Republican River in Colorado drainage basin" should be moved to the cell of the RRCA Groundwater Model in which the North Fork of the Republican River crosses the Colorado-Nebraska state line. This will result in reduced VWS for the "North Fork of the Republican River in Colorado drainage basin" to the extent of "GWk" and "GWn" between the Colorado-Nebraska state line and the confluence between the North Fork of the Republican River in Nebraska and the Arikaree River.[82] This will also result in increased VWS for the Main Stem by the same amounts.

76. The changes to the Accounting Procedures described in Findings 72 and 75 should apply to all years for which the accounting of water use has not been finalized and approved by the RRCA. This is consistent with the positions of both Colorado and Nebraska[83] (Kansas did not address this issue). This is also consistent with the decision of the Special Master.[84]

Damages – Losses to Kansas Water Users from Overuse in Nebraska

77. Subsection V.B.2.a. of the FSS explicitly requires that:

> a. During Water-Short Year Administration, Nebraska will limit its Computed Beneficial Consumptive Use above Guide Rock to not more than Nebraska's Allocation that is derived from sources above Guide Rock, and Nebraska's share of

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[81] Second Report of the Special Master (Subject: Final Settlement Stipulation), *Kansas v. Nebraska and Colorado*, No. 126, Original, April 15, 2003, p. 3.

[82] *See Republican River Compact Administration Accounting Procedures and Reporting Requirements*, revised July 2005 (revised date on title page: August 10, 2006), § IV.B.3. [*sic*], p. 26.

[83] *State of Colorado's Post-Trial Brief* at 56; *State of Nebraska's Post-Hearing Brief* at 57.

[84] Second Report of the Special Master (Subject: Final Settlement Stipulation), *Kansas v. Nebraska and Colorado*, No. 126, Original, April 15, 2003, p. 32.

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any unused portion of Colorado's Allocation (no entitlement to Colorado's unused Allocation is implied or expressly granted by this provision).[85]

Subsection V.B.2.e. of the FSS provides that:

> e. For purposes of determining Nebraska's compliance with Subsection V.B.2.:
>
> i. Virgin Water Supply, Computed Water Supply, Allocations and Computed Beneficial Consumptive Use will be calculated on a two-year running average, as computed above Guide Rock, with any Water-Short Year Administration year treated as the second year of the two-year running average and using the prior year as the first year;[86]

Subsection V.B.2.e. of the FSS does not explicitly address the **amount** of the violation when Nebraska is not in compliance with § V.B.2. based on calculated two-year running averages for Virgin Water Supply, Computed Water Supply, Allocations, and Computed Beneficial Consumptive Use.

78. The States agreed "to implement the obligations and agreements in this Stipulation in accordance with the schedule attached hereto as Appendix B."[87] Appendix B of the FSS unambiguously sets the "First year Water-Short Year Administration compliance" as 2006.[88]

79. Nebraska does not deny that it exceeded its basin-wide allocations in 2005 and 2006[89] and its Water-Short Year allocations above Guide Rock in 2005 and 2006,[90] based on the Accounting Procedures currently approved by the RRCA, although Nebraska disagrees with the amount of the violations estimated by Kansas for 2006.

80. Based on the accounting approved by the RRCA for 2005, Nebraska exceeded its 2005 Water-Short Year Administration allocation above Guide Rock by 42,860 acre-feet, when the evaporation from Non-Federal Reservoirs below Harlan County Lake is included.[91] Kansas' estimate of the amount of Nebraska's exceedance of its 2006 Water-Short Year Administration allocation above Guide Rock is 36,100 acre-feet, using data approved by the

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[85] Final Settlement Stipulation, Volume 1 of 5, p. 28.

[86] *Id.*, p. 30.

[87] *Id.*, p. 1.

[88] *Id.*, p. B1.

[89] *State of Nebraska's Post-Hearing Brief* at 4.

[90] Nebraska Exhibit 8, Expert Report of Marc Groff, Tom Riley, and David Kracman, *Review of the 20 January 2009 Report Prepared by Spronk Water Engineers, Inc for the State of Kansas*, February 17, 2009, Table 2-2, p. 5.

[91] Kansas Exhibit 1, Expert Report of Dale Book, *Engineering Analysis of Losses to Kansas Water Users Resulting from Overuse of Republican River Supply in Nebraska*, January 20, 2009, Attachment 1.

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RRCA.[92] The total of Nebraska's exceedance in 2005 and in 2006, as estimated by Kansas, is 78,960 acre-feet.

81. The basin-wide exceedance by Nebraska in 2005, based on the accounting approved by the RRCA for 2005, is 42,330 acre-feet.[93] The two-year running average of Nebraska's exceedance of its Water-Short Year Administration allocation above Guide Rock for 2006, using the exceedance estimated by Kansas for 2006, is 39,480 acre-feet.[94] The total of Nebraska's basin-wide exceedance in 2005 and the two-year running average of Nebraska's exceedance of its Water-Short Year Administration allocation above Guide Rock for 2006, using the exceedance estimated by Kansas for 2006, is 81,810 acre-feet. This total amount is greater than the sum of Nebraska's basin-wide exceedance in 2005 and Nebraska's exceedance of its Water-Short Year Administration allocation above Guide Rock in 2006 only, as estimated by Kansas, by 3,380 acre-feet.[95] The total amount of 81,810 acre-feet is also greater than the sum of Nebraska's exceedance of its Water-Short Year Administration allocation above Guide Rock in 2005 and in 2006, as estimated by Kansas, by 2,850 acre-feet.[96]

82. Because § V.B.2.e. of the FSS explicitly provides for using two-year running averages for Virgin Water Supply, Computed Water Supply, Allocations, and Computed Beneficial Consumptive Use to determine whether Nebraska is in compliance with § V.B.2. but does not explicitly address the amount of the violation when Nebraska is not in compliance with § V.B.2. and based on the comparisons in Finding 81, the two-year average of Nebraska's exceedance of its Water-Short Year Administration allocation above Guide Rock for 2006 should not be used to determine the amount of Nebraska's violation for 2006. Rather, the amount of Nebraska's violation for 2006 should be equal to Nebraska's exceedance of its 2006 Water-Short Year Administration allocation above Guide Rock. Similarly, the amount of Nebraska's violation for 2005 should be equal to Nebraska's exceedance of its 2005 Water-Short Year Administration allocation above Guide Rock. Both Kansas and Nebraska used Nebraska's exceedance of its Water-Short Year Administration allocation above Guide Rock for both 2005 and 2006 to establish the amount Nebraska's violation during these years,[91, 90] although Kansas estimates the amount of the 2006 violation as being 36,100 acre-feet whereas Nebraska estimates the amount of the 2006 violation as being 28,615 acre-feet, a difference of 7,485 acre-feet.

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[92] *Id.*

[93] Kansas Exhibit 1, Expert Report of Dale Book, *Engineering Analysis of Losses to Kansas Water Users Resulting from Overuse of Republican River Supply in Nebraska*, January 20, 2009, Attachment 2.

[94] (42,860 acre-feet + 36,100 acre-feet) / 2.

[95] 81,810 acre-feet – (42,330 acre-feet + 36,100 acre-feet).

[96] 81,810 acre-feet – 78,960 acre-feet.

83. The primary reason for the difference of 7,485 acre-feet between Kansas' estimate of Nebraska's 2006 violation and Nebraska's estimate is the assignment of evaporation from Harlan County Lake. Kansas assigned evaporation to both Kansas and Nebraska,[91] whereas Nebraska assigned 100 percent of the Harlan County Lake evaporation to Kansas since only KBID diverted water from Harlan County Lake in 2006.[97]

84. In the *Arbitrator's Final Decision on Legal Issues*, which is attached hereto, the Arbitrator decided the following concerning Question 3:

> The current Republican River Compact Administration Accounting Procedures allocate evaporative losses from Harlan County Lake entirely to Kansas when the Kansas Bostwick Irrigation District is the only entity actually diverting stored water from Harlan County Lake for irrigation.[98]

This decision was based on the assumption that Nebraska did not "[choose] to substitute supply for the Superior Canal from Nebraska's allocation below Guide Rock" in 2006 pursuant to § IV.A.e)(1) of the Accounting Procedures. The Arbitrator made this assumption because in their respective briefs on legal issues, neither Kansas nor Nebraska identified Nebraska's use of substitute supply for the Superior Canal from Nebraska's allocation below Guide Rock in 2006.

85. On the last day of the arbitration hearing, Kansas introduced as its Exhibit 84 a copy of a 2006 letter from Nebraska which stated the following:

> As identified in the Final Settlement Stipulation Section V.B.2.d., Nebraska is advising you of the following measures Nebraska plans to take in anticipation of a Water Short Year. The measures are cited by the corresponding Section in the Final Settlement Stipulation:
>
> > V.B.2.a.i. – "supplementing water for Nebraska Bostwick Irrigation District by providing alternate supplies from below Guide Rock or from outside the Basin". Nebraska intends to enter into an agreement with the Nebraska Bostwick Irrigation District whereby it is unlikely that Superior Canal will be diverting surface water during 2006. ... Some irrigators in the Superior Canal surface water delivery area will be using an alternate supply from ground water wells located below Guide Rock Diversion Dam.[99]

This fact was not known by the Arbitrator when he decided Question 3.

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[97] Nebraska Exhibit 26, Electronic Data for Expert Report of Marc Groff, Tom Riley, and David Kracman, *Review of the 20 January 2009 Report Prepared by Spronk Water Engineers, Inc for the State of Kansas*, February 17, 2009, Excel Workbook *NE 2006 Corrected*, Tab *Fed_Reservoir*.

[98] *Arbitrator's Final Decision on Legal Issues* at 10.

[99] Kansas Exhibit 84, Letter from Ann Bleed, Acting Director, Nebraska Department of Natural Resources, to Hal Simpson, Colorado State Engineer, David Pope, Kansas Chief Engineer, and Steve Raunshagen, Acting Area Manager, Great Plains Region (USBR), May 1, 2006, p. 1.

86. In light of Finding 85 and given the explicit provision in § IV.A.e)(1) of the Accounting Procedures pertaining to use of substitute supplies for the Superior Canal from Nebraska's allocation below Guide Rock, a portion of the 2006 evaporation from Harlan County Lake should be assigned to Nebraska.

87. The actual amount of groundwater diverted from wells below Guide Rock in 2006 is unknown,[100] which prevents a proportionate determination of the amount of Harlan County Lake evaporation in 2006 that should be assigned to Nebraska. However, for 2005 the allocation of net evaporation for Harlan County Lake between Kansas and Nebraska was very nearly 50 percent for each state.[101] Equally splitting the 2006 evaporation from Harlan County Lake between Kansas and Nebraska using Kansas' 2006 net evaporation of 16,298 acre-feet[102] or Nebraska's 2006 net evaporation of 16,182 acre-feet[103] would increase Nebraska's estimate of its Water-Short Year Administration exceedance above Guide Rock in 2006 by about 8,100 acre-feet, for a total violation in 2006 of about 36,715 acre-feet. This revised estimate of Nebraska's 2006 exceedance is sufficiently close to Kansas' estimate of the 2006 violation of 36,100 acre-feet to justify acceptance of Kansas' estimate, which allocated evaporation from Harlan County Lake "... based on long-term average uses."[104]

88. To provide a basis for estimating the direct economic impacts to Kansas caused by Nebraska's exceedance of its Water-Short Year allocation above Guide Rock, the additional amount of water that should have been available for use in Kansas was routed in accounting simulations by the experts for Kansas and Nebraska to where the direct economic of impacts of the shortages occurred: the farm headgates in KBID and downstream of KBID. To perform these simulations the experts for both Kansas and Nebraska assumed that the additional amount of water that should have been available for use in Kansas was regulated through Harlan County Lake.[105, 106]

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[100] *Kansas' Post-Trial Brief* at 14.

[101] Nebraska Exhibit 26, Electronic Data for Expert Report of Marc Groff, Tom Riley, and David Kracman, *Review of the 20 January 2009 Report Prepared by Spronk Water Engineers, Inc for the State of Kansas*, February 17, 2009, Excel Workbook *NE 2005 With Comment*, Tab *Fed_Reservoir*.

[102] Kansas Exhibit 1, Expert Report of Dale Book, *Engineering Analysis of Losses to Kansas Water Users Resulting from Overuse of Republican River Supply in Nebraska*, January 20, 2009, Appendix A.

[103] Nebraska Exhibit 26, Electronic Data for Expert Report of Marc Groff, Tom Riley, and David Kracman, *Review of the 20 January 2009 Report Prepared by Spronk Water Engineers, Inc for the State of Kansas*, February 17, 2009, Excel Workbook *NE 2006 Corrected*, Tab *Fed_Reservoir*.

[104] *Kansas' Post-Trial Brief* at 14.

[105] Kansas Exhibit 1, Expert Report of Dale Book, *Engineering Analysis of Losses to Kansas Water Users Resulting from Overuse of Republican River Supply in Nebraska*, January 20, 2009, p. 2.

[106] Nebraska Exhibit 8, Expert Report of Marc Groff, Tom Riley, and David Kracman, *Review of the 20 January 2009 Report Prepared by Spronk Water Engineers, Inc for the State of Kansas*, February 17, 2009, p. 6.

89. Nebraska's experts used the same methods as Kansas' expert to estimate the additional net evaporation from Harlan County Lake in 2005 and 2006 that would have resulted from the additional supplies that should have been available for release from Harlan County Lake for use in Kansas.[107] Also, Nebraska's experts and Kansas' expert both assumed that the conveyance losses between Harlan County Lake and the diversion to the Courtland Canal, which conveys water to KBID, were insignificant in 2005 and 2006.[108, 109]

90. To estimate the conveyance losses between the Courtland Canal diversion and the Nebraska-Kansas state line, Kansas' expert used the procedure for determining Courtland Canal losses between the diversion and the state line chargeable to Kansas CBCU as specified in § IV.B.13. of the Accounting Procedures.[110, 111] The Accounting Procedures specify that:

> The allocation of transportation losses in the Courtland Canal above Lovewell between Kansas and Nebraska shall be done by the Bureau of Reclamation and reported in their "Courtland Canal Above Lovewell" spreadsheet. Deliveries and losses associated with deliveries to both Nebraska and Kansas above Lovewell shall be reflected in the Bureau's Monthly Water District reports. Losses associated with delivering water to Lovewell shall be separately computed.
>
> Amount of transportation loss of the Courtland Canal deliveries to Lovewell that does not return to the river, charged to Kansas shall be 18% of the Bureau's estimate of losses associated with these deliveries.[112]

The above provision sets the amounts of conveyance losses from Courtland Canal deliveries to Lovewell Reservoir that do not "return to the river," which are chargeable to Kansas CBCU, at 18 percent. The amounts of conveyance losses from Courtland Canal deliveries to Kansas irrigators above Lovewell Reservoir that are chargeable to Kansas CBCU are to equal "1-%BRF," where %BRF is defined as "Percent of Diversion from Bureau Canals that returns to the stream."[113]

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[107] *Id.*

[108] *Id.*, p. 7.

[109] Kansas Exhibit 1, Expert Report of Dale Book, *Engineering Analysis of Losses to Kansas Water Users Resulting from Overuse of Republican River Supply in Nebraska*, January 20, 2009, Appendix B (Note that the only "Additional Transportation Losses" are for water diverted to the Upper Courtland unit and for water diverted for delivery to Lovewell Reservoir).

[110] *Id.*, p. 2.

[111] *Republican River Compact Administration Accounting Procedures and Reporting Requirements*, revised July 2005 (on title page, revised August 10, 2006), § IV.B.15. [*sic*], p. 33-34.

[112] *Id.*, p. 34.

[113] *Id.*, p. 25.

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91. The losses from the Courtland Canal assigned to Kansas in 2005 and 2006 for deliveries to Kansas irrigators and for deliveries to Lovewell Reservoir adopted by Kansas' expert[114] are the same as those reported for 2005 and 2006 in the RRCA Compact accounting spreadsheets provided by Nebraska's experts,[115] which reference the Bureau of Reclamation as the source. For 2005 those losses total 8,651 acre-feet, and for 2006 the losses total 12,158 acre-feet.

92. The RRCA Compact accounting spreadsheets provided by Nebraska's experts confirm that for 2005 and 2006, 18 percent of the conveyance losses from Courtland Canal deliveries to Lovewell Reservoir were attributed to Kansas CBCU.[116] The spreadsheets also show that for 2005 and 2006, 18 percent of the conveyance losses from Courtland Canal deliveries to Kansas irrigators above Lovewell Reservoir, referred to as "Upper Courtland", "does not recharge"[117] as adopted by Kansas' expert[118]. Therefore, %BRF for both 2005 and 2006 was 82 percent.

93. Kansas' expert assumed that only the conveyance losses that do not recharge (i.e., consumptive losses) were lost from the Courtland Canal. As a result, Kansas' expert estimated that the additional amount of water that would have been available at the Nebraska-Kansas state line in 2005 for delivery to Kansas irrigators, but for Nebraska's overuse, would equal the amount of Nebraska's exceedance (42,860 acre-feet), less the additional net evaporation from Harlan County Lake (1,341 acre-feet), and less the average of the conveyance losses "that do not recharge (18%)" as a percentage of Courland Canal diversions over the period 1995 through 2006 (968 acre-feet), for an adjusted additional supply of 40,551 acre-feet (rounded to 40,600 acre-feet).[119] Using this same procedure for 2006, Kansas' expert estimated an adjusted additional supply of 32,605 acre-feet (rounded to 32,600 acre-feet). These are the additional amounts of water Kansas' expert assumed would be available in the Courtland Canal at the Nebraska-Kansas state line for delivery to KBID in 2005 and 2006.[120] This assumption is incorrect.

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[114] Kansas Exhibit 1, Expert Report of Dale Book, *Engineering Analysis of Losses to Kansas Water Users Resulting from Overuse of Republican River Supply in Nebraska*, January 20, 2009, Appendix B.

[115] Nebraska Exhibit 26, Electronic Data for Expert Report of Marc Groff, Tom Riley, and David Kracman, *Review of the 20 January 2009 Report Prepared by Spronk Water Engineers, Inc for the State of Kansas*, February 17, 2009, Excel Workbooks *NE 2005 With Comment* and *NE 2006 Corrected*, Tab *CourtlandAvLove*.

[116] *Id.*, Tab *MAINSTEM*.

[117] *Id.*

[118] Kansas Exhibit 1, Expert Report of Dale Book, *Engineering Analysis of Losses to Kansas Water Users Resulting from Overuse of Republican River Supply in Nebraska*, January 20, 2009, Appendix B.

[119] *Id.*

[120] *Id.*, Table 1.

94. As described in Finding 91, the total amounts lost from the Courtland Canal in Nebraska in 2005 and 2006 were 8,651 acre-feet and 12,158 acre-feet, respectively. Because these amounts of water were lost from the Courtland Canal in Nebraska, these amounts of water could not be in the Courtland Canal at the Nebraska-Kansas state line, even though only 18 percent of these losses (the consumptive losses) were allocated to Kansas CBCU. Therefore, the actual amounts of water presumably determined by the Bureau of Reclamation to be available in the Courtland Canal at the Nebraska-Kansas state line for delivery to KBID in 2005 and 2006 were 40,086 acre-feet[121] and 38,473 acre-feet,[122] respectively, not the amounts of 47,180 acre-feet and 48,442 acre-feet implied by the flawed assumption of Kansas' expert.

95. Applying the computational methodology used by Kansas' expert to estimate the additional amounts of water that would have been available in the Courtland Canal at the Nebraska-Kansas state line in 2005 and 2006 for delivery to KBID, but using the average of the total conveyance losses as a percentage of Courland Canal diversions over the period 1995 through 2006 instead of the average of the conveyance losses that do not recharge as a percentage of Courland Canal diversions, results in adjusted additional supplies of 36,143 acre-feet[123] and 29,060 acre-feet,[124] respectively.

96. Some, if not all, of the amounts of water equal to the differences between the revised estimates in Finding 95 and the estimates of Kansas' expert described in Finding 93 (i.e., non-consumptive losses of 4,408 acre-feet for 2005 and 3,545 acre-feet for 2006) would reasonably be assumed to be available to Kansas as groundwater and as additional flow in the Republican River. There is insufficient information in the record to allow a reasonably reliable estimate of how this additional groundwater and flow in the Republican River might have been used in Kansas. However, it is not reasonable to assume these amounts of water would have been available to KBID at the Nebraska-Kansas state line from the Courtland Canal. Kansas' expert has overstated the additional amounts of water that would have available to KBID at the Nebraska-Kansas state line from the Courtland Canal, but for Nebraska's overuse in 2005 and 2006, by at least approximately 12 percent.

97. Nebraska's experts use a different approach to estimate the additional amounts of water that would have available to KBID at the Nebraska-Kansas state line from the Courtland Canal in

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[121] 48,737 acre-feet less total losses of 8,651 acre-feet. This equals the quantity of water at Courtland Canal 15.1 in Nebraska Exhibit 26, Electronic Data for Expert Report of Marc Groff, Tom Riley, and David Kracman, *Review of the 20 January 2009 Report Prepared by Spronk Water Engineers, Inc for the State of Kansas*, February 17, 2009, Excel Workbook *NE 2005 With Comment*, Tab *CourtlandAvLove*.

[122] 50,631 acre-feet less total losses of 12,158 acre-feet. This equals the quantity of water at Courtland Canal 15.1 in Nebraska Exhibit 26, Electronic Data for Expert Report of Marc Groff, Tom Riley, and David Kracman, *Review of the 20 January 2009 Report Prepared by Spronk Water Engineers, Inc for the State of Kansas*, February 17, 2009, Excel Workbook *NE 2006 Corrected*, Tab *CourtlandAvLove*.

[123] 42,860 acre-feet, less additional net evaporation of 1,341 acre-feet, less total additional losses of 5,376 acre-feet.

[124] 36,100 acre-feet, less additional net evaporation of 2,717 acre-feet, less total additional losses of 4,323 acre-feet.

2005 and 2006, but for Nebraska's overuse in those years.[125] While the methodology employed by Nebraska's experts properly excluded all of the estimated canal losses from the Courtland Canal in Nebraska, Nebraska's experts made no attempt to estimate the amounts of canal losses that would have been available to Kansas as groundwater or as additional flow in the Republican River. Nebraska's experts have understated the additional amounts of water that would have available to Kansas below the Nebraska-Kansas state line in 2005 and 2006.

Damages – Direct Economic Impacts

98. To estimate the economic impacts (damages) incurred by irrigators within KBID and downstream of KBID caused by overuse of water by Nebraska in 2005 and 2006, Kansas' experts estimated the difference in irrigated and non-irrigated crop mix and yields between: (1) the crop mix and yields Kansas' experts projected would have been realized, had overuse not occurred in Nebraska and irrigators in Kansas received the full amount of water to which they were entitled under the FSS; and (2) the reported crop mix and yields realized by impacted Kansas farmers in 2005 and 2006. The crop prices used by Kansas' experts to estimate the direct economic impacts as lost profits were the same for (1) and (2).[126]

99. To project irrigated crop yields that would have been realized, had overuse of water by Nebraska not occurred, Kansas' experts utilized a crop-yield model called IPYsim, which is named after irrigation and precipitation yield simulation.[127] While based in part on crop-yield-water-response functions reported in Stone et al., 2006[128] ("Stone's response functions"),[129] IPYsim differs from Stone's response functions in at least four respects that are important. First, Stone's response functions were based on the response of crop yield to precipitation and irrigation only,[130] whereas the version of IPYsim employed by Kansas' experts includes not only crop-yield response to precipitation and irrigation but also includes

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[125] Nebraska Exhibit 8, Expert Report of Marc Groff, Tom Riley, and David Kracman, *Review of the 20 January 2009 Report Prepared by Spronk Water Engineers, Inc for the State of Kansas*, February 17, 2009, pp. 7-10.

[126] Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 178:24-179:4 (Kastens).

[127] Kansas Exhibit 5, Expert Report of Dr. Bill Golden et al., *Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, January 20, 2009, p. 2.

[128] Loyd Stone is a Professor of Agronomy at Kansas State University and was a rebuttal expert for Kansas in *Kansas v. Colorado*, No. 105, Original. The Special Master appointed by the U. S. Supreme Court in this matter, Arthur L. Littleworth, believed that "Professor Stone's testimony is entitled to great weight." *See* Third Report of Special Master Littleworth, August 2000, p. 56.

[129] *Id.*; Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 179:7-16 (Kastens).

[130] *See* Kansas Exhibit 18, *Water Supply: Yield Relationships Developed for Study of Water Management*, L. R. Stone, et al., Journal of Natural Resources & Life Sciences Education, Volume 35, 2006, p. 162.

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crop-yield response to total usable nitrogen.[131, 132] Second, Stone's response functions do not include economic considerations,[133] whereas IPYsim incorporates both nitrogen fertilizer costs (average nitrogen fertilizer to crop price ratio by crop observed over the 1994-2000 time period) and water costs (after accounting for delivery efficiency).[134] Third, Kansas' experts adjusted the IPYsim response functions, as described in Finding 103, and did not provide any information to verify the reasonableness of the resulting response functions that were then used to assess impacts, whereas Stone's response functions were based on empirical relationships; that is, relationships based on observations that can be verified or disproved by observation or experiment.[135] Fourth, Stone's response functions in Kansas' Exhibit 18 were not developed or used to assess economic impacts. Rather Stone's response functions were developed "for use in water resource education."[136] While Stone's response functions may be "similar in all material respects" to those used in *Kansas v. Colorado*, No. 105, Original, the IPYsim crop-yield response functions employed by Kansas' experts in this arbitration proceeding are not,[137] contrary to Kansas' assertion in its closing brief.[138]

100. The IPYsim response functions are quadratic and of the mathematical form: $Y = A + BX - CX^2$ where for a particular crop Y is the calculated yield, A, B, and C are positive numerical constants, and X is the level of crop input.[139] With this quadratic form, as X increases Y

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131 Kansas Exhibit 5, Expert Report of Dr. Bill Golden et al., *Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, January 20, 2009, p. 2; Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 180:3-9 (Kastens); Kansas Exhibit 17, *Background for KSU-NPI_CropBudgets.xls*, January 2009, p. 4 (referenced in FN 1 of Kansas Exhibit 5, p. 2).

132 When asked what effect the inclusion of phosphate would have on his analysis, as is done in a newer version of IPYsim, Dr. Kastens testified:

> Actually, I can't even answer the effect the nitrogen has on the analysis in terms of the magnitude, say, of the moneys owed. I have not done that. Too [*sic*] me – and I'm not even sure that I have the intuition, without going back and studying it and analyzing it, what that would do.

Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 201:2-11.

133 Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 173:11-16 (Kastens).

134 Kansas Exhibit 5, Expert Report of Dr. Bill Golden et al., *Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, January 20, 2009, p. 6.

135 Kansas Exhibit 18, *Water Supply: Yield Relationships Developed for Study of Water Management*, L. R. Stone, et al., Journal of Natural Resources & Life Sciences Education, Volume 35, 2006.

136 *Id.*, p. 162.

137 *See* Third Report of Special Master Littleworth, August 2000, p. 47-48.

138 *Kansas' Post-Trial Brief* at 21.

139 Kansas Exhibit 17, *Background for KSU-NPI_CropBudgets.xls*, January 2009, p. 4 (referenced in FN 1 of Kansas Exhibit 5, p. 2).

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increases at a diminishing rate until Y reaches its maximum value, after which Y begins to decrease as X increases. The response functions have a horizontal slope when Y is at its maximum value for a particular crop. Kansas' experts call this point "the maximum of the quadratic plateau function that defines yield,"[140] and the response function for a particular crop is adjusted such that when Y is at its maximum value, it equals what Kansas' experts term the "yield goal",[141] which is defined as "the expected crop yield given that neither nitrogen fertilizer nor water is limiting."[142]

101. The "yield goal" is determined using IPYsim by assuming that the economically optimal yield for a particular crop, considering costs for nitrogen fertilizer and irrigation water, equals what the Kansas' experts term "trend yield" for that crop.[143] As a result of this assumption, the "trend yield" for a particular crop must be less than or equal to the calculated "yield goal" for that crop. The "trend yield" was determined by fitting a linear trend line through the observed yields by year for each crop within KBID (excluding ensilage) for the years 1962 through 2006, including or excluding yields during water-short years to derive the maximum yield along the trend line for the year 2006. The resulting "trend yield" was used for 2006 as well as 2005.[144]

102. The IPYsim response functions for each crop (excluding ensilage), adjusted such that the "trend yield" equaled the economically optimal yield, as described in Finding 101, were then used to simulate yields assuming KBID irrigators could have all of the irrigation water they desired during 2005 and 2006 ("full irrigation") and to simulate yields for the actual water available during 2005 and 2006.[145] (It is not clear why Kansas' experts assumed KBID irrigators could have all of the irrigation water they desired instead of assuming KBID irrigators would have received the quantity of water to which they were entitled had there been no overuse of water by Nebraska, although adjustments were subsequently made to account for this difference.)[146]

103. For each crop in the areas above and below Lovewell Reservoir, the actual crop yields reported for KBID were then multiplied by the ratio of the "full irrigation" yield simulated by

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[140] Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 183:8-10 (Kastens).

[141] *Id.*

[142] Kansas Exhibit 5, Expert Report of Dr. Bill Golden et al., *Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, January 20, 2009, p. 6.

[143] *Id.*

[144] *Id.*

[145] *Id.*, p. 7.

[146] *Id.*, p. 9; Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 186:4-15 (Kastens).

IPYsim divided by the yield simulated for the actual amount of irrigation water received to derive what Kansas' experts term the fully irrigated "expected yield."[147] The effect of this adjustment is to change the shape of the IPYsim response functions for each crop, assuming the Y intercept of the function does not change, and to increase the "yield goal." For corn in 2005,[148] for which the actual yield was 187 bushels/acre, this adjustment results in a fully irrigated "expected yield" of 206 bushels/acre. If the relationship between fully irrigated yield and "yield goal" remains proportionate or nearly proportionate, a fully irrigated "expected yield" of 206 bushels/acre implies a "yield goal" of 212 bushels/acre. Both the fully irrigated "expected yield" of 206 bushels/acre and the implied "yield goal" of 212 bushels/acre are close to the yield for maximum crop ET for corn from Stone et al., 2006, 14.0 megagrams/hectare or 222 bushels/acre.[149]

104. Kansas' experts did not use the adjustment procedure described in Finding 103 to derive the fully irrigated "expected yield" for crops above Lovewell Reservoir in 2005 and instead assumed the "expected yield" values above Lovewell Reservoir were the same as those derived for crops below Lovewell Reservoir.[150] Kansas' experts did not state why this assumption was made, but applying the adjustment procedure described in Finding 103 for corn in 2005 above Lovewell Reservoir would result in a fully irrigated "expected yield" of 258 bushels/acre, which is nearly 40 percent higher than the highest historical yield of 187 bushels/acre as of 2006 and more than 15 percent higher than the yield for maximum crop ET for corn from Stone et al., 2006, which is clearly not reasonable.

105. The fully irrigated "expected yield" is associated with the expectation of irrigators in KBID that all of the irrigation water "economically desired" would be available, which is more than the amount of water KBID irrigators would have received had there been no overuse of water in Nebraska.[151] Therefore Kansas' experts revised the "expected yield" for each crop downward to the yields simulated using the IPYsim crop response functions that would have been realized for amounts of irrigation water equal to the actual amounts received plus the

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147 Kansas Exhibit 5, Expert Report of Dr. Bill Golden et al., *Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, January 20, 2009, p. 7 and Table 10.

148 Kansas' experts identified corn as the most appropriate crop for this "base yield modeling framework ... since it is the crop where yield-response-to-irrigation data are most prevalent and the crop most frequently managed in an irrigation setting." *Id.*, p. 7.

149 -11.55 + 0.416 x 61.3 = 14.0 megagrams/hectare, Kansas Exhibit 18, *Water Supply: Yield Relationships Developed for Study of Water Management*, L. R. Stone, et al., Journal of Natural Resources & Life Sciences Education, Volume 35, 2006, Table 2, p. 164.

150 Kansas Exhibit 5, Expert Report of Dr. Bill Golden et al., *Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, January 20, 2009, Table 10.

151 *Id.*, pp. 8-9.

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additional amounts estimated by Kansas' experts[152] that would have been received had there been no overuse of water in Nebraska.[153]

106. Kansas' experts then used the revised crop-specific "expected yield" together with other relevant factors for 2005 and 2006 with and without overuse of water in Nebraska including actual crop yields (both irrigated and non-irrigated), growing season precipitation, acres irrigated, irrigation technology and efficiency, irrigated crop mix, non-irrigated crop mix, crop prices, and production costs to estimate the lost profit in KBID for 2005 and 2006 from overuse of water in Nebraska. The estimated lost profits in KBID for 2005 and 2006 were then divided by the amounts of farm-gate water shortages estimated from overuse of water in Nebraska for 2005 and 2006, respectively, and the resulting value per acre-foot of water shortage were multiplied by the estimated shortages caused by reductions in return flows outside of KBID.[154] The total direct economic impacts for each of 2005 and 2006 were calculated as the sum of the estimated lost profit in KBID and the value of the estimated shortages outside of KBID.[155]

107. The reasonableness of the estimates of total direct economic impacts in 2005 and 2006 proffered by Kansas' experts is dependent on the reasonableness of the many assumptions made by Kansas' experts. Besides the estimated shortages in irrigation water resulting from Nebraska's overuse of water in 2005 and 2006, the core of Kansas' estimates of total direct economic impacts centers on the IPYsim crop response functions.

108. One of Kansas' experts, Dr. Terry Kastens, testified that although "IPYsim has not been really academically reviewed, ... it has been very critically reviewed by many users who continue to use it on a regular basis for making crop decisions."[156] While IPYsim may have been "critically reviewed by many users," Kansas did not provide or offer any evidence that the adjusted IPYsim crop response functions used to estimate the fully irrigated "expected yield" for crops in KBID, as described in Finding 103, have been peer-reviewed by anyone other than the six authors of Kansas' expert report on this issue. While acknowledging that the adjustments made to the IPYsim crop response functions described in Finding 103 were

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[152] Kansas Exhibit 1, Expert Report of Dale E. Book, *Engineering Analysis of Losses to Kansas Water Users Resulting from Overuse of Republican River Supply in Nebraska 2005 and 2006*, January 20, 2009, p. 6.

[153] Kansas Exhibit 5, Expert Report of Dr. Bill Golden et al., *Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, January 20, 2009, p. 9; Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 186:4-11 (Kastens).

[154] Kansas Exhibit 5, Expert Report of Dr. Bill Golden et al., *Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, January 20, 2009, p. 8-9.

[155] Apparently, the total direct economic impacts were not reduced to account for Federal income tax that would have been paid on increased farm net income, as was done in *Kansas v. Colorado*. *See* Third Report of Special Master Littleworth, August 2000, p. 72.

[156] Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 180:25-181:3.

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"not suggested by Stone,"[157, 158] Kansas did not provide or offer any empirical data demonstrating that the adjusted IPYsim crop response functions and the estimates of fully irrigated "expected yield" are consistent with actual observations.

109. The experts for Colorado and Nebraska on this issue were both critical of the adjustment of the IPYsim crop response functions to estimate the crop-specific fully irrigated "expected yield." In his report, Colorado's expert, Dr. James Pritchett stated the following:

> In my opinion, the IPYsim model is accurate in suggesting the predicted yield under actual irrigation is 90% of the predicted model yield under full irrigation. However, I do not find documentation that the percentage difference [10%] may be applied to higher yield levels with accuracy.
>
> More specifically, the IPYsim model predicts that if the crop receives 6.12 fewer inches of water than is necessary, a yield loss of 15.4 bushels (165.9 bu. – 150.5 bu.) results. When scaled up, the EIA [Kansas Exhibit 5, *Economic Impacts on Kansas of Diminished Surface Water Supplies ...*] reports that if the crop receives 6.12 fewer inches of water a yield loss of 19.1 bushels (206.1 bu. – 187.0 bu.) results. Implicitly, at [*sic*] higher base yield generates increasingly *larger* incremental yields with additional water. I believe this to be inaccurate as the accepted relationship between applied water and crop yield is one of diminishing returns.[159]

In his direct testimony, Dr. Pritchett testified:

> What I do note is that in terms of its yield prediction, those seem to fit trend yields and also the National Ag Statistic Service yields. And so I felt comfortable in that sense, that the yields [Model Yield in Table 10, Kansas Exhibit 5] were representative.
>
> Later, the Kansas experts boot-strapped those yields to a higher level [fully irrigated Expected Yield in Table 10, Kansas Exhibit 5] and I'm not sure I'm comfortable with that.[160]

Nebraska's expert, Dr. David Sunding, testified in his direct testimony:

> So now the next step in what they describe as their calibration procedure, we have Stone down here. We have the quote/unquote, calibrated IPYsim to hit their assumptions about the 2005 trend yield.

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[157] It is unknown why Kansas did not utilize Professor Loyd Stone of Kansas State University as an expert witness on this issue, given that his testimony in *Kansas v. Colorado*, No. 105, Original, was given great weight. *See* FN 128.

[158] Transcript of Arbitration Proceedings, March 11, 2009, Volume III at 498:7-10 (Kastens).

[159] Colorado Exhibit 2, Expert Report of Dr. James Pritchett, *Reviewing the Assumptions, Methods and Results of: Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, February 16, 2008 [*sic*], p. 6.

[160] Transcript of Arbitration Proceedings, March 10, 2009, Volume II at 287:6-13.

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> Well, as you just pointed out, actual yield was somewhere up here, again off the front tier [*sic*].
>
> So how do we deal with that?
>
> And the way they deal with that is simply by taking the ratio between these two points and applying it up here. So whatever this vertical distance is, they take the actual observed yield and boost it up by that amount. That was what Dr. Pritchett referred to as this boot-strapping procedure.
>
> So this is the 187. And this is, I believe, 206, which is, as Dr. Kastens described, 10 percent higher than the highest observed yield ever; and I think, frankly, lacking credibility.[161]
>
> ...
>
> Now, why does that matter? That matters because the heart of their valuation analysis or their damage analysis is to answer the question: What would have been the extra yield and, hence, the extra profit earned from a few extra units of water, few extra inches of water per acre?
>
> So this slope matters a lot for their damage analysis. It's not derived from Stone. It is, I would submit, totally made up to fit this particular trend yield and, therefore, I think inadequate as a basis for a damage calculation.[162]

110. Kansas' expert report on economic impacts states that: "IPYsim was developed using expected yield response to water data reported in Stone et al., 2006, which were the same data underlying KSU's Crop Water Allocator (KSU-CWA)."[163] Stone et al. states that: "Crop-water production relationships are altered by variations in soil and climate and have not been well defined for most crops in most areas (internal citations omitted)."[164] However, Kansas' experts did not address variations in soil types and climate between western Kansas, for which Stone's response functions were developed, and north-central Kansas several hundred miles to the northeast, where KBID and the other impacted areas in Kansas are located, other than in Dr. Kasten's testimony when he stated:

> And though it's said that, you know, it makes a point, for example, about soil types mattering, we don't believe that the difference in the silt loam soils of western Kansas

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[161] *Id.*, at 322:4-20.

[162] *Id.*, at 323:16-324:1.

[163] Kansas Exhibit 5, *Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, Dr. Bill Golden et al., January 20, 2009, p. 2.

[164] Kansas Exhibit 18, *Water Supply: Yield Relationships Developed for Study of Water Management*, L. R. Stone, et al., Journal of Natural Resources & Life Sciences Education, Volume 35, 2006, p. 161.

and those of the KBID area, for example, are sufficiently large that they would diminish our efforts of using this model specifically for KBID.[165]

Kansas did not provide or offer any empirical data confirming Dr. Kasten's testimony and did not address the significance of any climate variations.

111. Since the assumed lack of significance of soil and climate variations and the methodology applied by Kansas' experts for the purposes of estimating lost profits and establishing damages have not been shown to be reasonable, the assumptions and methodology should be validated by peer review or by empirical data before being accepted for the purposes of estimating lost profits and establishing damages. Even if validated, the estimates of lost profits can not be adopted because Kansas has overstated the additional amounts of water that would have available to KBID, but for Nebraska's overuse in 2005 and 2006, as described in Finding 96.[166] The preponderance of evidence at this juncture does not support the assumed lack of significance of soil and climate variations, the methodology used, or the estimates of the total direct economic impacts in 2005 and 2006 made by Kansas' experts with reasonable certainty.

112. The alternative estimates of total direct economic impacts developed by Nebraska's expert, Dr. David Sunding, based on the difference between the rental rates paid by farmers to rent irrigated land in 2005 and 2006 and the rental rates paid for non-irrigated land are not sufficiently reliable. Dr. Sunding relied on land prices and cash rental rates for 2005 and 2006 published by the Kansas State University Agricultural Experiment Station and Cooperative Extension Service.[167] The introduction for this published data contains the following qualifier:

> These data are useful to farm managers in determining cash rental rates, to farmland appraisers in calculating indexes for making time adjustments to land prices, and to landowners and investors who base expectations on historical price and return levels for farmland. The average prices in this guide encompass parcels of land that vary widely in

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[165] Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 182:16-22.

[166] When asked what the effect would be if the estimated amounts of additional water that should have been available to KBID were reduced, the following exchange occurred:

> DR. KASTENS: I can't say exactly. I can say that the dollars per acre-foot likely would go up. The total dollars likely would go down, but I can't say to what magnitude.
>
> MR. WILMOTH: Thank you.
>
> ARBITRATOR DREHER: So Mr. Wilmoth, just so I understand. It's not a linear relationship then?
>
> DR. KASTENS: That's correct.

Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 216:4-12.

[167] Nebraska Exhibit 6, Expert Report of Dr. David Sunding, *Analysis of Kansas' Economic Losses Caused by Nebraska's Overuse of Water in the Republican River Basin in 2005 and 2006*, February 17, 2009, p. 14.

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> productivity. Thus, these data are more appropriate for analyzing trends than for establishing market value or rental rates for specific tracts of farmland.[168]

The limited applicability of the data relied on by Dr. Sunding was further confirmed by the following testimony of Dr. Kastens, who was co-publisher of the data:

> I don't like to say we don't trust the data, but we don't. And I can say that because anybody that has ever heard me speaking in Kansas have heard us say this for years and for hundreds of presentations, the irrigated rent data in Kansas, we don't believe them. That's all I can say.
>
> We have plenty of anecdotal evidence to suggest otherwise, but we don't believe the data and so we don't use them for anything.[169]

113. In its closing brief, Nebraska argues that: "When checked against reality, it is clear Kansas suffered relatively little economic harm from any loss of Republican River water she sustained."[170] Nebraska further concludes that: "In sum, the actual, direct economic harm suffered by Kansas as a result of Nebraska's overuse is somewhere between 'nearly zero' and $930,630.00."[171] Yet in 2006, Nebraska[172] may have spent as much as $3.5 million[173] to lease a total of 23,518 acre-feet of surface water in Nebraska from the Frenchman Valley Irrigation District, Riverside Irrigation Company, and Bostwick Irrigation District in Nebraska.[174] The leased surface water was relinquished by Nebraska for diversion by KBID at the Guide Rock Diversion Dam.[175] Nebraska would not have paid $ 3.0 or $3.5 million to lease 23,518 acre-feet of surface water, for an average volume-weighted unit cost as high as $149/acre-foot,[176] if the additional water that would have been available to KBID but for overuse by Nebraska had an economic value of nearly zero.

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168 *Id.*, p. 1 of attachment marked MF-1100 in upper right-hand corner.

169 Transcript of Arbitration Proceedings, March 11, 2009, Volume III at 518:19-519:2.

170 *State of Nebraska's Post-Hearing Brief* at 17.

171 *Id.* at 22.

172 The Middle Republican Natural Resources District paid $50,000 of the total. Kansas Exhibit 44, p. 1; Kansas Exhibit 51, p. 2.

173 Kansas Exhibit 44 shows $3.0 million paid to Bostwick Irrigation District in Nebraska whereas Kansas Exhibit 52 shows $2.5 million plus $64,500 was paid to the District.

174 Kansas Exhibit 44, *Memorandum to Jeanne Glenn from Ann Bleed*, March 5, 2007, p. 1.

175 Nebraska Exhibit 15, Expert Report of James Schneider and James Williams, *Nebraska Compact Compliance*, February 17, 2009, p. 12.

176 $3,500,000 / 23,518 acre-feet.

114. Other than the leasing transactions by the state of Nebraska described in Finding 113, there is no evidence in the record of an active water market in or adjacent to south-central Nebraska. Therefore, the unit cost that Nebraska paid to lease water in its attempt to comply with the FSS in 2006 is not the same as the unit value of water to Kansas from lost profits due to overuse by Nebraska in 2006. As Nebraska's expert correctly noted regarding Nebraska's lease payments:

> So you have basically a monopolist, on one side, as opposed to what you would have in a land rental market, where you have many participants on either side of the transaction.[177]

115. The alternative estimates of total direct economic impacts in 2005 and 2006 developed by Colorado's expert, Dr. James Pritchett, based on modifications to the methodology used by Kansas' experts are also not sufficiently reliable. Dr. Pritchett used the IPYsim crop response functions to predict yield under actual irrigation and under full irrigation and did not perform the adjustment described in Finding 103 to adjust the response functions upward to the fully irrigated "expected yield."[178] However, Dr. Pritchett used crop production costs from northwest Kansas, which is predominantly irrigated using groundwater from the Ogallala Aquifer,[179] and did not investigate whether these costs were comparable to the crop production costs in the KBID, which is predominantly irrigated using surface water.[180] Because the production costs associated with using groundwater from the Ogallala Aquifer in northwest Kansas include pumping costs to lift water from wells that are 250 ft to 300 ft deep,[181] as compared to the pumping costs to operate "relatively small centrifugal [booster] pumps" to deliver surface water to center pivots in KBID,[182] the farm production costs used by Dr. Pritchett are not representative of the farm production costs in KBID. Since the alternative estimates of total direct economic impacts in 2005 and 2006 developed by Dr. Pritchett necessarily incorporate his estimates of farm production costs, his estimates of lost profits in 2005 and 2006 are not sufficiently reliable.

116. There presently is not a sufficiently reliable basis to form an appropriate recommendation for awarding damages to Kansas for overuse of water by Nebraska in 2005 and 2006. Clearly Kansas incurred damages and those damages may well be in the range of one to several million dollars. However, until such time Kansas can demonstrate with a preponderance of evidence that its assumptions and methodology for estimating lost profits, including its estimate of the amount of water that would have been available at the headgates of Kansas

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[177] Transcript of Arbitration Proceedings, March 10, 2009, Volume II at 374:22-25 (Sunding).

[178] Colorado Exhibit 2, Expert Report of Dr. James Pritchett, *Reviewing the Assumptions, Methods and Results of: Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, February 16, 2008 [*sic*], p. 6.

[179] Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 125:25-126:3 (Ross).

[180] *Id.* at 121:13-5; Transcript of Arbitration Proceedings, March 10, 2009, Volume II at 292:7-293:25.

[181] Transcript of Arbitration Proceedings, March 9, 2009, Volume I at 125:18-126:3 (Ross).

[182] *Id.* at 124:3-17.

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irrigators, and establishing actual damages is reasonably reliable (either through independent peer review or with empirical data), during subsequent arbitration or before the Court, only an award of nominal damages should be made.

Damages – Indirect Economic Impacts

117. Kansas' experts estimated indirect economic impacts from their estimates of reduced farm income resulting from Nebraska's overuse of water in 2005 and 2006 by modeling the Kansas state economy using an input-output accounting system termed "Social Accounting Matrix" ("SAM"). The SAM system used by Kansas' experts was the Micro-IMPLAN (Impact analysis for PLANing) system, which was also used to estimate indirect or secondary impacts in *Kansas v. Colorado*, No. 105, Original.[183]

118. The indirect economic impacts, or "Value Added Impact" or "Indirect Value Added Loss" estimated by Kansas' experts for both 2005 and 2006 are listed in Table 16 of their report[184] and total 44 percent of the direct economic impacts (gross income loss), meaning that total economic impacts were estimated to be 1.44 times the estimated direct economic impacts.[185]

119. In his report, Colorado's expert stated that:

> While I have not been able to independently verify the SAM used in the EIA [Kansas Exhibit 5, *Economic Impacts on Kansas of Diminished Surface Water Supplies ...*], the multiplier [1.44] is consistent with my own research in the regional economic activity generated by irrigated agriculture.[186]

120. Nebraska's expert stated in his report that:

> While the method is standard, the use of IMPLAN to assess indirect impacts resulting from changes in water availability is fraught with problems relating to the generally poor quality of the input purchase and consumer expenditure data, including information on "export" coefficients, for rural area in the United States.[187]

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183 Kansas Exhibit 5, Expert Report of Dr. Bill Golden et al., *Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, January 20, 2009, p. 9-10.

184 *Id.*, p. 21.

185 *Id.*, Table 16 and Table 17, p. 21.

186 Colorado Exhibit 2, Expert Report of Dr. James Pritchett, *Reviewing the Assumptions, Methods and Results of: Economic Impacts on Kansas of Diminished Surface Water Supplies to the Lower Republican River Basin Caused by Nebraska in 2005 and 2006*, February 16, 2008 [*sic*], p. 13.

187 Nebraska Exhibit 6, Expert Report of Dr. David Sunding, *Analysis of Kansas' Economic Losses Caused by Nebraska's Overuse of Water in the Republican River Basin in 2005 and 2006*, February 17, 2009, p. 4. Also, *see* Transcript of Arbitration Proceedings, March 10, 2009, Volume II at 363:15-364:17.

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When asked whether a multiplier of "1.44 would be appropriate for indirect effects or do you think it's too high or too low?"[188] Nebraska's expert responded:

> I think it's a – well, it's hard to know for sure if it's too high or too low without getting in supplemental information specific to Kansas that I discussed; but within the confines of the analysis that Kansas has proffered, I think the multiplier would be the same for both years. 1.44, I think, is not out of the realm of what I have seen in other contacts [*sic*], so that particular part of their analysis didn't stick out particularly.[189]

121. Nebraska's expert also stated in his report that:

> More importantly ... indirect impacts are not a legitimate consideration in a proceeding of this type ... because any damage payment from Nebraska to Kansas will generate its own multiplier effects, and a damage payment that compensates for direct losses should result in indirect benefits that compensate for indirect losses.[190]

122. In response, Kansas' expert, Dr. John Leatherman, testified that:

> [T]heoretically, there could, in fact, be offsetting impacts, positive impacts associated with the payments versus the damage occurred by the loss of family income. But, once again, that would be under a very narrow set of circumstances. You would essentially have to replicate as closely as possible in terms of the amount of damage, as well as the timing of those payments, as well as what ultimately happened to stimulate economic activity. And, here again, it's simply not feasible. Indeed, the State of Kansas, perhaps, would take any – any type of moneys awarded to them and they would – they would do something with that; but exactly what, I really don't know. And so that is something that would be very speculative on my part to try to estimate any kind of offsetting damages, absent there being specific information with regard to how they would spend the money.[191]

123. During cross, Nebraska's expert testified that:

> There are indirect impacts and I have never challenged that in this case. I do challenge their relevance to the proceeding going on here, both because I have questions about the reliability of the results and the Kansas analysis failed to consider the indirect benefits that result from Nebraska's payments.[192]

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[188] *Id.* at 371:1-2.

[189] *Id.* at 371:3-11.

[190] Nebraska Exhibit 6, Expert Report of Dr. David Sunding, *Analysis of Kansas' Economic Losses Caused by Nebraska's Overuse of Water in the Republican River Basin in 2005 and 2006*, February 17, 2009, pp. 4, 2.

[191] Transcript of Arbitration Proceedings, March 10, 2009, Volume II at 264:14-265:8.

[192] Transcript of Arbitration Proceedings, March 10, 2009, Volume II at 364:18-23 (Sunding).

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124. Even though the indirect benefits resulting from Nebraska's payments may be "speculative," they are nonetheless real, and Kansas' experts should have attempted to reasonably quantify them.

125. In *Kansas v. Colorado*, No. 105, Original, the Court accepted the use of the IMPLAN model to assess secondary impacts to the economy of Kansas, and did not consider the indirect benefits that result from Colorado's payment of money damages.[193] However, based on the testimony of different experts for Kansas in that case, the Court found that "[s]econdary economic impacts are also affected by a concept known among economists as 'opportunity costs'"[194] and that "[o]nly 20 percent of the total secondary impacts were counted as net gains or losses."[195]

126. There is no evidence in the record for this proceeding whether opportunity costs offsetting or reducing gross secondary impacts were considered by Kansas' experts or whether such offsets are even relevant.

127. Since an award of only nominal damages for direct economic impacts is recommended in this proceeding, no award of damages for indirect economic impacts should be made.

128. If Kansas seeks to demonstrate with a preponderance of evidence that its assumptions and methodology for estimating lost profits and establishing actual damages is reasonably reliable during subsequent arbitration or before the Court, Kansas should also attempt to reasonably quantify indirect benefits resulting from Nebraska's payment for actual damages and should also include any offsetting opportunity costs if relevant.

Future Compliance

129. To ensure future compliance with the FSS, "Kansas has proposed that Nebraska reduce its groundwater-irrigated acreage in the Basin by approximately 515,000 acres of approximately 1.2 million acres which receive groundwater irrigation in the Nebraska portion of the Basin."[196] This would represent a reduction of 43 percent from the approximately 1.2 million acres in the Nebraska portion of the Republican River Basin estimated by Kansas as being

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[193] Third Report of Special Master Littleworth, August 2000, p. 65-71.

[194] *Id.*, p. 68.

[195] *Id.*, p. 69.

[196] Kansas Exhibit 6, Expert Report of David W. Barfield, *Ensuring Future Compliance by Nebraska*, January 20, 2009, § III. Remedies.

irrigated with groundwater, which Kansas's experts estimate would reduce consumptive groundwater withdrawals by an average of 619,000 acre-feet per year.[197]

130. To derive the amount of reduction in groundwater-irrigated acreage proposed by Kansas, one of Kansas' experts on this issue, Mr. Dale Book, first estimated the reduction in the Nebraska groundwater CBCU that would have been necessary for compliance with the FSS on a 5-year average basis for the years 2002 through 2006 as follows:

> ... I reviewed and utilized the Compact Administration, RRCA, the accounting data for the five years. I compared the results of the beneficial consumptive use in the state of Nebraska with the Nebraska allocation and computed the difference and determined what the resulting required reduction in beneficial consumptive use would be to achieve a balance between the allocation and consumptive use for the five years. I then made an estimate of the amount of reduced consumptive use resulting from reducing groundwater pumping that would be resulting in increased surface water use within the state of Nebraska [45 percent of the reduction in groundwater CBCU] and adjusted for that in the calculation. The result of the analysis was a recommendation for a level of groundwater consumptive use that would balance with the allocations for this five-year period.[198]
> ...
>
> The imported water supply credit ... was obtained from the RRCA Groundwater Model results with the – this level of pumping and that was averaging 30,000 acre-feet per year. The result is a balance for the five-year period.[199]

The result of this analysis is an ongoing, year-to-year, estimated limitation on groundwater CBCU in the Nebraska portion of the Republican River Basin of 175,000 acre-feet.[200]

131. Assuming that 45 percent of the reduction in groundwater CBCU would approximately equal the amount of increased streamflow resulting from curtailment of groundwater irrigation that would then be consumptively used by surface water irrigators in Nebraska[188] has the effect of increasing the amount of the reduction in groundwater CBCU that must be achieved to comply with the FSS. While reducing groundwater CBCU in Nebraska would clearly increase streamflows in Nebraska, a portion of which would undoubtedly be diverted and consumed by surface water irrigators, there is presently insufficient evidence to support the assumption that the increased surface water CBCU in Nebraska would equal 45 percent of the reduction in groundwater CBCU.

132. The RRCA Groundwater Model was then used:

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197 Kansas Exhibit 3, Expert Report of Samuel P. Perkins and Steven P. Larson, *Attachment 5: RRCA groundwater model analysis (revised) Impact of Nebraska pumping and proposed remedy*, January 4, 2008, p. 4.

198 Transcript of Arbitration Proceedings, March 11, 2009, Volume III at 533:9-534:1.

199 *Id.* at 539:3-7.

200 Kansas Exhibit 2, Expert Report of Dale E. Book, *Requirements for Nebraska's Compliance with the Republican River Compact*, January 20, 2009, p. 3-4 and Table 1.

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> ... in a trial-and-error process ... [to look] at various levels of curtailment of pumping, again focusing on, in part, looking at what we call quick response areas, or areas near the stream system that would respond relatively quickly to reductions in groundwater irrigation and upland areas that respond more slowly, looking at combinations of those to determine how much reduction would be necessary in order to achieve the level of groundwater consumptive use that Mr. Book had determined.
>
> Ultimately, what we determined was that if we -- if we curtailed pumping within about 2 ½ miles of the stream system and if we also held the pumping outside that -- that corridor along the stream system to the amount of acreage that was in place in the year 2000, that the combination of those two things would produce a reduction in groundwater beneficial consumptive use that would, over the long haul, stay below the level that Mr. Book had determined.[201]

In the simulated reductions of groundwater consumption using the RRCA Groundwater Model, the amount of irrigated acreage using comingled groundwater and surface water supplies was "held at 2006 levels at all distances from stream cells within the Republican River basin in Nebraska."[202] The result of this analysis was a reduction of "350,970 acres within the no-pumping zone and 163,640 acres outside the no-pumping zone."[203]

133. In performing the simulations described in Finding 132:

> Model datasets for historical years 1990-2006 were used to construct future scenarios. These years were chosen initially because of the higher quality of Kansas water use reporting data beginning in 1990. The sequence of historical years 1990-2006, beginning with year 1990, was repeated three times to represent future scenarios for years 2007-2057. Median annual precipitation for years 1990-2006, spatially averaged over the groundwater model domain, is 19.58 inches/year. Compared against the model's years of record 1918-2006, this corresponds to a probability of 54.5 percentile, which is slightly above median rainfall of 19.28 in/yr for years 1918-2006. This indicates that the sequence is a reasonable projection, at least with respect to the historical record. Additionally, the sequence consists of a relatively wet period (1990-1999) followed by a relatively dry period (2000-2006).[204]

Nebraska's experts on this issue reported that the annual precipitation for the years 1990 – 2006 was at the 60th percentile, meaning that the annual precipitation for this period of years

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201 Transcript of Arbitration Proceedings, March 11, 2009, Volume III at 554:20-555:14 (Larson).

202 Kansas Exhibit 3, Expert Report of Samuel P. Perkins and Steven P. Larson, *Attachment 5: RRCA groundwater model analysis (revised) Impact of Nebraska pumping and proposed remedy*, January 4, 2008, p. 1.

203 *Id.*

204 *Id.*, pp. 1-2.

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was above average and equaled or exceeded 60 percent of the measurements of annual precipitation over the longer term of 1918 through 2006.[205]

134. Because of the nonlinear response of the RRCA Groundwater Model when stream-drying occurs,[206] introducing streamflow to de-watered streams in the RRCA Groundwater Model increases the simulated streamflows that can be depleted by groundwater consumption, which increases groundwater CBCU. For example, 1993 was a year with unusually high amounts of precipitation,[207] and 1993 was used to represent the years 2010, 2027, and 2044[208] in Kansas' simulations using the RRCA Groundwater Model described in Finding 132. For each of the three years during the simulations, when the dataset for 1993 is introduced (i.e., 2010, 2027, and 2044), computed impacts from pumping in Nebraska increase significantly, except for the simulation of Kansas' proposed remedy.[209] The reason why simulated impacts from pumping in Nebraska do not increase significantly in 2010, 2027, and 2044 for the simulation of Kansas' proposed remedy may result from the reduction in the acreage irrigated with groundwater being so significant that simulated de-watering of streams is relatively limited and the response of the Groundwater Model is for the most part linear.

135. Kansas has adequately demonstrated that its proposed remedy would result in Nebraska's compliance with the FSS, even during dry-year conditions similar to what occurred during the period 2002 through 2006.[210] However, given the magnitude of the assumed increase in

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205 Nebraska Exhibit 15, Expert Report of James Schneider and James Williams, *Nebraska Compact Compliance*, February 17, 2009, p. 16.

206 *See* Finding 20.

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> MR. DRAPER: Dr. Schneider, you've mentioned several times that 1993 was the wettest year on record?.
>
> DR. SCHNEIDER: I may not be completely accurate on that. I believe I'm referring to the rainfall precipitation gages within the model that are located in Nebraska and looking at the -- that's generally what I'm looking at. And if it's not the wettest year, it's second or third, but it's my -- it's my recollection that it's the wettest year in terms of precipitation in Nebraska.
>
> MR. DRAPER: In fact, I have no quarrel with that. I think it's often referred to as the "Great Flood of 1993," isn't it?

Transcript of Arbitration Proceedings, March 13, 2009, Volume V at 940:10-23.

208 *See* Finding 133.

209 *See* Kansas Exhibit 65, *Comparison of Nebraska pumping impact under baseline conditions, Kansas proposed remedy, and NRD Pumping Alternatives*, 3/16/2009.

210 For this decision, the period of years 2002 through 2006 is considered a period of dry years, even though the probability of non-exceedance over the period of record (1918 – 2007) for precipitation in the Nebraska portion of the Republican River Basin during 2004 through 2006 was more than 0.5 (*See* Kansas Exhibit 6, Expert Report of David W. Barfield, *Ensuring Future Compliance by Nebraska*, January 20, 2009, Figure 7), since both 2005 and 2006 were years of Water-Short Year Administration.

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surface water CBCU from reductions in groundwater CBCU described in Finding 131 and the fact that Kansas' experts used datasets from years when precipitation was above average overall as described in Finding 133, Kansas' experts likely have overstated the amount of reduction in groundwater irrigated acreage that is necessary in Nebraska for Nebraska to comply with the FSS. Therefore, Kansas has not adequately demonstrated that its proposed remedy is the "minimum remedy necessary for compliance" as it has asserted.[211] Based on the testimony and evidence in the record for this proceeding, it is not possible to reasonably assess the extent that Kansas' experts may have overestimated the reduction in groundwater irrigated acreage in Nebraska that is necessary for Nebraska's compliance with the FSS.

136. Nebraska asserts that:

> Following the signing of the FSS, Nebraska has implemented landmark changes to its system of water regulation. The resulting integrated management planning process mandates a cooperative effort between the Department [of Natural Resources] (historically responsible for surface water administration), and the NRDs [Upper Republican Natural Resources District, Middle Republican Natural Resources District, and Lower Republican Natural Resources District] (historically responsible for groundwater management). Taking into account all proposed future scenarios by Kansas and Nebraska, and assuming there are no changes to the current RRCA Accounting Procedures, Nebraska will under the worst case, have only a modest shortfall of 8,288 acre feet on average (less than 3.5%). Recently, through dry year leasing of surface water supplies, Nebraska has shown the ability to make up substantially greater than this amount annually. We are confident the IMPs [Integrated Management Plans] are more than sufficient to maintain compliance with the Compact [and the FSS] through 2012, when they will be reevaluated and modified to ensure compliance into the future.[212]

137. One of Nebraska's experts, Mr. Williams, testified that the Upper Republican Natural Resources District (URNRD), Middle Republican Natural Resources District (MRNRD), and Lower Republican Natural Resources District (LRNRD) account for 95 percent of the depletions to surface water sources in the Republican River Basin caused by consumptive groundwater withdrawals.[213] The Nebraska Department of Water Resources and each of these three NRDs jointly developed an individual Integrated Management Plan and associated rules and regulations ("IMP") for each NRD.[214] While there are differences between each of the IMPs, the three IMPs are substantially similar. Each IMP, as revised in

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[211] Kansas Exhibit 6, Expert Report of David W. Barfield, *Ensuring Future Compliance by Nebraska*, January 20, 2009, § III.a.

[212] Nebraska Exhibit 15, Expert Report of James Schneider and James Williams, *Nebraska Compact Compliance*, February 17, 2009, p. 18.

[213] Transcript of Arbitration Proceedings, March 13, 2009, Volume V at 829:7-9; 831:24-832:2.

[214] *Id.* at 964:10-16 (Dunnigan).

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late 2007 or early 2008,[215] generally has three increasingly stringent requirements limiting consumptive groundwater withdrawals, although the IMP for the LRNRD only has two requirements. The first requirement is a limitation on the amount of groundwater that may be withdrawn and applied to crops by individual irrigators. The second, and more stringent, requirement is a limitation on the average annual volume of groundwater withdrawals for each NRD, averaged over the period 2008 through 2012, which is 20 percent less than the baseline average groundwater withdrawals for the years 1998 through 2006, excluding the LRNRD in which the allotments for individual irrigators were further reduced with the intent of achieving a 20 percent reduction from the 1998 through 2006 baseline.[216] The average annual groundwater withdrawals for the URNRD, MRNRD, and LRNRD during the period of 1998 through 2006 are reported to be 531,763 acre-feet, 309,479 acre-feet, and 242,289 acre-feet, respectively, totaling just more than 1,083,530 acre-feet per year.[217] The limitations on the average annual volume of groundwater withdrawals for the URNRD and MRNRD, averaged over the period 2008 through 2012, are 425,000 acre-feet and 247,580 acre-feet, respectively.[218, 219] The intended limitation for the LRNRD is 193,830 acre-feet.[220] The sum of the required limitations on the average annual volume of groundwater withdrawals for the URNRD and MRNRD plus the intended limitation for the LRNRD total 866,410 acre-feet per year, a reduction of 217,120 acre-feet from the 1998 – 2006 average of 1,083,530 acre-feet per year.

The third and most stringent requirement, at least during dry years, is a limitation on either the annual net groundwater depletions (URNRD and LRNRD) or the groundwater depletions averaged over the period 2008 through 2012 (MRNRD). The net groundwater depletions for the URNRD, MRNRD, and LRNRD are not to exceed 44 percent, 30 percent, and 26 percent, respectively, of Nebraska's allowable groundwater CBCU determined from using the RRCA Groundwater Model.[221, 222, 223] Although the limitations on net groundwater

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215 For IMPs adopted for URNRD, MRNRD, and LRNRD, respectively, *see* Nebraska Exibits: 16; 17; and 15, Appendix A.

216 Transcript of Arbitration Proceedings, March 13, 2009, Volume V at 893:7-13; 963:3-10 (Williams).

217 Nebraska Exhibit 16, *Integrated Management Plan Jointly Developed by the Department of Natural Resources and the Upper Republican Natural Resources District*, p. 2.

218 *Id.*, p. 7.

219 Nebraska Exhibit 17, *Rules and Regulations and the Integrated Management Plan for the Middle Republican Natural Resources District and the Nebraska Department of Natural Resources*, February 8, 2008, p. 8 (Integrated Management Plan revised January 8, 2008).

220 242,289 acre-feet x 0.80.

221 Nebraska Exhibit 16, *Integrated Management Plan Jointly Developed by the Department of Natural Resources and the Upper Republican Natural Resources District*, p. 7.

222 Nebraska Exhibit 17, *Rules and Regulations and the Integrated Management Plan for the Middle Republican Natural Resources District and the Nebraska Department of Natural Resources*, February 8, 2008, p. 8-9 (Integrated Management Plan revised January 8, 2008).

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depletions for the URNRD and LRNRD are stated as annual requirements in the respective IMPs, these are effectively average limitations, at least for a two-year period, since the accounting is done after-the-fact during the following year. Consequently, whether or not compliance with the FSS was achieved and whether further reductions in groundwater use are needed is not known until the year following the year in which the groundwater depletions actually occurred.

138. The IMPs for the URNRD, MRNRD, and LRNRD have considerable flexibility in that average limitations are used, meaning that the limitations can be exceeded during any given year. The IMPs also provide for variances, carryover of unused individual allocations, pooling of individual allocations (URNRD and MRNRD), and bonus inches (MRNRD) when compliance is achieved in a preceding year. Despite this flexibility, a careful reading of the IMPs indicates that there are no exceptions to the overall limitations on the average annual volume of groundwater withdrawals for the URNRD and MRNRD, as well as the overall limitations on allowable net groundwater depletions for all three Republican River NRDs.

139. When asked whether the IMPs were enforceable, the Nebraska official responsible for ensuring compliance with the Compact and the FSS, Mr. Brian Dunnigan[224], answered: "Absolutely."[225] When asked "what happens if an NRD refuses to honor an IMP?"[226] Mr. Dunnigan answered as follows:

> Well, certainly the department would look at that; and if there was an issue with that, we would certainly confer with the Attorney General's office to see if action would be taken by the State against [the] Natural Resources District. The department could also look at and the State could look at enforcement actions against individuals.[227]

When asked what if there is a failure of compliance, Mr. Dunnigan answered:

> I would say it's both and, ultimately, it would come to the DNR and we would take whatever measures we needed to take to make sure that we were in compliance.[228]

Mr. Dunnigan also testified that: "The State will do what is necessary to achieve Compact compliance."[229]

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223 Nebraska Exhibit 15, Expert Report of James Schneider and James Williams, *Nebraska Compact Compliance*, February 17, 2009, Appendix A, p. 16.

224 Director, Nebraska Department of Natural Resources.

225 Transcript of Arbitration Proceedings, March 13, 2009, Volume V at 948:6.

226 *Id.*, at 948:25-949:1.

227 *Id.*, at 949:2-8.

228 *Id.* at 970:5-8.

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140. Although Mr. Dunnigan was not appointed as the Director for the Nebraska Department of Natural Resources ("DNR") until December 9, 2008,[230] his statements set forth in Finding 139 that "we [DNR] would take whatever measures we needed to take to make sure that we were in compliance" and "The State will do what is necessary to achieve Compact compliance" are presumably accurate statements of Nebraska's intentions when it entered into the FSS on December 15, 2002. Yet, in the very first year for Water-Short Year Administration compliance (2006), Nebraska concedes it violated the FSS.[231] Similarly, in the very first normal compliance year (2007), Nebraska concedes it again violated the FSS.[232]

141. In its attempts to ensure future compliance with the Compact and FSS, Nebraska first relies on the 20 percent reduction in the average annual groundwater withdrawals within the URNRD, MRNRD, and LRNRD, compared to the average withdrawals for 1998 through 2006, as described in Finding 137. Assuming the URNRD and MRNRD do not exceed their average annual withdrawal limitations of 425,000 acre-feet and 247,580 acre-feet, respectively, and assuming that the additional reductions in the allotments for individual irrigators in the LRNRD results in a 20 percent reduction in LRNRD's average annual groundwater withdrawal as compared to its average withdrawals for 1998 through 2006, resulting in a reduced average annual LRNRD withdrawal of 193,830 acre-feet, the average annual groundwater withdrawals in the NRDs for the period 2008 through 2012 will not total more than 866,410 acre-feet per year, a reduction of 217,120 acre-feet from the 1998 – 2006 average of 1,083,530 acre-feet per year.[233] For comparison, this amount of reduction in average annual groundwater withdrawals is 35 percent of the average annual reduction of 619,000 acre-feet per year that Kansas estimates would result from its proposed remedy.[234]

142. Nebraska's experts simulated the performance of the IMPs, assuming 20 percent reductions in the average annual groundwater withdrawals within the URNRD, MRNRD, and LRNRD, compared to the average withdrawals for 1998 through 2006, under "average climatic conditions" using the RRCA Groundwater Model and the Accounting Procedures.[235] The results from these simulations showed that Nebraska would be in compliance under normal

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229 *Id.* at 980:15-16.

230 *Id.* at 946:22-24.

231 Nebraska Exhibit 8, Expert Report of Marc Groff, Tom Riley, and David Kracman, *Review of the 20 January 2009 Report Prepared by Spronk Water Engineers, Inc for the State of Kansas*, February 17, 2009, Table 2-2, p. 5.

232 *State of Nebraska's Post-Hearing Brief* at 4 (row in table for average 2003 – 2007).

233 *See* Finding 137.

234 *See* Finding 129.

235 Nebraska Exhibit 15, Expert Report of James Schneider and James Williams, *Nebraska Compact Compliance*, February 17, 2009, p. 7.

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year administration and under its allocation by an average amount of 18,950 acre-feet per year over the 5-year simulation period.[236]

143. However, it is not during "average climatic conditions" that compliance with the Compact and FSS are the most challenging for Nebraska and the Republican River NRDs. Rather, it is during dry-year conditions that compliance with the Compact and FSS will be the most difficult, and as correctly noted by Kansas' expert, Mr. David Barfield, it is under those conditions in particular "when the Compact needs to work."[237]

144. Nebraska's experts also simulated the performance of the IMPs, assuming 20 percent reductions in the average annual groundwater withdrawals within the URNRD, MRNRD, and LRNRD, compared to the average withdrawals for 1998 through 2006, under an "exceptionally (arguably unrealistic) scenario of repeated dry conditions" using the RRCA Groundwater Model and the Accounting Procedures.[235] The results from these simulations showed that Nebraska would be over its allocation under normal year administration by an average amount of 340 acre-feet per year over the 5-year simulation period[238] and would be over by 8,288 acre-feet per year under Water-Short Year Administration.[239] However, Nebraska's basin-wide allocation from these simulations averaged 231,360 acre-feet per year over the 5-year simulation period,[238] which is 20,000 acre-feet per year more than the average basin-wide allocation of about 211,000 acre-feet per year that was determined by the RRCA for the actual dry-year period of 2002 through 2006.[240] Similarly, Nebraska's allocation above Guide Rock from these simulations for Water-Short Year Administration averaged 221,680 acre-feet per year over the 5-year simulation period,[239] which is nearly 32,000 acre-feet per year more than the actual average allocation above Guide Rock of 189,820 acre-feet per year that was determined by the RRCA for the Water-Short Year Administration in 2005 and 2006.[241] These computed allocations that are larger than the actual allocations for 2002 through 2006 likely primarily result from Nebraska's experts using the average streamflows for the years 2000 through 2005, which totaled 195,250 acre-feet,[242] as compared to the actual average streamflows for 2002 through 2006, which were

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236 *Id.*, Appendix B to Appendix E, Table 3C.

237 Transcript of Arbitration Proceedings, March 16, 2009, Volume VI at 1049:15-16.

238 Nebraska Exhibit 15, Expert Report of James Schneider and James Williams, *Nebraska Compact Compliance*, February 17, 2009, Appendix B to Appendix G, Table 3C.

239 *Id.*, Table 5C.

240 Kansas Exhibit 2, Expert Report of Dale E. Book, *Requirements for Nebraska's Compliance with the Republican River Compact*, January 20, 2009, Table 1.

241 Kansas Exhibit 1, Expert Report of Dale Book, *Engineering Analysis of Losses to Kansas Water Users Resulting from Overuse of Republican River Supply in Nebraska*, January 20, 2009, Attachment 1.

242 Nebraska Exhibit 15, Expert Report of James Schneider and James Williams, *Nebraska Compact Compliance*, February 17, 2009, Appendix G, Table D, p. 4 (Total of entries in column titled "Dry conditions").

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reported to total approximately 126,000 acre-feet per year.[243] Consequently, Nebraska has underestimated the amounts by which it is likely to exceed its allocations during dry-year conditions by perhaps as much as 20,000 acre-feet to 30,000 acre-feet per year. As a result, the 20 percent reductions in the average annual groundwater withdrawals within the URNRD, MRNRD, and LRNRD, compared to the average withdrawals for 1998 through 2006, are likely inadequate to ensure compact compliance during prolonged dry-year conditions, such as occurred from 2002 through 2006.

145. When a 20 percent reduction in the average annual groundwater withdrawals within the URNRD, MRNRD, and LRNRD, compared to the average withdrawals for 1998 through 2006, is not sufficient to achieve compliance with the Compact and FSS, Nebraska then relies on the provisions in the IMPs that limit the net groundwater depletions for the URNRD, MRNRD, and LRNRD to 44 percent, 30 percent, and 26 percent, respectively, of Nebraska's allowable groundwater CBCU determined from using the RRCA Groundwater Model, as described in Finding 137. The difficulty in ensuring compliance with the Compact and FSS through these provisions of the IMPs is what is termed the "lag effect." That is, just as for groundwater withdrawals, where "there is [a] long time lag between the time when the pumping actually occurs and the time when it manifests itself on streamflows,"[244] depending on the location of the wells from which consumptive groundwater withdrawals are made, there is also a long time lag between the time when groundwater withdrawals are reduced or curtailed and the time when resulting increases in streamflow occur, again depending on the location of the wells from which pumping is reduced or ceases. Consequently, when it is determined that one or more of the URNRD, MRNRD, or LRNRD has exceeded their portion of Nebraska's allowable groundwater CBCU in the preceding year, as specified in the respective IMP, and further reductions are made to consumptive groundwater withdrawals in the respective NRD, it will be years before the effects of those reductions are expressed as increased streamflow, again depending on the location of the wells from which groundwater withdrawals are reduced or curtailed. If a particular NRD's exceedance of its portion of Nebraska's allowable groundwater CBCU occurs during a prolonged period of dry conditions, such as occurred from 2002 through 2006, it will likely not be possible for Nebraska to achieve compliance during the term of the current IMPs without focused curtailment of consumptive groundwater withdrawals in close proximity to surface water streams, which is not specifically required in any the IMPs for the URNRD, MRNRD, or LRNRD. As a result, the limitations on the average annual net streamflow depletions from consumptive groundwater withdrawals within the URNRD, MRNRD, and LRNRD are likely inadequate to ensure compliance with the Compact and FSS during prolonged dry-year conditions, such as occurred from 2002 through 2006.

146. Given Kansas' concerns that the IMPs for the NRDs are inadequate, Nebraska points out that in 2007 and 2008, Nebraska remained under its allocations by 30,000 acre-feet and 78,000 acre-feet, respectively.[245] The years 2007 and 2008, however, were wet years with the

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[243] Transcript of Arbitration Proceedings, March 16, 2009, Volume VI at 1039:22-23 (Barfield).

[244] Transcript of Arbitration Proceedings, March 16, 2009, Volume VI at 1006:13-15 (Larson).

[245] *State of Nebraska's Post-Hearing Brief* at 3.

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probability of non-exceedance for precipitation being 0.91 and 0.76, respectively,[246] and there were more than adequate surface water supplies. Because of the increased availability of surface water supplies in 2007 and 2008, Nebraska's Republican River allocations of 243,400 acre-feet and 332,400 acre-feet, respectively,[247] were the largest since accounting pursuant to the FSS was implemented.[248] This masks Nebraska's problem in complying with the Compact and FSS, which is groundwater CBCU, not surface water CBCU. Groundwater CBCU is by far the largest portion of Nebraska's total CBCU.[249] During dry-year conditions, such as occurred during 2002 through 2006, surface water CBCU varied, but groundwater CBCU did not vary significantly.[250] The provisions in the IMPs that if the 20 percent reductions in the average annual groundwater withdrawals within the URNRD, MRNRD, and LRNRD do not achieve compliance with the Compact and FSS, then the net groundwater depletions within the NRDs will be further reduced to the NRDs respective portions of Nebraska's allowable groundwater CBCU are not likely sufficient to achieve compliance with the Compact and FSS during prolonged dry-year conditions for the reasons set forth in the Finding 145.

147. Aside from seeking changes to the Accounting Procedures and seeking credit for any damages paid in calculating moving averages of its allocations less CBCU reduced by IWS, Nebraska and the Republican River NRDs intend to offset exceedances of Nebraska's future allocations with plans to continue clearing invasive riparian vegetation along the Republican River and its tributaries, plans to continue participation in incentive programs to retire irrigated acreage, and plans to implement streamflow augmentation projects.[251] However, the benefits from these plans remain largely unquantified.

148. The primary means that Nebraska and the Republican River NRDs have available to offset exceedances of Nebraska's future allocations is the leasing of surface water supplies for conveyance to Kansas, which one of Nebraska's experts referred to as "the lowest hanging fruit on the tree."[252] Although the Nebraska DNR and NRDs successfully leased 25,000 acre-feet, 53,500 acre-feet, and 15,000 acre-feet of surface water in 2006, 2007, and 2008,

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246 Kansas Exhibit 6, Expert Report of David W. Barfield, *Ensuring Future Compliance by Nebraska*, January 20, 2009, Figure 7.

247 *State of Nebraska's Post-Hearing Brief* at 4.

248 Kansas Exhibit 1, Expert Report of Dale Book, *Engineering Analysis of Losses to Kansas Water Users Resulting from Overuse of Republican River Supply in Nebraska*, January 20, 2009, Table 1.

249 *Id.*

250 *Id.*

251 Nebraska Exhibit 15, Expert Report of James Schneider and James Williams, *Nebraska Compact Compliance*, February 17, 2009, pp. 10-15.

252 Transcript of Arbitration Proceedings, March 12, 2009, Volume IV at 794:8 (Williams).

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respectively, there is no evidence in the record that similar quantities of surface water could be leased during a prolonged dry period, such as occurred from 2002 through 2006. The probability of non-exceedance over the period of record (1918 – 2007) for precipitation in the Nebraska portion of the Republican River Basin during 2006, 2007, and 2008 was 0.63, 0.91, and 0.76, respectively,[234] which undoubtedly resulted in more surface water being available for lease than would be available during a prolonged dry period, particularly when the lessor can use groundwater as a substitute supply such as occurred in the Nebraska Bostwick Irrigation District during 2006.[253]

149. If Nebraska and the Republican River NRDs are going to rely on leasing surface water for conveyance to Kansas to offset exceedances of its future allocations and reduce future violations of the Compact and the FSS, then Nebraska and the Republican River NRDs should have permanent, interruptible supply contracts with surface water irrigators that subject to the call of Nebraska and the Republican River NRDs would provide certain amounts of surface water, if available. However, there apparently are no efforts underway to put in place such permanent, interruptible supply contracts.[254]

150. Because Nebraska has underestimated the amounts by which it is likely to exceed its allocations during dry-year conditions by perhaps as much as 20,000 acre-feet to 30,000 acre-feet per year,[255] the current IMPs adopted by Nebraska and the Republican River NRDs are inadequate to ensure compliance with the Compact and FSS during prolonged dry-year conditions, such as occurred from 2002 through 2006. Nebraska and the Republican River NRDs should make further reductions in consumptive groundwater withdrawals beyond what's required in the current IMPs, in addition to obtaining permanent, interruptible supply contracts with surface water irrigators, to ensure compliance with the Compact and FSS during prolonged dry-year conditions.

151. Neither the Compact nor the FSS require that Nebraska demonstrate in advance how it will be in compliance in the future. Nonetheless, Nebraska must maintain compliance as prescribed by the FSS during each 5-year period for normal administration and during each 2-year period for Water-Short Year Administration. While the Nebraska official responsible for ensuring compliance with the Compact and the FSS clearly understands non-compliance is not an option,[256] it is not clear that this same understanding exists within the NRDs. For example, in early 2007, the general manager for the MRNRD stated:

> As NRDs, we struggle in trying to help others understand that we have been active in the basin and that given time, our controls will have a positive benefit.
> ...

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253 *See* Finding 85.

254 Transcript of Arbitration Proceedings, March 13, 2009, Volume V at 963:11-18 (Dunnigan).

255 *See* Finding 144.

256 *See* Finding 139.

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> We are concerned on two points: 1) That the formula being used to measure water allocations for this lawsuit settlement are flawed and are not giving Nebraska irrigators appropriate credit for groundwater savings; and, 2) That the Nebraska DNR does not really know what needs to be done in order to bring Nebraska into compliance. We hesitate to subject the irrigators in the Republican Basin to such drastic reductions – and the entire region to such economic hardship – based on a guess or an assumption that may not be accurate or true.[257]

The fact is Nebraska has not been in compliance with the FSS since it was executed on December 15, 2002, until the 5-year normal administration period ending in 2008,[247] following the wet year of 2007 with wet-year conditions continuing through 2008, as described in Finding 146.

152. Even if Kansas' experts have not overestimated the amount of reduction in groundwater irrigated acreage that is necessary in Nebraska for Nebraska to comply with the FSS as described in Finding 135, it is not necessary to impose Kansas' proposed remedy to ensure that Nebraska complies with the Compact and FSS in the future.

153. To ensure Nebraska's future compliance with the provisions of the FSS, Kansas is entitled to injunctive relief enjoining Nebraska from exceeding its future allocations determined in accordance with the Accounting Procedures using the averaging provisions for normal administration and Water-Short Year Administration as set forth in the FSS.

154. Should Nebraska fail to comply with the injunction contemplated by Finding 153, sanctions may be appropriate in addition to the award of additional damages to Kansas. While such sanctions may be significant, those sanctions should be based on the specific circumstances of Nebraska's failure to comply, and hence it is not appropriate to recommend the pre-establishment of such sanctions in advance, as requested by Kansas.[258]

155. Contrary to the viewpoint expressed by one of Nebraska's experts,[259] the FSS does not provide that money can be exchanged for water in determining the 5-year averages of allocation less CBCU reduced by the IWS credit for normal administration periods or the 2-year averages for Water-Short Year Administration. Consistent with the express provisions of the FSS and as a sanction for violating the FSS by exceeding its allocations during Water-Short Year Administration in 2005 and 2006, Nebraska should not receive credit in subsequent 5-year averages for damages that may be paid to Kansas for those violations.

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257 Kansas Exhibit 61, *An Open Letter To All Concerned About Nebraska Water Issues*, pp. 2, 3.

258 Kansas Exhibit 6, Expert Report of David W. Barfield, *Ensuring Future Compliance by Nebraska*, January 20, 2009, § III.b.vi.; *Kansas' Post-Trial Brief* at 38.

259 Transcript of Arbitration Proceedings, March 12, 2009, Volume IV at 795:12-16 (Williams).

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156. In addition to its proposed remedy, Kansas also seeks the appointment of a river master to administer future compliance with the FSS "on an annual basis until such time as Nebraska can demonstrate an independent ability to achieve compliance."[260] Acknowledging that the "Court rarely appoints a river master,"[261] Kansas cites three reasons why it believes the Court should appoint a river master: (1) Nebraska does not have a central authority or institutions that are capable of curtailing excessive consumptive groundwater withdrawals in Nebraska's portion of the Republican River Basin to achieve compliance with the FSS in the short term;[262] (2) there is no incentive for Nebraska to comply with the FSS, since Nebraska's gain from noncompliance with the FSS is considerably greater than Kansas' losses; and (3) there is a natural propensity for the states to disagree.

157. While Nebraska does not have a central authority that regulates groundwater withdrawals and although the Nebraska NRDs may not embrace the reductions in groundwater CBCU that may be necessary for compliance with the Compact and FSS during prolonged dry-year conditions, there is a central authority that can impose the necessary actions to ensure compliance: the State of Nebraska itself. The Nebraska NRDs operate pursuant to statutes enacted by the Nebraska legislature, and the Nebraska legislature can change those statutes to ensure that Nebraska complies with the Compact and FSS. As the director of the Nebraska DNR testified: "The State of the [*sic*] Nebraska has to live within its allocation."[263] With the injunctive relief suggested in Finding 153 enjoining Nebraska from exceeding its allocations in the future and sanctions for failure to comply, the cost to Nebraska for noncompliance should incentivize Nebraska to take whatever steps are necessary to ensure that it does stay within its allocations under the Compact pursuant to the FSS during all conditions including prolonged dry-year conditions.

158. Kansas cites to *Texas v. New Mexico*[264] as a precedent for the Court appointing a river master. In that case, as is the setting here, the Court recognized "the natural propensity of these two States to disagree."[265] But that was not the reason why the Special Master in that case made the recommendation, which the Court accepted, that a river master be appointed. In *Texas v. New Mexico*, the Court specifically noted the Special Master's recommendation as follows:

> ... that because applying the approved apportionment formula is not entirely mechanical and involves a degree of judgment, an additional enforcement mechanism be supplied.

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[260] Kansas Exhibit 6, Expert Report of David W. Barfield, *Ensuring Future Compliance by Nebraska*, January 20, 2009, p. 1.

[261] *Kansas' Post-Trial Brief* at 35.

[262] *Id.*

[263] Transcript of Arbitration Proceedings, March 13, 2009, Volume V at 954:7-8 (Dunnigan).

[264] *Texas v. New* Mexico, No.65, Original, 482 U.S. 124, 107 S.Ct. 2279.

[265] *Id.* at 134.

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> We accept his recommendation and also his preferred solution: the appointment of a River Master to make the required periodic calculations.[266]

In this matter, a river master is not needed "to make the required periodic calculations" because pursuant to the FSS:

> The States will determine Virgin Water Supply, Computed Water Supply, Allocations, Imported Water Supply Credit, augmentation credit and Computed Beneficial Consumptive Use based on a methodology set forth in the RRCA Accounting Procedures, attached hereto as Appendix C.[267]

159. In *Texas v. New Mexico*, the river master appointed by the Court had the specific and limited duty "to make the required periodic calculations" in applying the approved apportionment formula. In this matter, Kansas has not identified what specific duties and authorities a Court-appointed river master could or should undertake. Kansas has only proposed the general duty "to administer Decree compliance on an annual basis"[268] Until such time as the duties and authorities of a river master for the Republican River Basin are specifically identified, appointment of a river master is not warranted.

CONCLUSIONS

Accounting Procedures

1. For the reasons set forth in the *Arbitrator's Final Decision on Legal Issues*, which is attached and incorporated herein, Nebraska's proposed changes to the Accounting Procedures are proper subjects for this arbitration.

Accounting Procedures – Estimating Computed Beneficial Consumptive Use for Groundwater and Imported Water Supply

2. The assertion made by Colorado and Kansas that the issue of estimating CBCU of groundwater and determining the IWS is not a proper subject for this arbitration, because Nebraska's expert report on this issue had not been submitted to the RRCA for its consideration, is not convincing. Nebraska's proposal to use 8 differences calculated using 16 runs of the RRCA Groundwater Model for each of 4 aquifer stresses is essentially the same as what was presented to the RRCA in August of 2008, even though the weighting coefficients used to combine the differences have changed. Neither Colorado nor Kansas timely made this assertion when they submitted their respective expert reports in response to

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266 *Id.*

267 Final Settlement Stipulation, Volume 1 of 5, § IV.A., p. 17.

268 Kansas Exhibit 6, Expert Report of David W. Barfield, *Ensuring Future Compliance by Nebraska*, January 20, 2009, § IV.3.

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Nebraska's expert report on this issue, and neither timely raised this assertion during the hearing conducted as part of this arbitration.

3. Nebraska's proposed procedure for determining VWS, whereby what Nebraska terms VWS_G, determined as (θ – CKMN), is more consistent with the definition of VWS established in the Compact and adopted in the Accounting Procedures than is summing $CBCU_C$, $CBCU_K$, and $CBCU_N$, less IWS, each calculated in accordance with the existing Accounting Procedures, to compute VWS_G.

4. While Nebraska's proposal for determining what it terms VWS_G is consistent with the definition of VWS established in the Compact and adopted in the Accounting Procedures, Nebraska's proposed changes to calculate $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS, are problematic and adoption of Nebraska's proposed changes by the RRCA is not appropriate.

5. Although Nebraska's proposed changes to calculate $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS, should not be adopted by the RRCA, the RRCA should consider reconvening the Technical Groundwater Modeling Committee to thoroughly re-evaluate the nonlinear response of the RRCA Groundwater Model when simulated stream drying occurs, re-evaluate the existing procedures for determining CBCU and IWS, and document its conclusions and any recommendations in a report to the RRCA.

Accounting Procedures – Haigler Canal

6. During the period of years from 1995 through 2006, the annual amounts of water measured at the Haigler Canal Spillback gage exceeded the actual annual amounts of water measured at the Arikaree Gage in 2002, 2003, 2004, and 2005, indicating that a significant portion of the water measured at the Haigler Canal Spillback gage during these years does not remain in the Arikaree River as measurable surface water at the Arikaree Gage.

7. While some of the water measured at the Haigler Canal Spillback gage undoubtedly reaches the Arikaree Gage under certain conditions, there is insufficient information to justify changing the Accounting Procedures to reduce the diversions from the North Fork Republican River into the Haigler Canal by the amount of water measured at the Haigler Canal Spillback gage, as proposed by Nebraska.

8. Consequently, the changes to the Accounting Procedures proposed by Nebraska involving VWS calculations for the North Fork of the Republican River in Colorado and the Arikaree River are not justified.

9. During the period of years from 1995 through 2006, the annual amounts of water returning to the Arikaree River from irrigation using water from the Haigler Canal, as estimated in accordance with the change to the Accounting Procedures proposed by Nebraska to apportion 49 percent of the return flows to the Arikaree River at the Arikaree Gage, exceeded the actual annual amounts of water measured at the Arikaree Gage in 2001, 2002, 2003, and 2004.

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Thus, only a small portion of the return flow from irrigation in Nebraska using water from the Haigler Canal returns to the Arikaree River, at least during the years since 2001.

10. The conclusion that since 2001 only a small portion of the return flow from irrigation in Nebraska using water from the Haigler Canal returns to the Arikaree River is supported by the observations that: (1) the lands irrigated with water from the Haigler Canal in the Arikaree drainage near Haigler are sandy; (2) many of the systems used to irrigate lands in Arikaree drainage near Haigler using water from the Hailger Canal have been converted to center pivot sprinklers reducing return flows comprised by overland flow; and (3) the direction of groundwater flow under the Arikaree drainage is north towards the Main Stem, not towards the Arikaree River.

11. While some of the water measured at the Arikaree Gage may be comprised of return flow from groundwater discharge under certain conditions, there is insufficient information to justify changing the Accounting Procedures to apportion any of the return flow from irrigating lands using water from the Haigler Canal to the Arikaree River, as proposed by Nebraska.

Accounting Procedures – Groundwater Model Accounting Points

12. The "equitable division" or "allocation" of the waters of the Republican River Basin set forth in Article IV of the Compact for a named "drainage basin" is derived from the "computed average annual virgin water supply" originating in that drainage basin, which ends at the confluence of the stream draining that basin and the "Main Stem" of the Republican River as "Main Stem" is defined in § II. of the Accounting Procedures. This definition of Main Stem is entirely consistent with Article III of the Compact.

13. The locations of the accounting points in the RRCA Groundwater Model that are used for calculating CBCU of groundwater for the "Frenchman Creek (River) drainage basin in Nebraska," "South Fork of the Republican River drainage basin," and "Driftwood Creek drainage basin," pursuant to § III.D.1. of the Accounting Procedures, are consistent with the allocations made by named drainage basin in Article IV of the Compact.

14. Changing the locations of the accounting points in the RRCA Groundwater Model that are used to determine CBCU of groundwater as proposed by Nebraska for the "Frenchman Creek (River) drainage basin in Nebraska," "South Fork of the Republican River drainage basin," and "Driftwood Creek drainage basin," such that the accounting point locations would correspond to the locations of the stream gages designated in § II. of the Accounting Procedures, would result in the CBCU of groundwater below the designated stream gages being included in the CBCU for the Main Stem rather than in the CBCU for the tributary drainage basins. These changes would be inconsistent with the definitions of these drainage basins implicit in Article III of the Compact and are not appropriate.

15. However, to the extent groundwater pumping causes depletions to streamflows downstream of the gages designated in § II. of the Accounting Procedures for the "Frenchman Creek

(River) drainage basin in Nebraska," "South Fork of the Republican River drainage basin," and "Driftwood Creek drainage basin," and upstream of the confluence of each associated stream with the Main Stem, the RRCA should modify the Accounting Procedures for these sub-basins to subtract the CBCU of groundwater below the designated gage for each Sub-basin and above the confluence of that Sub-basin's stream with the Main Stem from the VWS for that Sub-basin, to avoid a double-accounting of that quantity of water, and add that increment of groundwater CBCU in the VWS for the Main Stem, such as is currently done in accounting for the CBCU of surface water below the Sub-basin gages for Medicine Creek, Sappa Creek, Beaver Creek, and Prairie Dog Creek.

16. The accounting point currently used to determine the CBCU of groundwater in the "North Fork of the Republican River in Colorado drainage basin" is not located at the confluence with the Main Stem, as the Main Stem is defined in § II. of the Accounting Procedures. This is inconsistent with the explicit meaning of the "North Fork of the Republican River drainage basin in Colorado" in Article III of the Compact and results in CBCU of groundwater that should be included in the CBCU for the Main Stem being included instead in the CBCU for the "North Fork of the Republican River in Colorado drainage basin." The RRCA should move the location of this accounting point to the model cell in which the North Fork of the Republican River crosses the Colorado-Nebraska state line to provide for the appropriate determination of CBCU for the "North Fork of the Republican River in Colorado drainage basin" and CBCU for the Main Stem.

17. The changes to the Accounting Procedures described above should apply to all years for which the accounting of water use has not been finalized and approved by the RRCA.

Damages – Losses to Kansas Water Users from Overuse in Nebraska

18. Nebraska does not deny that it exceeded its basin-wide allocations in 2005 and 2006 and its Water-Short Year allocations above Guide Rock in 2005 and 2006.

19. Subsection V.B.2.e. of the FSS explicitly provides that for purposes of determining Nebraska's compliance during Water-Short Year Administration, Virgin Water Supply, Computed Water Supply, Allocations, and Nebraska's Computed Beneficial Consumptive Use, are to be calculated as two-year running averages. The FSS does not explicitly address the amount of the violation when Nebraska is not in compliance with the FSS during Water-Short Year Administration.

20. The two-year average of Nebraska's exceedance of its Water-Short Year Administration allocation above Guide Rock for 2006 should not be used to determine the amount of Nebraska's violation for 2006 because the two-year average is greater than Nebraska's actual exceedance in 2006. Rather, the amount of Nebraska's violation for 2005 and 2006 should be equal to Nebraska's exceedance of its Water-Short Year Administration allocations above Guide Rock for each of those years.

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21. Based on a document accepted as Kansas Exhibit 84 on the last day of hearing, irrigators in the Nebraska Bostwick Irrigation District chose to substitute water supply from Nebraska's allocation below Guide Rock for water supply from the Superior Canal in 2006. Given the explicit provision in § IV.A.e)(1) of the Accounting Procedures pertaining to use of substitute supplies for the Superior Canal from Nebraska's allocation below Guide Rock, a portion of the 2006 evaporation from Harlan County Lake should be assigned to Nebraska.

22. Adding half of the net evaporation from Harlan County Lake for 2006 to Nebraska's estimate of its 2006 allocation exceedance results in a revised estimate of the 2006 exceedance that is sufficiently close to Kansas' estimate of the 2006 exceedance to justify acceptance of Kansas' estimate, which allocated evaporation from Harlan County Lake "... based on long-term average uses."

23. Nebraska's exceedance of its Water-Short Year Administration allocation above Guide Rock is estimated to be 42,860 acre-feet for 2005 and 36,100 acre-feet for 2006, which are the amounts estimated by Kansas' expert.

24. To provide a basis for estimating the direct economic impacts to Kansas caused by Nebraska's exceedance of its Water-Short Year allocation above Guide Rock, the additional amount of water that should have been available for use in Kansas was routed in accounting simulations by the experts for Kansas and Nebraska to where the direct economic of impacts of the shortages occurred: the farm headgates in KBID and downstream of KBID. To perform these simulations the experts for both Kansas and Nebraska assumed that the additional amount of water that should have been available for use in Kansas was regulated through Harlan County Lake. After deducting for additional net evaporation from Harlan County Lake, the additional amounts of water that should have been available from Harlan County Lake were estimated to be 41,519 acre-feet for 2005 and 33,383 acre-feet, the amounts estimated by Kansas' expert.

25. The accounting simulations routing the additional water from Harlan County Lake performed by Kansas' expert results in estimated amounts of water that would have been available for delivery to KBID from the Courtland Canal at the Nebraska-Kansas state line of 40,551 acre-feet (rounded to 40,600 acre-feet) for 2005 and 32,605 acre-feet (rounded to 32,600 acre-feet) for 2006. These estimated amounts are overstated. Kansas' expert only subtracted the consumptive canal losses (losses that do not recharge computed as 18 percent of the total canal losses in accordance with RRCA accounting) from the Courtland Canal diversions in Nebraska, leaving the non-consumptive losses (losses that do recharge computed as 82 percent of the total canal losses in accordance with RRCA accounting) as part of the simulated additional supplies available to KBID from the Courtland Canal at the Nebraska-Kansas state line in 2005 and 2006. While some, if not all, of the non-consumptive losses from the Courtland Canal in Nebraska would reasonably be assumed to be available to Kansas irrigators as groundwater and as additional flow in the Republican River, the non-consumptive canal losses are losses from the canal and can not be part of the water supply available to KBID from the Courtland Canal at the Nebraska-Kansas state line.

26. There is insufficient information in the record to allow a reasonably reliable estimate of how the additional groundwater and flow in the Republican River from non-consumptive losses from the Courtland Canal in Nebraska might have been used by irrigators in Kansas.

27. The accounting simulations routing the additional water from Harlan County Lake performed by Nebraska's experts properly exclude all of the estimated canal losses from the Courtland Canal in Nebraska. However, Nebraska's experts made no attempt to estimate the amounts of canal losses that would have been available to Kansas as groundwater or as additional flow in the Republican River. Nebraska's experts have understated the additional amounts of water that would have available to Kansas irrigators below the Nebraska-Kansas state line in 2005 and 2006.

Damages – Direct Economic Impacts

28. The approach used by Kansas' experts to project irrigated crop yields that would have been realized, had overuse of water by Nebraska not occurred, is not materially the same as the approach used in *Kansas v. Colorado*, No. 105, Original, in several respects that are important. First, the crop response functions in *Kansas v. Colorado* were based on the response of crop yield to precipitation and irrigation only, whereas the version of IPYsim employed by Kansas' experts includes not only crop-yield response to precipitation and irrigation but also includes crop-yield response to total usable nitrogen. Second, the crop response functions in *Kansas v. Colorado* do not include economic considerations, whereas IPYsim incorporates costs for both nitrogen fertilizer and water. Third, Kansas' experts adjusted the IPYsim response functions first so that the economically optimal yields equaled trend yields and then secondly so that yields for fully irrigated crops (termed fully irrigated "expected yield" for an individual crop) equaled observed yields under actual irrigation multiplied by the ratios of simulated yield under full irrigation and simulated yield under actual irrigation, both simulated when the economically optimal yields equaled trend yields. This resulted in the fully irrigated "expected yield" for corn, which Kansas' experts identified as the most appropriate crop for their proposed yield modeling framework, of 206 bushel/acre. This fully irrigated "expected yield" is 10 percent higher than the historical maximum yield of 187 bushel/acre in KBID, which was observed in 2005. Kansas did not provide any information to verify the reasonableness of the resulting response functions that were then used to assess impacts, whereas the crop response functions in *Kansas v. Colorado* were based on empirical relationships; that is, relationships based on observations that can be verified or disproved by observation or experiment.

29. The experts for Colorado and Nebraska on the issue of economic impacts were both critical of the adjustment of the IPYsim crop response functions to estimate the crop-specific fully irrigated "expected yield."

30. Kansas did not sufficiently address variations in soil types and climate between western Kansas, where the crop-yield functions for precipitation and irrigation were developed and upon which the IPYsim crop response functions were based, and north-central Kansas

several hundred miles to the northeast, where KBID and the other impacted areas in Kansas are located.

31. There is no evidence in the record of an active water market in or adjacent to south-central Nebraska, where Nebraska leased surface water in 2006 that could be diverted by KBID at the Guide Rock Diversion Dam. Therefore, the unit cost that Nebraska paid to lease water in its attempt to comply with the FSS in 2006 is not the same as the unit value of water to Kansas from lost profits due to overuse by Nebraska in 2006.

32. In seeking damages, Kansas bears the burden of proof concerning the extent of such damages based upon a preponderance of the evidence[269, 270] and must show such damages to reasonable certainty.[271]

33. The preponderance of evidence at this juncture does not support the estimates of additional water that would have been available at the headgates of Kansas irrigators but for Nebraska's overuse of water in 2005 and 2006, the lack of significance of soil and climate variations assumed by Kansas' experts, the methodology used by Kansas's experts to project irrigated crop yields that would have been realized had overuse of water by Nebraska not occurred, or the estimates of the total direct economic impacts in 2005 and 2006 made by Kansas' experts with reasonable certainty. Kansas's estimates of the total direct economic impacts in 2005 and 2006 are not sufficiently reliable to form an appropriate recommendation for awarding damages to Kansas.

34. The alternative estimates of total direct economic impacts in 2005 and 2006 developed by experts for Colorado and Nebraska are also not sufficiently reliable to form an appropriate recommendation for awarding damages to Kansas.

35. Because this arbitration is non-binding, the legal principle *res judicata* is not applicable and Kansas may submit additional information to support or revise its estimates of actual damages caused by Nebraska's overuse of water in 2005 and 2006. Such additional information can be presented in arbitration supplemental to this present proceeding, before the same or a different arbitrator, or such information can be presented during a determination of damages by the Court.

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269 "In a typical civil suit for money damages, plaintiffs must prove their case by a preponderance of the evidence." *Herman & MacLean v. Huddleston*, 459 U.S. 375, 103 S.Ct. 683 (1983), at 387.

270 "The burden of showing something by a 'preponderance of the evidence,' the most common standard in the civil law, 'simply requires the trier of fact to believe that the existence of a fact is more probable than its nonexistence before [he] may find in favor of the party who has the burden to persuade the [judge] of the fact's existence.'" *Concrete Pipe & Products of California, In. v. Construction Laborers Pension Trust for Southern California*, 508 U.S. 602, 113 S.Ct. 2264, at 2279 (internal citations omitted).

271 "It is well understood that such evidence must show damages to reasonable certainty. Mere 'plausible anticipation' does not merit consideration nor are flights into the realm of pure speculation entitled to be treated as evidence. *Connecticut RY. & Lighting Co. v. Palmer et al.*, 305 U.S. 493, 59 S.Ct. 316 (1939), at 505.

36. Clearly Kansas incurred damages resulting from Nebraska's overuse of water in 2005 and 2006 and those damages may well be in the range of one to several million dollars. However, until such time Kansas can demonstrate with a preponderance of evidence that its assumptions and methodology for estimating lost profits and establishing damages is reasonably reliable (either through independent peer review or with empirical data), during subsequent arbitration or before the Court, only an award of nominal damages should be made.

37. Nominal damages are "by definition, minimal monetary damages."[272] While nominal damages could be $ 1 or less,[273] given that Kansas has clearly been harmed by Nebraska's overuse of water but has not shown the extent of such harm with sufficient certainty, an award of nominal damages in the amount of $10,000 is recommended.

Damages – Indirect Economic Impacts

38. The gross indirect economic impacts, or "Value Added Impact" or "Indirect Value Added Loss" estimated by Kansas' experts for both 2005 and 2006 of 44 percent of the direct economic impacts (gross income loss), meaning that total economic impacts are estimated to be 1.44 times the estimated direct economic impacts, are reasonable.

39. Kansas' experts should have attempted to reasonably quantify the indirect benefits resulting from Nebraska's payments for actual damages. Also, there is no evidence in the record for this proceeding whether opportunity costs offsetting or reducing gross secondary impacts, as found to be appropriate by the Court in *Kansas v. Colorado*, No. 105, Original, were considered by Kansas' experts, or whether such offsets are even relevant in this instance.

40. Since an award of only nominal damages for direct economic impacts is recommended in this proceeding, no award of damages for indirect economic impacts should be made.

41. If Kansas seeks to demonstrate with a preponderance of evidence the amounts of additional water that would have been available at the headgates of Kansas irrigators, but for Nebraska's overuse of water in 2005 and 2006, and that its assumptions and methodology for estimating lost profits and establishing actual damages is reasonably reliable during subsequent arbitration or before the Court, Kansas should also attempt to reasonably quantify indirect benefits resulting from Nebraska's payment for actual damages and should also include any offsetting opportunity costs if such are relevant.

Future Compliance

42. To ensure future compliance with the FSS, Kansas has proposed that Nebraska reduce its groundwater-irrigated acreage in the Basin by approximately 515,000 acres. Kansas' experts

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[272] 22 Am. Jur. 2d Damages § 8 (2008).

[273] *Colorado Investment Services v. Hager*, 685 P.2d 1371 (1984) at 1375.

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estimate that this would reduce consumptive groundwater withdrawals by an average of 619,000 acre-feet per year.

43. Kansas has adequately demonstrated that its proposed remedy would result in Nebraska's compliance with the FSS, even during dry-year conditions similar to what occurred during the period 2002 through 2006. However, given the magnitude of the assumed increase in surface water CBCU from reductions in groundwater CBCU and the fact that Kansas' experts used datasets from years when precipitation was above average overall, Kansas' experts likely have overestimated the amount of reduction in groundwater irrigated acreage that is necessary in Nebraska for Nebraska to comply with the FSS. Therefore, Kansas has not adequately demonstrated that its proposed remedy is the "minimum remedy necessary for compliance" as it has asserted.

44. In its attempts to ensure future compliance with the Compact and FSS, Nebraska and the URNRD, MRNRD, and LRNRD have jointly developed revised IMPs for the 5-year term from 2008 through 2012. These revised IMPs first rely on 20 percent reductions in the average annual groundwater withdrawals within the URNRD, MRNRD, and LRNRD (intended to be achieved in the LRNRD through reduced allocations for individual irrigators), compared to the average withdrawals for 1998 through 2006. This would reduce consumptive groundwater withdrawals within the portion of the Republican River Basin in Nebraska by an average of 217,120 acre-feet per year from the 1998 – 2006 average of 1,083,530 acre-feet per year. An average reduction in consumptive groundwater withdrawals of 217,120 acre-feet per year is 35 percent of the average annual reduction of 619,000 acre-feet per year that Kansas estimates would result from its proposed remedy.

45. Simulations by Nebraska's experts of the performance of the IMPs, assuming 20 percent reductions in the average annual consumptive groundwater withdrawals within the URNRD, MRNRD, and LRNRD from the 1998 – 2006 average withdrawals, under a scenario of repeated dry conditions, during which compliance would be crucial, showed that Nebraska would be over its allocation under normal year administration by an average amount of 340 acre-feet per year, over the 5-year simulation period, and would be over by an average amount of 8,288 acre-feet per year under Water-Short Year Administration. However, Nebraska's basin-wide allocation from these simulations averaged 20,000 acre-feet per year more than the average basin-wide allocation of about 211,000 acre-feet per year that was determined by the RRCA for the actual dry-year period of 2002 through 2006, and Nebraska's allocation above Guide Rock from these simulations for Water-Short Year Administration averaged 32,000 acre-feet per year more than the actual average allocation above Guide Rock of 189,820 acre-feet per year that was determined by the RRCA for the Water-Short Year Administration in 2005 and 2006. Consequently, Nebraska has underestimated the amounts by which it is likely to exceed its allocations during dry-year conditions by perhaps as much as 20,000 acre-feet to 30,000 acre-feet per year. As a result, the 20 percent reductions in the average annual groundwater withdrawals within the URNRD, MRNRD, and LRNRD, compared to the average withdrawals for 1998 through 2006, are unlikely sufficient to ensure compact compliance during prolonged dry-year conditions, such as occurred from 2002 through 2006.

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46. When a 20 percent reduction in the average annual consumptive groundwater withdrawals within the URNRD, MRNRD, and LRNRD, compared to the 1998 – 2006 average withdrawals, is not sufficient to achieve compliance with the Compact and FSS, Nebraska then relies on the provisions in the IMPs that limit the net groundwater depletions for the URNRD, MRNRD, and LRNRD to 44 percent, 30 percent, and 26 percent, respectively, of Nebraska's allowable groundwater. The difficulty in ensuring compliance with the Compact and FSS through these provisions of the IMPs is that just as for groundwater withdrawals where there is a long time lag between the time when the pumping actually occurs and the time when it manifests itself on streamflows, depending on the location of the wells from which consumptive groundwater withdrawals are made, there is also a long time lag between the time when groundwater withdrawals are reduced or curtailed and the time when resulting increases in streamflow occur.

47. When it is determined that one or more of the URNRD, MRNRD, or LRNRD has exceeded their portion of Nebraska's allowable groundwater CBCU in the preceding year, as specified in the respective IMP, and further reductions are made to consumptive groundwater withdrawals in the respective NRD, it will be years before the effects of those reductions are expressed as increased streamflow, depending on the location of the wells from which groundwater withdrawals are reduced or curtailed. If a particular NRD's exceedance of its portion of Nebraska's allowable groundwater CBCU occurs during a prolonged period of dry conditions, such as occurred from 2002 through 2006, it will likely not be possible for Nebraska to achieve compliance during the term of the current IMPs without focused curtailment of consumptive groundwater withdrawals in close proximity to surface water streams, which is not specifically required in any the IMPs for the URNRD, MRNRD, or LRNRD. As a result, the limitations on the average annual net streamflow depletions from consumptive groundwater withdrawals within the URNRD, MRNRD, and LRNRD are likely inadequate to ensure compliance with the Compact and FSS during prolonged dry-year conditions, such as occurred from 2002 through 2006.

48. Nebraska has not been in compliance with the FSS since it was executed on December 15, 2002, until the 5-year normal administration period ending in 2008, following the wet year of 2007 with wet-year conditions continuing through 2008. Although the IMPs for the Republican River NRDs are enforceable, the current IMPs adopted by Nebraska and the Republican River NRDs are inadequate to ensure compliance with the Compact and FSS during prolonged dry-year conditions, such as occurred from 2002 through 2006. Nebraska and the Republican River NRDs should make further reductions in consumptive groundwater withdrawals beyond what's required in the current IMPs, in addition to obtaining permanent, interruptible supply contracts with surface water irrigators, to ensure compliance with the Compact and FSS during prolonged dry-year conditions.

49. Neither the Compact nor the FSS require that Nebraska demonstrate in advance how it will be in compliance in the future. Nonetheless, Nebraska must maintain compliance as prescribed by the FSS during each 5-year period for normal administration and during each 2-year period for Water-Short Year Administration. To ensure Nebraska's compliance with the Compact and FSS into the future, it is not necessary to impose Kansas' proposed remedy. However, Kansas is entitled to injunctive relief enjoining Nebraska from exceeding its future

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allocations determined in accordance with the Accounting Procedures using the averaging provisions for normal administration and Water-Short Year Administration as set forth in the FSS.

50. Should Nebraska fail to comply with an injunction, sanctions may be appropriate in addition to the award of additional damages to Kansas. While such sanctions may be significant, those sanctions should be based on the specific circumstances of Nebraska's failure to comply, and hence it is not appropriate to recommend the pre-establishment of such sanctions in advance, as requested by Kansas.

51. Consistent with the express provisions of the FSS, which do not provide that money can be exchanged for water in determining the 5-year averages of allocation less CBCU reduced by the IWS credit for normal administration periods or the 2-year averages for Water-Short Year Administration, and as a sanction for violating the FSS by exceeding its allocations during Water-Short Year Administration in 2005 and 2006, Nebraska should not receive credit in subsequent 5-year averages for damages that may be paid to Kansas for those violations.

52. With the injunctive relief enjoining Nebraska from exceeding its allocations in the future and sanctions for failure to comply, the cost to Nebraska for noncompliance should incentivize Nebraska to take whatever steps are necessary to ensure that it does stay within its allocations under the Compact pursuant to the FSS during all conditions including prolonged dry-year conditions.

53. In *Texas v. New Mexico*, the Court appointed a river master with the specific and limited duty "to make the required periodic calculations" in applying the approved apportionment formula.[274] Since the specific duties and authorities that a river master appointed by the Court could or should undertake in the Republican River Basin have not been specifically identified, appointment of a river master is not warranted at this time.

[274] *Texas v. New* Mexico, No.65, Original, 482 U.S. 124, 107 S.Ct. 2279, at 134.

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RECOMMENDATIONS

1. As described in the *Arbitrator's Final Decision on Legal Issue*, Question 3, the Accounting Procedures should be modified so that evaporation from Harlan County Lake is allocated between Kansas and Nebraska in proportion to each state's use of water from Harlan County Lake for all purposes, including use to offset streamflow depletions from consumptive groundwater withdrawals.[275]

2. Nebraska's proposed changes to the Accounting Procedures to calculate $CBCU_C$, $CBCU_K$, $CBCU_N$, and IWS, should not be adopted. However, the RRCA should consider reconvening the Technical Groundwater Modeling Committee to thoroughly re-evaluate the nonlinear response of the RRCA Groundwater Model when simulated stream drying occurs, re-evaluate the existing procedures for determining CBCU and IWS, and document its conclusions and any recommendations in a report to the RRCA.

3. Nebraska's proposed changes to the Accounting Procedures involving calculation of VWS for the North Fork of the Republican River in Colorado and the Arikaree River should not be adopted.

4. Nebraska's proposed changes to the Accounting Procedures to apportion return flows from irrigation using water diverted through the Haigler Canal between the North Fork of the Republican River in Nebraska and the Arikaree River should not be adopted.

5. Nebraska's proposed changes to the Accounting Procedures to move the location of the accounting points in the RRCA Groundwater model to correspond to the location of the Sub-basin gages for "Frenchman Creek (River) drainage basin in Nebraska," "South Fork of the Republican River drainage basin," and "Driftwood Creek drainage basin," should not be adopted. However, to the extent groundwater pumping causes depletions to streamflows downstream of the gages in these sub-basins and upstream of the confluence of each associated stream with the Main Stem, the Accounting Procedures for these sub-basins should be modified to subtract the CBCU of groundwater below the designated gage for each Sub-basin and above the confluence of that Sub-basin's stream with the Main Stem from the VWS for that Sub-basin, to avoid a double-accounting of that quantity of water, and add that increment of groundwater CBCU in the VWS for the Main Stem.[275]

6. Nebraska's proposed change to the Accounting Procedures to move the location of the accounting point in the RRCA Groundwater model for the "North Fork of the Republican River in Colorado drainage basin" to the location where the North Fork of the Republican River crosses the Colorado-Nebraska state line should be adopted.[275]

7. Kansas should be awarded nominal damages of $10,000 for Nebraska's overuse of water in 2005 and 2006 until Kansas can correct its estimates of the amounts of water that would have been available to KBID from the Courtland Canal, but for Nebraska's overuse, and can

[275] Changes should apply to all years for which the accounting of water use has not been finalized and approved by the RRCA.

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demonstrate that its assumptions and methodology for estimating lost profits and establishing damages is reasonably reliable, during subsequent arbitration or before the Court.

8. Nebraska's IMPs for the URNRD, MRNRD, and LRNRD are inadequate to ensure compliance with the Compact and FSS during prolonged dry-year conditions, such as occurred from 2002 though 2006. Nebraska and the Republican River NRDs should make further reductions in consumptive groundwater withdrawals beyond what's required in the current IMPs and should obtain permanent, interruptible supply contracts with surface water irrigators, to ensure compliance with the Compact and FSS during prolonged dry-year conditions.

9. To ensure Nebraska's compliance with the Compact and FSS into the future, it is not necessary to impose Kansas' proposed remedy. However, Kansas is entitled to injunctive relief enjoining Nebraska from exceeding its future allocations determined in accordance with the Accounting Procedures using the averaging provisions for normal administration and Water-Short Year Administration as set forth in the FSS.

10. Should Nebraska fail to comply with an injunction, sanctions may be appropriate in addition to the award of additional damages to Kansas. While such sanctions may be significant, those sanctions should be based on the specific circumstances of Nebraska's failure to comply.

11. Nebraska should not receive credit in subsequent 5-year averages for damages that may be paid to Kansas for Nebraska's violations of the FSS in 2005 and 2006.

12. A river master for the Republican River should not be appointed until the specific duties and authorities that a river master could or should undertake in the Republican River Basin have been specifically identified and determined to be necessary.

Dated: June 30, 2009

Karl J. Dreher
Arbitrator

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CERTIFICATE OF SERVICE

I, Karl J. Dreher, hereby certify that I caused a copy of the foregoing Arbitrator's Final Decision to be placed in the U.S. Mail, postage paid, on this 30th day of June, 2009, addressed to each of the following:

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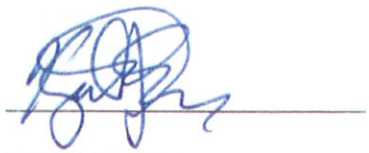

Karl J. Dreher

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TAB 9

KANSAS LETTER OF DECEMBER 19, 2007

KANSAS
DEPARTMENT OF AGRICULTURE

Kathleen Sebelius, Governor
Adrian J. Polansky, Secretary

www.ksda.gov

December 19, 2007

Ann Bleed, P.E.
Nebraska Commissioner,
Republican River Compact Administration
Director, Nebraska Department of Natural Resources
P.O. Box 94676
Lincoln, NE 68509-4676

Subject: Remedy for Nebraska's violation of the Decree in *Kansas v. Nebraska & Colorado*, No. 126, Original, U.S. Supreme Court

Dear Commissioner Bleed:

The State of Nebraska is in violation of the May 19, 2003 Supreme Court Decree in *Kansas v. Nebraska & Colorado,* 538 U.S. 720 (2003). The Decree approved the Final Settlement Stipulation ("FSS"), which had been filed with the Special Master on December 16, 2002. The FSS requires compliance on a five-year running average, and, when Water-Short Year Administration is in effect, compliance is also calculated on a two-year running average unless Nebraska submits an Alternative Water-Short Year Administration plan to the Republican River Compact Administration ("RRCA"). Appendix B to the FSS provides the FSS Implementation Schedule, which sets the first normal compliance year as 2007 (5-year running average for 2003-2007) and the first Water-Short Year Administration compliance year as 2006 (2-year running average for 2005-2006) if water supply conditions for Water-Short Year Administration are present.

Pursuant to the Implementation Schedule and water supply conditions, Water-Short Year Administration began in 2006. Data for the year 2006 was received in 2007. Analysis of that data and data for 2005 shows the 2-year running average of Nebraska's Computed Beneficial Consumptive Use above Guide Rock for 2005-2006 to be 41,430 acre-feet per year in excess of Nebraska's allocations above Guide Rock, contrary to Subsection V.B.2 (a) of the FSS. For the two years, Nebraska's total overuse of water in violation of the FSS amounts to 82,870 acre-feet. See Attachment 1 hereto. For comparison, this amount is more than a city in Kansas of 100,000 population consumes in 10 years. It is also more than twice the amount of water that would be consumed per year under full supply conditions on all the acreage authorized to be irrigated in the Kansas Bostwick Irrigation District in the Republican Basin.

Kansas began to express its concerns in the 1980s that Nebraska was violating the Compact. Despite continued complaints by Kansas and attempts at mediation, Nebraska allowed further significant increases in water development and use by its water users. Consequently, Kansas was forced to file *Kansas v. Nebraska & Colorado,* No.126, Orig., in 1998. After rulings by the Special Master and the Supreme Court, the States agreed to the FSS in December 2002 as noted above. Since then Kansas has complied with all of its obligations under the FSS in good

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faith. The State of Nebraska, on the other hand, has seriously neglected its obligations under the FSS. Actions by the State of Nebraska have been grossly insufficient and unrealistic, resulting in injury to Kansas and its water users. As was the case when David Pope wrote his letter of January 24, 2007, actions apparently being discussed by the State of Nebraska will continue to be insufficient and ignore growing river depletions due to past groundwater pumping.

It is now five years since the FSS was agreed to by Nebraska. But again, the State of Nebraska has failed to meet its obligations to the State of Kansas under the Republican River Compact, and Kansas' water users have continued to suffer as a result. Although there are disagreements between Kansas and Nebraska on certain portions of the final accounting for 2005 and 2006, Nebraska is significantly out of compliance for this first period of Water-Short Year Administration regardless of which State's methodology is used. Further, although the accounting for 2007 is not yet available, it is clear that Nebraska will not be in compliance for the statewide five-year accounting period 2003 through 2007. The cumulative Nebraska overuse for 2003 through 2006 is 143,840 acre-feet. See Attachment 2 hereto. This is the amount that Nebraska needed to make up in 2007 in order to be in compliance for 2003-2007, an unlikely event. In addition, 2007 was also a Water-Short Year Administration year, and it is highly unlikely, as well, that Nebraska will meet the Water-Short Year Administration requirements for that year.

In light of the foregoing, Kansas proposes the remedy set out in Attachment 3 to this letter. The remedy includes: (1) entry of an order by the Supreme Court finding Nebraska in violation of the Court's Decree; (2) Kansas' damages for the years 2005-2006 or Nebraska's gains, whichever are greater, plus compounded interest and attorneys fees and costs, together with any additional relief that may be considered appropriate by the Court; and (3) (a) shutdown of wells and groundwater irrigation in Nebraska within 2 ½ miles of the Republican River and its tributaries, (b) shutdown of groundwater irrigation of acreage added after the year 2000 throughout the Republican River Basin in Nebraska and (c) such further reductions of net consumptive use in the Basin in Nebraska necessary to maintain yearly compliance, or the hydrologic equivalent of the foregoing. In addition, if Nebraska continues to be unable or unwilling to control its water users, further relief, including a Court-appointed River Master, may be necessary.

Supporting Materials

Although the most urgent need is to bring Nebraska into compliance, sanctions for the 2005-2006 violations are also appropriate. Kansas' preference is for repayment in water, but repayment in water by Nebraska appears to be impractical, given the overwhelming deficit that has been accumulated by Nebraska. Therefore, monetary payment is proposed, equal to the gains reaped by Nebraska as a direct result of violating the Court's decree, or Kansas' damages, whichever are greater. This should reduce Nebraska's incentive to violate the Court's Decree in the future.

During recent years, Nebraska's groundwater consumptive beneficial use has been approximately 200,000 acre-feet per year. Even with purchase of surface water and other actions by Nebraska, however, Nebraska has been significantly short of Compact compliance. Kansas' attached analysis demonstrates that Nebraska must reduce its annual groundwater consumptive use (depletions of the surface waters of the Republican River Basin in Nebraska) to 175,000 acre-feet per year, or otherwise achieve the hydrologic equivalent, to dependably meet its 5-year compliance test. See Attachment 4 hereto.

The stipulated RRCA Ground Water Model has been used to determine the extent to which ground water pumping must be curtailed in order to reduce and maintain river depletions caused by groundwater pumping in Nebraska down to 175,000 acre-feet per year. See Attachment 5 hereto. That analysis indicates that a reduction in groundwater irrigated acreage of approximately 515,000 acres is required of 1,201,000 irrigated acres assumed in the future case. As is demonstrated in Figure 4 of Attachment 5, failure to address groundwater depletions in a substantive way will result in continued loss of streamflow. Without this reduction in groundwater pumping, significantly less surface water will be available for existing irrigation projects and/or to assist in achieving Compact compliance. Immediate additional actions by Nebraska are also necessary to achieve near-term compliance. In the long term, further actions will likely be needed, especially in Water-Short Year Administration years.

Designated Schedule for Resolution

Kansas is proposing the foregoing remedies to address the past and continuing violations of the Supreme Court Decree in order that you may consider whether you can agree to these remedies. This situation comes as no surprise to you. Nebraska has been aware that its consumptive use has exceeded allocation every year since 2003. At the 2006 and 2007 Republican River Compact Administration meetings, for instance, Kansas pointed to the increasing likelihood that Nebraska would be out of compliance as soon as the data became available. In addition, by letter of January 24, 2007, Kansas specifically addressed the inadequacy of actions then being proposed in Nebraska as a means of bringing Nebraska into compliance.

Please review this proposal and respond to me within 45 days with regard to whether Nebraska is willing to agree to the proposed remedy. If we do not reach an agreement within that time period, Kansas will submit the dispute to the RRCA. If the dispute is not resolved by the RRCA, we will submit the dispute to the RRCA as a "fast track" issue and will proceed pursuant to the FSS Dispute Resolution procedure according to the schedule set out in Attachment 6 hereto, unless otherwise agreed.

Very truly yours,

David W. Barfield

David W. Barfield, P.E
Kansas Chief Engineer
Kansas RRCA Commissioner

cc: (w/encl.) (Via Email & U.S. Mail)
Kansas Attorney General Paul Morrison
Dick Wolfe, Colorado RRCA Commissioner
Aaron M. Thompson, U.S. Bureau of Reclamation
Col. Roger Wilson, Jr., U.S. Army Corps of Engineers
James J. DuBois, U.S. Department of Justice

Attachments:

Attachment 1 – Nebraska's Violations of the Final Settlement Stipulation: 2005-2006

Attachment 2 – Nebraska's Statewide Allocation and Computed Beneficial Consumptive Use: 2003-2006

Attachment 3 – Proposed Remedy for Violations of the Court's Decree

Attachment 4 – Engineering Report: Requirements for Nebraska's Compliance with the Republican

Attachment 5 – Report: RRCA Groundwater Model Analysis

Attachment 6 – Designated Schedule for Resolution

Attachment 1

Nebraska's Violation of Water-Short Year Administration Requirement 2005 and 2006

Table 5C Nebraska's Compliance During Water-Short Year Administration (from App. C of the FSS p. C65)*								
Year	Allocations			Computed Beneficial Consumptive Use (CBCU)			Credits from Imported Water	Difference Between Allocation and Consumptive Use Minus Imported Water Supply above Guide Rock
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8
	State Wide Allocation	Allocation below Guide Rock	State Wide Allocation above Guide Rock	State Wide CBCU	CBCU Below Guide Rock	State Wide CBCU Above Guide Rock	Credits above Guide Rock	Col 3 – (Col 6 – Col 7)
2005	199,450	4,586	194,864	253,740	4,052	249,689	11,965	(42,860)
2006	189,180	3,615	185,565	240,850	3,064	237,786	12,214	(40,010)
Average	194,320	4,100	190,210	247,300	3,560	243,740	12,090	(41,430)

*All average and total values are rounded to the nearest 10.

For 2005, two accountings were approved by the RRCA. The difference was caused by dispute over the inclusion or exclusion of evaporation from non-federal reservoirs in Nebraska below Harlan County Reservoir. The values displayed are from the accounting includes all non-federal reservoir evaporation in Nebraska, as proposed by Kansas.

For 2006, no accounting was approved by the RRCA. Only input data for the accounting was approved. The values displayed are from an accounting consistent with Kansas position on accounting inclusive of (1) all non-federal reservoir evaporation in Nebraska and (2) a Harlan County Reservoir evaporation assignment method that assigns evaporation to both Kansas and Nebraska when only one State takes water from Harlan County Storage.

The totals for 2005 and 2006 from table 5C are below:

Year	Allocations			Computed Beneficial Consumptive Use (CBCU)			Credits from Imported Water	Difference Between Allocation and Consumptive Use Minus Imported Water Supply above Guide Rock
Column	Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8
	State Wide Allocation	Allocation below Guide Rock	State Wide Allocation above Guide Rock	State Wide CBCU	CBCU Below Guide Rock	State Wide CBCU Above Guide Rock	Credits above Guide Rock	Col 3 – (Col 6 – Col 7)
Totals	388,630	8,200	380,430	494,590	7,120	487,470	24,180	(82,870)

Attachment 2

Nebraska's Five-Year Running Average Allocation and Computed Beneficial Consumptive Use for Determining Compact Compliance 2003 through 2006

Table 3C: Nebraska's Five-Year Average Allocation and CBCU (from App. C of the FSS p. 62)*				
	Col. 1	Col. 2	Col. 3	Col. 4
Year	Allocation	Computed Beneficial Consumptive Use	Credits from Imported Water Supply	Difference between Allocation and Computed Beneficial Consumptive Use minus Imported Water Supply
2003	227,580	262,780	9,782	(25,418)
2004	205,630	252,650	10,386	(36,640)
2005	199,450	253,740	11,965	(42,325)
2006	189,180	240,850	12,214	(39,456)
2007				
Average	205,460	252,510	11,090	(35,960)

*All average and total values are rounded to the nearest 10.

The values for years 2003 and 2004 were approved by the Republican River Compact Administration.

For 2005, two accountings were approved by the RRCA. The difference was caused by dispute over the inclusion or exclusion of evaporation from non-federal reservoirs in Nebraska below Harlan County Reservoir. The values displayed are from the accounting includes all non-federal reservoir evaporation in Nebraska, as proposed by Kansas.

For 2006, no accounting was approved by the RRCA. Only input data for the accounting was approved. The values displayed are from an accounting consistent with Kansas position on accounting inclusive of (1) all non-federal reservoir evaporation in Nebraska and (2) a Harlan County Reservoir evaporation assignment method that assigns evaporation to both Kansas and Nebraska when only one State takes water from Harlan County Storage.

The totals of table 3 C are below:

Year	Allocation	Computed Beneficial Consumptive Use	Credits from Imported Water Supply	Difference between Allocation and Computed Beneficial Consumptive Use minus Imported Water Supply
Totals for 2003 to 2006	821,840	1,010,020	44,350	(143,840)

Attachment 3

Proposed Remedy for Violation of the Court's Decree
in
Kansas v. Nebraska and Colorado,
No. 126, Orig., U.S. Supreme Court
Decree of May 29, 2003, 538 U.S. 720

1. Order of Supreme Court finding Nebraska in violation of the Court's Decree and imposing the following remedy.

2. For 2005-2006 violation of the Final Settlement Stipulation (FSS), Nebraska shall pay to Kansas the following:

   A. Kansas' damages or Nebraska's gains, whichever are greater;

   B. Prejudgment interest compounded from the date of Nebraska's overuse;

   C. Attorneys fees and costs; and

   D. Such further relief as may be considered appropriate by the Court to address fully the Decree violation by Nebraska.

3. To achieve compliance with the FSS in the future, Nebraska shall:

   A. Immediately (a) shut down wells and groundwater irrigation in Nebraska within 2 ½ miles of the Republican River and its tributaries, (b) shut down groundwater irrigation of acreage added after the year 2000 throughout the Republican River Basin in Nebraska and (c) such further reductions of net consumptive use in the Basin in Nebraska necessary to maintain yearly compliance. This will reduce groundwater consumptive use to approximately 175,000 acre-feet per year. Nebraska is invited to submit an alternative remedy that is the hydrologic equivalent in quantity and timing;

   B. Further reduce Nebraska's Computed Beneficial Consumptive Use to the extent necessary to keep Nebraska (1) within its Compact allocation until the effects of the reduction of groundwater pumping brings Nebraska into compliance with the Compact and the FSS, and (2) in compliance when the actions listed above in are insufficient, especially in Water-Short Year Administration years;

   C. Be subject to preset damages, costs, attorneys' fees, and additional sanctions for any failure to comply with the Court's order in the future.

Attachment 4

Requirements for Nebraska's Compliance with the Republican River Compact

Report to

David Barfield

Kansas Department of Agriculture, Division of Water Resources

from

Spronk Water Engineers, Inc.

Dale E. Book, P.E.

December 18, 2007

NE0176363

Introduction

This report describes the analysis made to determine the reductions in Groundwater Computed Beneficial Consumptive Use (CBCU) necessary in Nebraska to achieve compliance with the Republican River Compact as implemented by the Final Settlement Stipulation (FSS). Nebraska's CBCU exceeded the allocation above Guide Rock for the two-year water short year test applied to 2005 and 2006. The expected result for the five-year period of 2003 through 2007 is that Nebraska's statewide CBCU will exceed its corresponding allocation. For the four years of 2003 through 2006, Nebraska's statewide CBCU has exceeded allocations by a total of 143,840 acre-feet using the Kansas methodology.

The analysis described in this report is intended to estimate the level of Groundwater CBCU that could occur within Nebraska's allocation to achieve compliance with the five-year test. Compliance with the Water Short year standard would require that additional reduction of surface water CBCU or equivalent offset be supplied. This analysis was intended to quantify the level of groundwater CBCU that could occur within Nebraska's allocation. The RRCA Groundwater model was used to determine reductions in pumping that would be necessary to achieve this level of CBCU (see Attachment 5).

This analysis relies on the data for the period of 2002 - 2006 to compare CBCU with the allocation under the Republican River Compact. This comparison provides the amount of groundwater CBCU that can occur, in combination with the limited surface water CBCU of this period, to achieve compliance with the FSS for this period. The amount of groundwater CBCU that can occur is a reduction from recent levels of groundwater CBCU of approximately 200,000 acre-feet/year. The RRCA groundwater model was used to quantify the projected groundwater depletions in Nebraska resulting from reductions in pumping as well as changes to Imported Water Supply Credits that would occur with the reduced groundwater pumping. The projected effects of these reductions on surface water CBCU and compliance with the FSS over this period were estimated.

Criteria and Assumptions

The level of groundwater CBCU that would allow the total CBCU to be within the allocation over the five-year period of 2002 through 2006 was determined as follows. The increased streamflow caused by a proposed level of pumping reduction would increase the supply available for surface water use in Nebraska and increase supply available to Kansas. The net change of Nebraska use was estimated assuming that additional water would be consumed by the surface water users as a result of the increased supply.

NE0176364

The level of groundwater depletion that would provide compliance with the five-year statewide standard in Nebraska was determined by estimating the change in groundwater CBCU, surface water CBCU, and Imported Water Supply Credits and then comparing the resulting net total CBCU to the allocation for the five-year period. The analysis is based on the following criteria and assumptions:

- CBCU should not exceed the statewide allocation, over a five-year period.
- The Imported Water Supply Credit was estimated from analysis with the RRCA Groundwater Model
- Reductions in CBCU necessary to achieve compliance are assumed to be accomplished from reductions in groundwater irrigation pumping, as represented in the groundwater model simulation.
- Surface water CBCU in Nebraska would be increased due to increased streamflow.
- Compliance with the two-year standard for water short conditions may require reduction in surface water use, in addition to the pumping reductions.
- The time required for groundwater CBCU, as predicted with the RRCA Groundwater model, to decline to the necessary level will be several years. Until CBCU is reduced to that level, other reductions will be needed to achieve compliance.

Description of Analysis

The analysis computes the change in statewide CBCU corresponding to a reduced level of groundwater depletions. It is necessary to reduce the groundwater depletions by more than the actual deficit, since additional surface water consumptive use would be expected to occur, as a result of the increased streamflow resulting from less depletion to streamflow from groundwater pumping.

Using available compact data, the five-year average statewide allocation over the period of 2002 - 2006 was 212,000 acre-feet/year. Table 1 shows the actual FSS accounting for this period. The overuse averaged 32,000 acre-feet/year for this period.

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The amount of increased surface water consumptive use in Nebraska was estimated, based on the location of the changes in groundwater depletions. For the storage conditions in effect during these years, it was assumed that the increased flows would be largely diverted for irrigation, with some additional reservoir evaporation. The amount of additional streamflow that would be consumed by surface water uses in Nebraska was estimated to be 45%. Table 1 shows the adjusted CBCU and the comparison with the allocation.

The Imported Water Supply Credit was estimated using the RRCA Groundwater Model, with the projected future level of pumping determined from this analysis. The credit was estimated to be approximately 30,000 acre-feet/year. Actual credit would of course depend on the amounts of continued importation of Platte River water into the basin.

Results of Analysis

1. The average annual allocation for Nebraska for 2002 - 2006 was 212,000 acre-feet/year. The actual use, including both surface and groundwater, averaged 254,000 acre-feet/year. After adjusting for the Imported Water Supply Credit, the Computed Beneficial Consumptive Use exceeded the allocation by 32,000 acre-feet/year.

2. When the groundwater CBCU is reduced to 175,000 acre-feet/yr, average surface water CBCU is estimated to increase from 55,000 to 67,000 acre-feet/year. Imported Water Supply Credits increase to approximately 30,000 acre-feet/year.

3. The total CBCU that could occur within the Nebraska's allocation is 242,000 acre-feet/yr, after applying the estimated Imported Water Supply Credit.

4. The Groundwater CBCU must be reduced to 175,000 acre-feet/yr to achieve a balance with the statewide allocation over the five year period.

Conclusions

The Nebraska beneficial consumptive use has exceeded the statewide allocation for each of the years 2002 - 2006. The five-year total for the period of 2003 - 2007 is expected to exceed the allocation over that period, given the status of the accounting through 2006. Based on the five-year allocation through 2006, it would be necessary to reduce the total CBCU to approximately 242,000 acre-feet/year for Nebraska to be in compliance with the FSS.

NE0176366

A reduction of stream depletions due to groundwater pumping in Nebraska from 200,000 to 175,000 acre-feet was estimated to be necessary to provide compliance with the five-year test of the FSS over a period of similar water supply conditions. This would result in a balance between CBCU and allocation. This level of groundwater depletions corresponds to the pumping reductions described in Attachment 5.

To achieve compliance with the Water-short year periods, additional reductions to CBCU beyond those described above will be necessary. It would be necessary to limit surface water consumptive use or provide equivalent offsets from alternate sources.

Table 1

Estimated Effect on Compliance from a Reduction in Nebraska's Pumping: 2002 - 2006

(1000 acre-ft)

Table 3C: Nebraska's Five-Year Average Allocation and CBCU					
	Actual				
Year	Statewide Allocation	Ground Water CBCU	Surface Water CBCU	Imported Water Supply Credit	Allocation - (CBCU - IWS Credit)
2002	237	180	85	14	-15
2003	228	204	59	10	-25
2004	206	213	40	10	-37
2005	199	203	51	12	-42
2006	189	198	42	12	-39
Average	212	200	55	12	-32

	Adjusted				
Year	Ground Water [1] CBCU	Effect on [2] Nebraska's Surface Water CBCU	Surface Water [3] CBCU	Imported Water [4] Supply Credit	Allocation - [5] (Adjusted CBCU - IWS Credit)
2002	175	2	88	30	4
2003	175	13	72	30	11
2004	175	17	57	30	4
2005	175	13	63	30	-9
2006	175	11	53	30	-9
Average	175	11	67	30	0

[1] Nebraska's projected amount of Ground Water CBCU

[2] 45% of the difference between the actual Ground Water CBCU and adjusted Ground Water CBCU

[3] Adjusted Surface Water CBCU = the actual surface water CBCU plus the Effect on Nebraska's Surface Water CBCU

[4] Nebraska's projected Imported Water Supply Credit

[5] Adjusted compliance = Nebraska's allocation - (the adjusted Ground Water CBCU + the adjusted Surface Water CBCU - the adjusted imported water supply credit)

Attachment 5: RRCA groundwater model analysis (revised)
Impact of Nebraska pumping and proposed remedy

Samuel P. Perkins[1] and Steven P. Larson[2]
January 4, 2008
(see Appendix A for an explanation of revisions)

[1]Civil Engineer, Interstate Water Issues, Kansas Dept. Of Agriculture, Div. of Water Resources;
[2]S. S. Papadopulos & Associates, Inc., Bethesda, MD.

Introduction

The analysis described in Attachment 4 has shown that annual groundwater consumptive use in Nebraska must be reduced to 175,000 acre-feet in order to achieve sustained compliance with the compact. The approved RRCA groundwater model was used to determine the reduction in pumping necessary for Nebraska to meet this requirement and thereby achieve sustained compliance with the Republican River Compact. This memo describes the basis for the projected depletions computed by the groundwater model under both status quo and reduced pumping scenarios.

In order to reach and then sustain a groundwater consumptive use of 175,000 acre-feet (AF) needed to comply with the Compact over the next 50 years, the proposed remedy case imposes the following conditions on future groundwater pumping for irrigation within the Republican River basin in Nebraska: first, a no-pumping zone for irrigation is imposed within 2.5 miles of RRCA groundwater model stream cells; second, groundwater irrigation area is held at 2000 levels at distances greater than 2.5 miles from stream cells; third, commingled irrigation area is held at 2006 levels at all distances from stream cells within the Republican River basin in Nebraska. Under this scenario, future groundwater irrigation area in Nebraska is reduced by 514,610 acres, including 350,970 acres within the no-pumping zone and 163,640 acres outside the no-pumping zone. For comparison, Nebraska's reported groundwater irrigated acreage within the Republican River basin has increased by 211,000 acres since 2000 and by 309,900 acres since 1990.

The proposed remedy is intended to allow recovery of streamflow as quickly as groundwater response will allow by focusing on groundwater pumping near the Republican River and its tributaries. The groundwater model was used to represent impacts of Nebraska groundwater pumping on Republican river streamflow and of imported water supply from the Platte River. Model scenarios were run to represent both status quo conditions and the proposed remedy. Projected Nebraska impacts for a 51-year future time period, as well as computed Republican River streamflow, are presented here under both scenarios.

Projected average annual impacts over 51 years (2007-2057) on Republican River streamflow under status quo conditions are 268,000 acre-feet per year (afy) for Nebraska groundwater pumping, reduced by 11,700 afy for imported water supply credit from Platte River imports, for a net impact of 256,300 afy. The corresponding impacts under the reduced pumping scenario are 164,700 afy for Nebraska pumping, reduced by 27,600 afy for imported water supply credits, for a net impact of 137,100 afy. Compared with the base case scenario, the proposed remedy scenario shows an average decrease in pumping impact of 103,300 afy and increase in imported water supply credit of 16,000 afy, for a reduction in Nebraska's net impact of 119,300 afy. However, the net impact under the proposed remedy shows an initial decline followed by an upward trend for years 2015-2057, indicating a possibly larger net impact beyond the simulated time period.

Using a sequence of historical years to represent futures

Model datasets for historical years 1990-2006 were used to construct future scenarios. These years were chosen initially because of the higher quality of Kansas water use reporting data beginning in 1990. The sequence of historical years 1990-2006, beginning with year 1990, was repeated three times to represent future scenarios for years 2007-2057. Median annual precipitation for years 1990-

2006, spatially averaged over the groundwater model domain, is 19.58 inches/year. Compared against the model's years of record 1918-2006, this corresponds to a probability of 54.5 percentile, which is slightly above median rainfall of 19.28 in/yr for years 1918-2006. This indicates that the sequence is a reasonable projection, at least with respect to the historical record. Additionally, the sequence consists of a relatively wet period (1990-1999) followed by a relatively dry period (2000-2006).

Hydrologic conditions for future years were represented by the conditions of the historical sequence of years. These conditions include mean monthly streamflow and reservoir elevations at the end of each month, both of which are specified for the stream (STR) package, and evapotranspiration (for the EVT package) as input to Modflow (mf2k). Groundwater recharge, pumping and irrigated area are also based on conditions of the historical sequence of years, but with adjustments to specify conditions for the specific cases as input files to the pumping (WEL) and recharge (RCH) packages. Irrigated area is a consideration due to the dependence of precipitation recharge on whether or not the land is irrigated. Input files to Modflow were assembled by the preprocessor programs mketff (EVT package), mkstrff (STR package) and rrppf (RCH and WEL packages) [version: rrppf_v519].

Status quo scenario

Recharge and pumping for the status quo scenario were represented by historical conditions with adjustments as follows.

Kansas data for irrigated area, groundwater pumping and return flow in future years were based on corresponding historical years' data, but with adjustments to reflect 2006 conditions with respect to return flow (based on improvements in irrigation systems), metering and development.

Data for irrigated area served by groundwater and commingled pumping as reported in 2006 by Colorado and Nebraska were used to represent all future years under base case conditions. Irrigated area served by surface water in future years was represented by data for the corresponding historical years. For Colorado, 2006 groundwater irrigated area was substituted for the corresponding historical years' area as a correction to the Colorado dataset from authorized area, as specified in years 1990-2000, to reported area used for irrigation, as specified in years 2001-2006. No corresponding adjustment was made to groundwater pumping for Colorado.

In the case of Nebraska, 2006 groundwater and commingled irrigated area were substituted for corresponding historical years' data in order to represent continued development through 2006. Groundwater pumping by Nebraska in future years was represented by reported pumping in the corresponding historical years to reflect hydrological conditions. To reflect the change in development associated with irrigation from a given historical year to the year 2006, historical pumping corresponding to each grid cell was multiplied by the ratio of total groundwater and commingled irrigated area in 2006 to the total area for the corresponding historical year. In order to reflect differences in development across Natural Resource Districts in Nebraska, this ratio was calculated for each NRD within the groundwater model domain, and applied to total reported pumping and groundwater return flow for each model grid cell within the corresponding District. NRD boundaries are shown in Figure 1.

The assumptions of historical conditions for the Nebraska dataset that are projected into the future include return flow from groundwater pumping for irrigation, which is assumed to be 20 percent. This is considered to be a generous assumption, even for recent historical years, and may warrant revision for scenario refinements, especially if allocations imposed by Natural Resource Districts are to be incorporated.

Proposed remedy case: reduced Nebraska pumping scenario

Conditions for the reduced Nebraska pumping scenario are summarized above in the Introduction. The conditions are explained in greater detail as follows.

No-pumping zone

The no-pumping zone was specified in terms of model grid cells as an approximation of an actual zone, which would likely be independent of the model grid; for example, it might reference a boundary based on the Public Land Survey System. The grid-based approximation has the advantage of allowing the affected pumping in Nebraska to be selected from datasets previously prepared by Nebraska for the model, including groundwater pumping, recharge and irrigated area. Additionally, defining the no-pumping zone with reference to model stream cell centers is intended to be consistent with prior decisions made during model development to represent the stream network.

Figure 1 shows the extent of the proposed no-pumping zone on Nebraska groundwater pumping for irrigation within the Republican River basin as gray-shaded grid cells. Model cells representing streams and federal reservoirs (turquoise) are included in the no-pumping zone. By selecting model grid cells whose centers lie within two miles of stream cell centers, the resulting no-pumping zone applies to groundwater diversions within 2.5 miles of the stream. The model grid cells corresponding to the no-pumping zone were selected in GIS and converted into a "mask", i.e., an array of 1's and 0's that was written to a text file for input to a preprocessor to identify grid cells for which pumping is to be excluded.

2000 irrigated area

Outside the no-pumping zone, groundwater irrigation area for the year 2000 was substituted for corresponding historical years' data to hold development at 2000 levels. Groundwater pumping by Nebraska in future years was represented by reported pumping in the corresponding historical years to reflect hydrological conditions, multiplied by a factor to reflect the change in irrigated area, given by the ratio of groundwater irrigated area in 2000 to groundwater irrigated area in the corresponding historical year. Ratios were calculated for each Natural Resource District (NRD) and applied to corresponding pumping within the NRD.

An implicit assumption of the above conditions for the proposed remedy scenario is that pumping within the no-pumping zone cannot be transferred outside the zone.

The combined effects of imposing the no-pumping zone and fixing irrigated area at 2000 elsewhere in the Republican River basin are to reduce groundwater irrigated area within the Republican River basin by 514,600 acres, or 43 percent, from 1,200,600 acres under the status quo scenario to 686,000 acres under the proposed remedy.

Commingled irrigated area

In applying the proposed remedy, the condition to hold groundwater irrigation area to 2000 levels is not applied to commingled irrigation area, which is instead held at 2006 levels for all of Nebraska within the RRCA groundwater model domain. Within the no-pumping zone, commingled irrigation area is retained, under the assumption that commingled area could be irrigated if surface water is available. Total 2006 commingled irrigated area in Nebraska was 119,000 acres. Within the no-pump zone, 2006 commingled irrigation area was 11,040 acres; Within the Republican River basin and outside the no-pump zone, 2006 commingled area was 2,230 acres.

Evaluation of impacts of Nebraska pumping under status quo and reduced pumping conditions

In order to compute Nebraska impacts of both groundwater pumping and imported water supply, three additional cases were run for comparison against the status quo and reduced pumping cases, above. Conditions for the third case specify no groundwater pumping in Nebraska for the entire simulation

period, beginning in 1918, but are otherwise the same as conditions for the base case. Similarly, conditions for the fourth case specify no imported water supply from the Platte River in Nebraska for the entire simulation period, beginning in 1918, but are otherwise the same as conditions for the base case. The fifth case is identical to the reduced pumping cases (above), except for the assumption that future imported water supplies from the Platte River are excluded.

Based on these five future scenario runs, impacts of Nebraska pumping and imported water supply were evaluated with respect to both baseline and reduced pumping conditions. First, the impact of Nebraska pumping under status quo conditions was evaluated as the difference given by computed Republican River flows for the "no Nebraska pumping" case minus corresponding flows for the status quo case. Second, the impact of Nebraska pumping under the proposed remedy is evaluated as the difference given by computed Republican River flows for the "no Nebraska pumping" case minus corresponding flows for the proposed remedy case. Similarly, imported water supply credits were evaluated twice: first, with respect to status quo conditions, and then with respect to reduced pumping conditions under the proposed remedy case.

Results: impacts of Nebraska pumping and imported water supply from Platte River

The reduction in groundwater irrigated area of 514,600 acres within the Republican River basin under the proposed remedy results in a groundwater pumping reduction of 619,900 acre-feet/year. Impacts of this reduction on streamflow are presented here.

Table 1 lists computed annual impacts of Nebraska pumping on Republican River streamflow and of imported water supply under both the status quo and reduced pumping scenarios for years 2007-2057, and averages over the same period. The rightmost column of Table 1 lists the reduction of impacts achieved under the reduced pumping scenario.

Table 1 shows that projected average annual impacts over 51 years (2007-2057) on Republican River streamflow under baseline, conditions are 268,000 acre-feet/per year (afy) for Nebraska groundwater pumping, reduced by 11,700 afy for imports from the Platte River, for a net impact of 256,300 afy. The corresponding impacts under the reduced pumping scenario are 164,700 afy for Nebraska pumping, reduced by 27,600 afy for imported water supply for a net average impact of 137,100 afy. Compared with the base case scenario, the proposed remedy scenario shows an average decreased pumping impact of 103,300 afy, and an increase in imported water supply credit of 16,000 afy, for an average net Nebraska impact reduction of 119,300 afy. However, the net impact under the proposed remedy shows an initial decline followed by an upward trend for years 2015-2057 that indicates a possibly larger net impact beyond the modeled time period.

Nebraska impacts on Republican River streamflow are shown graphically in Figures 2 and 3. Figure 2 shows the separate impacts of Nebraska pumping and imported water supply credit under both scenarios. Figure 3 shows the net sum of pumping impact and imported water supply credit for each scenario.

Figure 2 shows historical impacts of Nebraska pumping on Republican River streamflow and imported water supply credit according to the RRCA groundwater model for years 1960-2006. The historical impact of Nebraska pumping reached peak levels of 212,900 acre-feet/year in 2001 and 213,100 acre-feet/year in 2004, and was 198,400 acre-feet/year in 2006. Figure 2 also shows projected impacts of Nebraska pumping on Republican River streamflow and imported water supply credit under both the status quo scenario and the reduced pumping scenarios for years 2007-2057.

The impact of Nebraska pumping on Republican River streamflow in future years under the status quo scenario shows greater variability than under the reduced pumping scenario because of the greater magnitudes of the pumping under the status quo scenario. Projected pumping impacts under both scenarios appear to have upward trends, although impacts under status quo conditions show a

decreasing rate of change. Imported water supply credits under the proposed remedy are greater and show less variability than do those under status quo conditions.

Table 1. Projected impacts of Nebraska pumping and Platte River imports under both status quo conditions and the proposed remedy (acre-feet/year)

year	Status quo conditions			Proposed remedy			Impact reduction
	pumping	imports	Net impact	pumping	imports	Net impact	
2007	206,685	15,945	190,740	189,290	17,476	171,814	18,926
2008	228,723	10,519	218,204	185,972	18,160	167,812	50,392
2009	232,212	10,058	222,154	184,619	24,438	160,181	61,973
2010	268,248	28,216	240,032	188,316	28,869	159,447	80,585
2011	234,826	18,396	216,430	167,740	23,517	144,223	72,207
2012	257,288	16,004	241,284	169,116	25,785	143,331	97,953
2013	279,390	19,589	259,801	170,714	27,116	143,598	116,203
2014	253,960	20,178	233,782	161,514	25,630	135,884	97,898
2015	239,184	13,010	226,174	153,278	24,317	128,961	97,213
2016	259,639	12,697	246,942	162,518	27,757	134,761	112,181
2017	235,315	12,933	222,382	149,632	23,936	125,696	96,686
2018	249,836	11,921	237,915	151,570	26,762	124,808	113,107
2019	220,215	8,478	211,737	137,938	20,590	117,348	94,389
2020	239,380	9,005	230,375	151,122	25,655	125,467	104,908
2021	249,061	9,087	239,974	155,209	27,349	127,860	112,114
2022	248,073	9,400	238,673	152,490	25,855	126,635	112,038
2023	232,745	9,054	223,691	148,589	26,396	122,193	101,498
2024	241,650	9,967	231,683	150,586	25,203	125,383	106,300
2025	260,704	8,756	251,948	158,291	26,119	132,172	119,776
2026	261,893	9,493	252,400	159,352	27,569	131,783	120,617
2027	310,470	20,000	290,470	168,124	29,958	138,166	152,304
2028	266,199	17,524	248,675	157,838	27,737	130,101	118,574
2029	288,790	11,750	277,040	161,625	29,072	132,553	144,487
2030	315,741	13,507	302,234	167,204	30,214	136,990	165,244
2031	281,880	17,106	264,774	161,227	29,113	132,114	132,660
2032	268,225	9,908	258,317	155,858	27,867	127,991	130,326
2033	287,840	10,699	277,141	165,875	30,366	135,509	141,632
2034	260,095	9,511	250,584	155,124	27,216	127,908	122,676
2035	275,704	9,444	266,260	157,893	29,493	128,400	137,860
2036	240,324	7,342	232,982	146,034	23,234	122,800	110,182
2037	253,962	8,401	245,561	159,222	28,213	131,009	114,552
2038	268,318	8,603	259,715	163,913	29,615	134,298	125,417
2039	272,377	9,011	263,366	161,569	28,314	133,255	130,111
2040	254,226	8,699	245,527	158,492	28,645	129,847	115,680
2041	262,968	8,440	254,528	160,150	27,552	132,598	121,930
2042	281,574	8,280	273,294	169,229	28,218	141,011	132,283
2043	282,715	9,153	273,562	170,738	29,665	141,073	132,489
2044	340,444	14,502	325,942	180,788	32,343	148,445	177,497
2045	285,259	15,373	269,886	168,711	29,938	138,773	131,113
2046	310,820	9,985	300,835	173,741	31,303	142,438	158,397
2047	339,785	11,229	328,556	180,301	32,442	147,859	180,697
2048	302,494	15,013	287,481	174,016	31,491	142,525	144,956
2049	286,563	8,973	277,590	167,400	29,872	137,528	140,062
2050	305,555	10,562	294,993	179,129	32,415	146,714	148,279
2051	278,614	8,926	269,688	167,245	29,129	138,116	131,572
2052	293,521	9,281	284,240	170,714	31,589	139,125	145,115
2053	250,743	6,952	243,791	156,746	24,702	132,044	111,747
2054	265,943	8,337	257,606	171,879	29,872	142,007	115,599
2055	280,141	8,709	271,432	176,507	31,446	145,061	126,371

2056	287,984	8,969	279,015	174,543	30,068	144,475	134,540
2057	270,883	8,707	262,176	169,789	30,174	139,615	122,561
2007-2057	268,023	11,678	256,345	164,696	27,643	137,053	119,292

Figure 2 shows that the impact of Nebraska pumping under the proposed remedy is projected to fall below 175,000 acre-feet/year for the first time in 2011, or in the fifth year of the future scenario, and then occasionally exceeds 175,000 acre-feet/year beginning in 2044. Based on linear trends for years 2011-2057, the impact of Nebraska pumping increases by 394 acre-feet/year under the proposed remedy, and by 1,055 afy under status quo conditions.

Figure 3 shows that the net impact of Nebraska pumping and imported water supply under the proposed remedy is projected to fall below 150,000 acre-feet/year for the first time in 2011, and then stay below 150,000 acre-feet/year for the remaining years of the simulation. Based on linear trends for years 2011-2057, the net impact of Nebraska pumping and imported water supply increases by 261 acre-feet/year under the proposed remedy, and by 1,179 afy under status quo conditions.

Figure 4 shows computed Republican River flows contributed by groundwater for the historical period 1960-2006 and for the two scenarios 2007-2057. Under status quo conditions, computed annual flows for years 1960-2057 diminish at an average rate of 2.5 percent per year, based on an exponential trend for years 2011-2057, as shown in Figure 4. Under the proposed remedy scenario, computed flows after 2006 show relatively rapid recovery during the first few years, followed by an average rate of decline of 0.23 percent per year, based on an exponential trend for years 2011-2057.

Future hydrologic conditions

It is important to keep in mind that the projections, particularly on an annual basis or in the short term, are dependent on the hydrological conditions of the assumed sequence of years. Because of this, the time required to reduce the impact of Nebraska pumping to less than 175,000 acre-feet/year, and the net impact of Nebraska pumping and imported water supply to less than 150,000 acre-feet/year, will be influenced by future and unknown hydrological conditions.

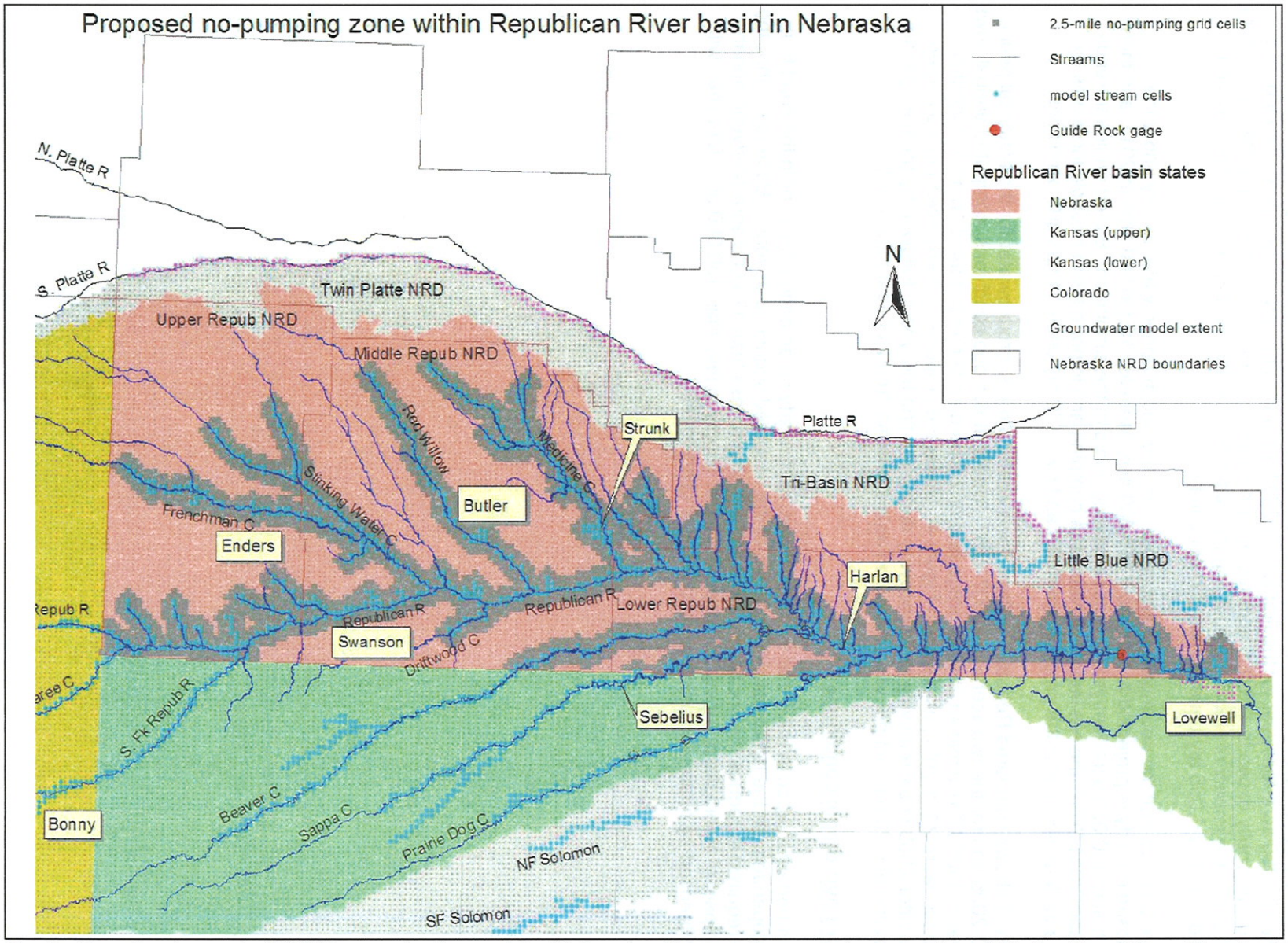

Fig. 1. Map showing part of RRCA groundwater model grid domain. Proposed no-pumping zone lies within the Republican River basin in Nebraska. Grid cells shaded dark gray are those whose centers lie within two miles of centers of stream cells (turquoise).

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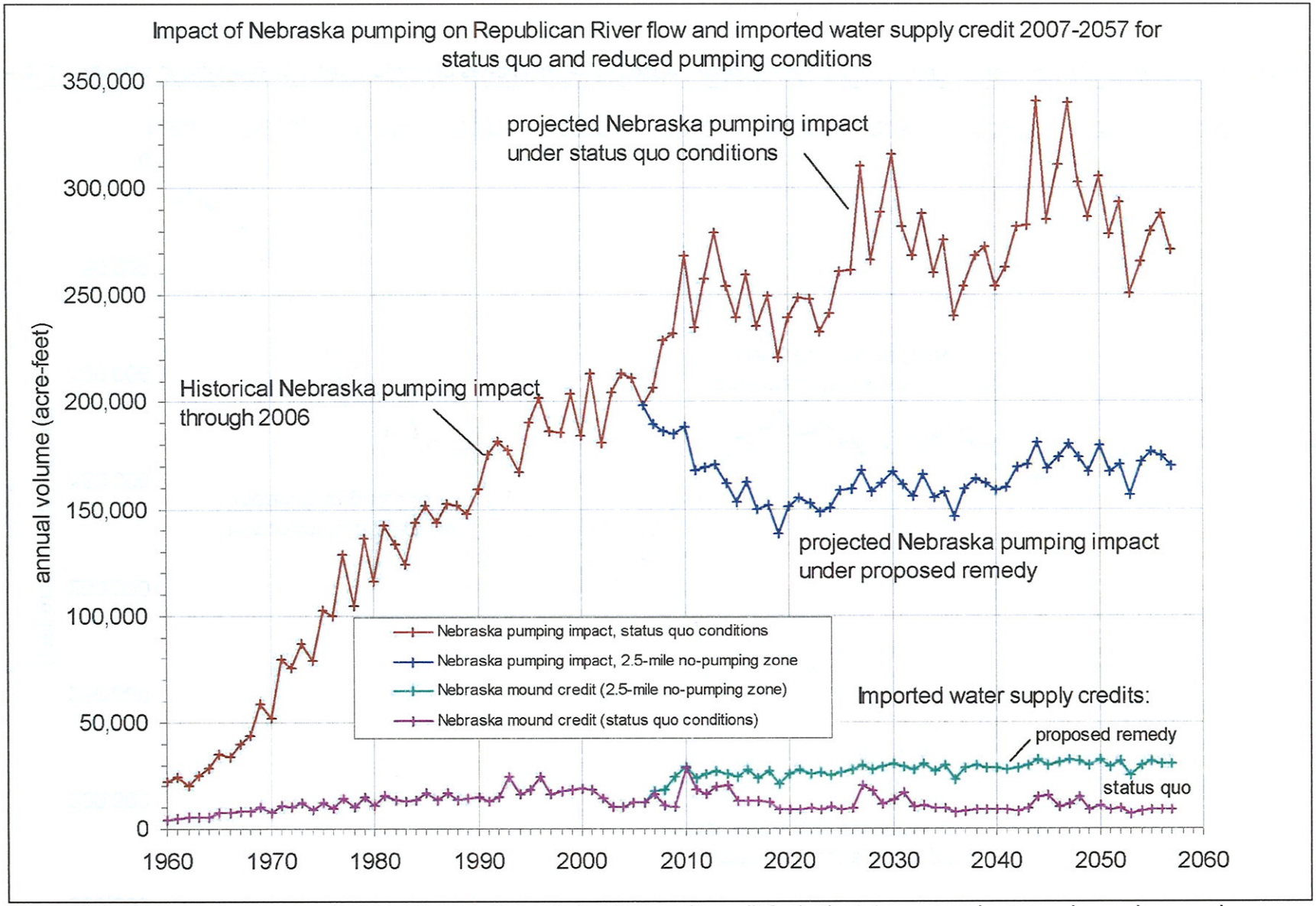

Fig. 2. Nebraska pumping impact on streamflow and imported water supply credit for both status quo and proposed remedy scenarios.

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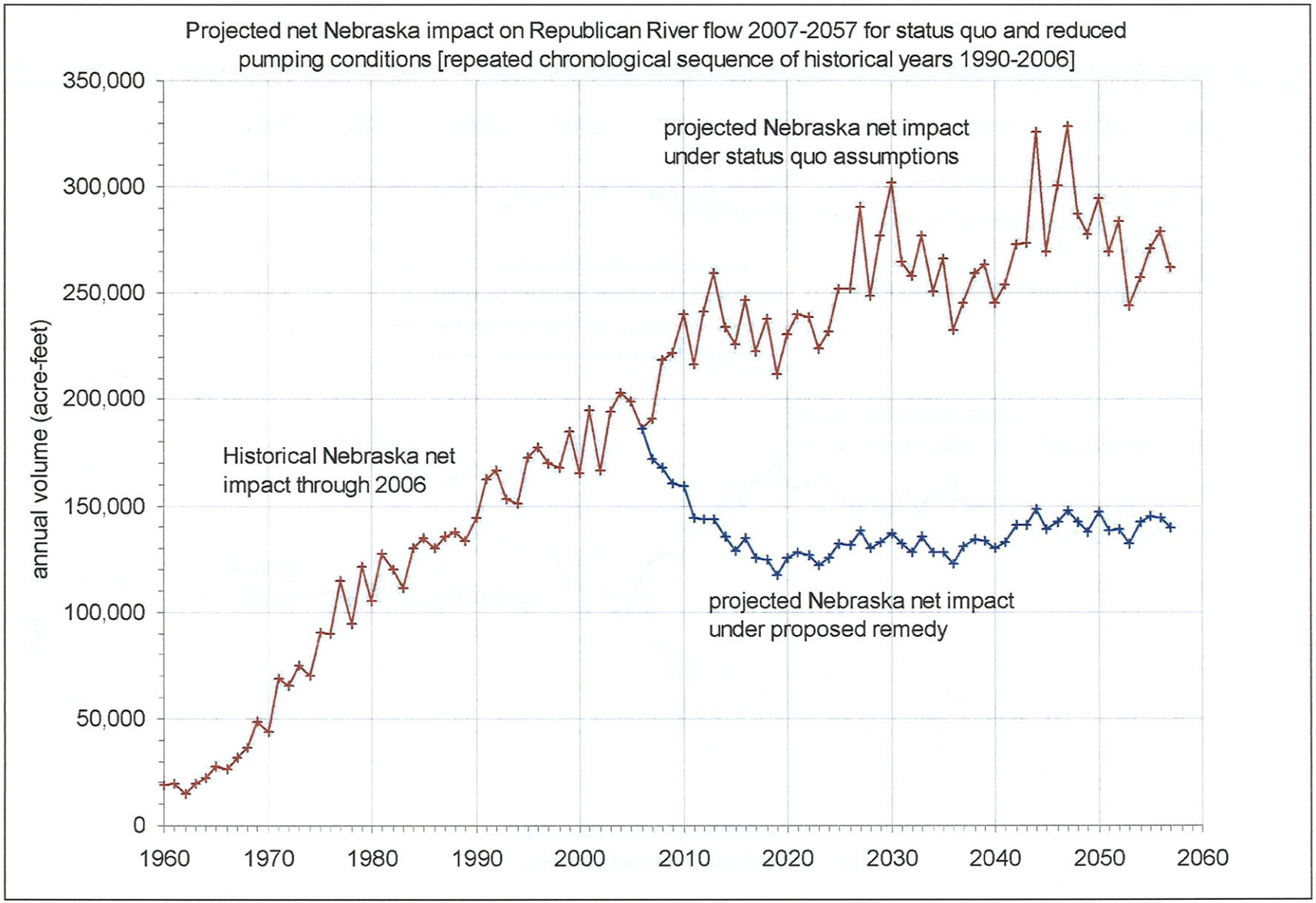

Fig. 3. Net sum of Nebraska pumping impact on streamflow and imported water supply credit for status quo and proposed remedy scenarios.

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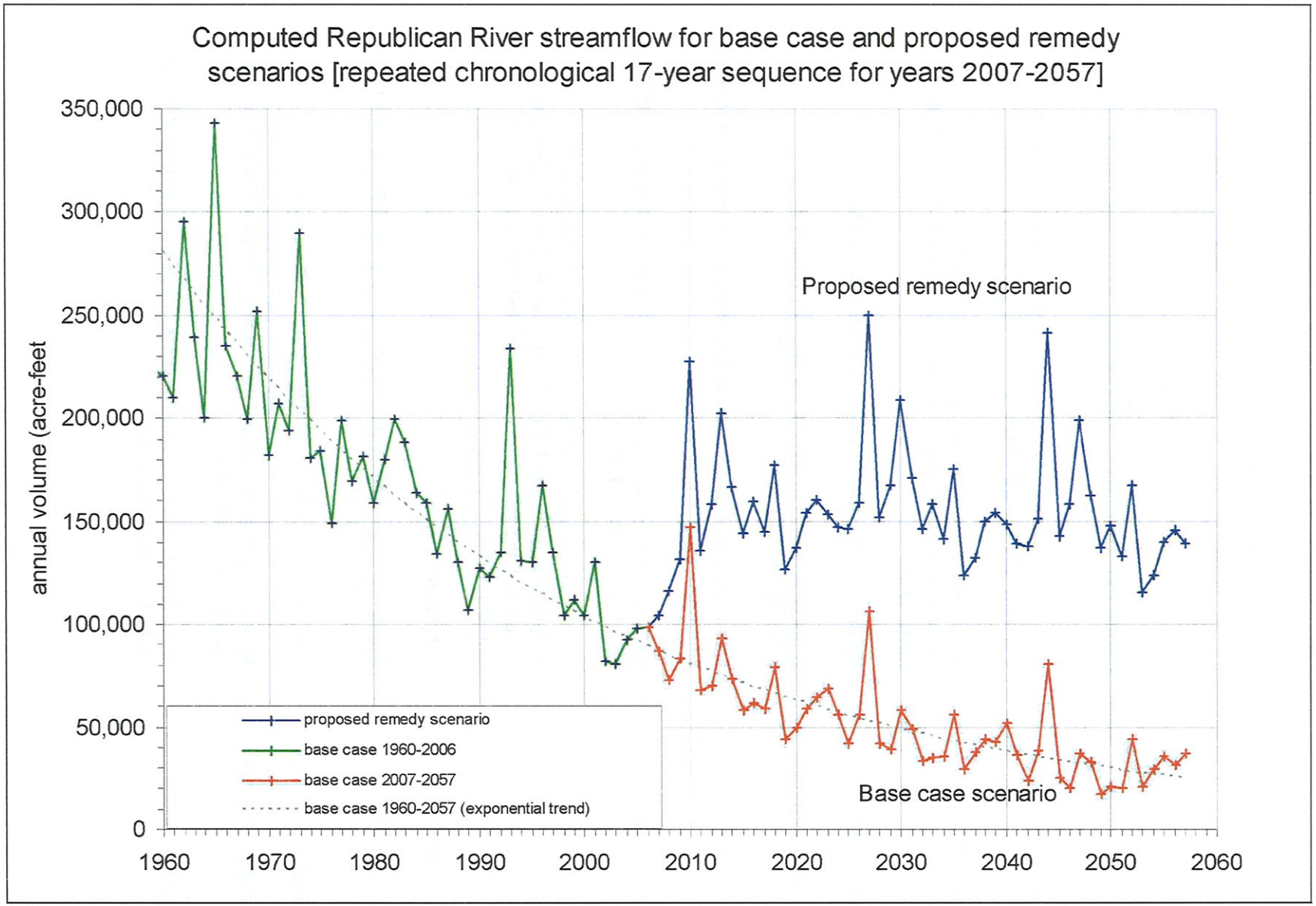

Fig. 4. Computed Republican River streamflow for status quo and proposed remedy scenarios.

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Attachment 6

Kansas v. Nebraska & Colorado,
No. 126, Orig., U.S. Supreme Court

Designated Schedule for Resolution

December 19, 2007	Kansas provides proposed remedy to Nebraska with copies to Colorado and United States.
February 4, 2008	If agreement is not reached, Kansas submits dispute to the Republican River Compact Administration (RRCA) as a "fast-track" issue.
March 5, 2008	By this date, the RRCA meets to resolve the dispute.
March 20, 2008	If the RRCA fails to resolve the dispute, Kansas invokes nonbinding arbitration.
April 3, 2008	Kansas or Nebraska may amend the scope of the dispute to address additional issues.
April 17, 2008	Kansas and Nebraska submit names of proposed arbitrators and qualifications to each other.
April 28, 2008	Kansas and Nebraska representatives meet in person or by telephone to confer and agree on arbitrators; if agreement cannot be reached, the selection is submitted to CDR Associates of Boulder, Colo.
May 1, 2008	Arbitrators engaged.
May 12, 2008	Initial meeting/scheduling conference of Kansas and Nebraska before the arbitrators.
November 12, 2008	Deadline to complete arbitration and render decision.
December 12, 2008	Kansas and Nebraska give written notice whether they will accept the arbitrators' decision.
Thereafter	If the dispute is not resolved, Kansas makes the appropriate filings in the U.S. Supreme Court.