

Non-Binding Arbitration initiated 10/21/08
pursuant to
Decree of May 19, 2003, 538 U.S. 720
Kansas v. Nebraska & Colorado
No. 126, Orig., U.S. Supreme Court

Requirements for Nebraska's Compliance
with the Republican River Compact

Report to

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from

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January 20, 2009

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). This report was previously submitted to the RRCA as Attachment 4 of the letter to Ann Bleed from Dave Barfield dated December 19, 2007. 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 141,260 ac-ft 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 Larson and Perkins export report).

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 ac-ft/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.

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 211,000 ac-ft/year. Table 1 shows the actual FSS accounting for this period. The overuse averaged 31,000 ac-ft/year for this period.

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 ac-ft/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 211,000 ac-ft/year. The actual use, including both surface and groundwater, averaged 254,000 ac-ft/year. After adjusting for the Imported Water Supply Credit, the Computed Beneficial Consumptive Use exceeded the allocation by 31,000 ac-ft/year.
2. When the groundwater CBCU is reduced to 175,000 ac-ft/yr, average surface water CBCU is estimated to increase from 54,000 to 66,000 ac-ft/year. Imported Water Supply Credits increase to approximately 30,000 ac-ft/year.
3. The total CBCU that could occur within Nebraska's allocation is 241,000 ac-ft/yr with the estimated Imported Water Supply Credit.
4. The Groundwater CBCU must be reduced to 175,000 ac-ft/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 241,000 ac-ft/year for Nebraska to be in compliance with the FSS.

A reduction of stream depletions due to groundwater pumping in Nebraska from 200,000 to 175,000 ac-ft 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 the Larson and Perkins export report.

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 ac-ft)

Year	Actual				
	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	187	198	38	12	-37
Average	211	200	54	12	-31

Year	Adjusted				
	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	48	30	-6
Average	175	11	66	30	1

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)