

Application For A Permit to Construct A Water Well (MRNRD 9/03)
In The Middle Republican Natural Resources District Ground Water Management Area

1. Name and Address of Land Owner:

Bruce McLean
33412 So. Somerset Road
Wellfleet, ne. 69170

DNR & NRD USE ONLY	
Permit No.	_____
Reg. No.	_____
Received Date	_____

2. Purpose of Well (indicate one):

Irrigation Public Water Supply Industrial
 Other _____

Amount of water to be consumed if other than irrigation use _____ acre feet / gals (select one)
 Application must include FSA farm photo or other approved map.

3. Identify the Location of the Proposed Well:

Lincoln County, Section 8
 Township 10 North, Range 31 West

The box at the right represents one square mile, (section). Indicate with an "X", the proposed location of the well. If the well is to be used for irrigation, outline lands to be irrigated.

NWNW	NENW	NWNE	NENE
SWNW	SENW	SWNE	SENE
NWSW	NESW <u>X</u>	NWSE	NESE
SWSW	SESW	SWSE	SESE
1320'			
	2640'		
			5280'

The well will be located 2000 feet from the (North/South) section line, and 2000 feet from the (East/West) section line.

How many acres will be irrigated? 13.5+

Type of irrigation system. Center Pivot , Gravity _____, Other (specify) _____

Will Fertilizer or Chemicals be applied through the proposed system Yes No?

Will System be Electric Fuel, powered?

Will the well be used in a system with other wells Yes No? How many _____

Distance from nearest well 3000 Type of well Irrigation

Have you checked county zoning requirements for well location Yes No?

4. Replacement and Abandonment Well Information: (see #1 on reverse side)

- A. Is this a replacement well? Yes No B. Registration number of abandoned well: _____
 C. Decommissioned well was last operated _____ D. Replacement well is _____ feet from abandoned well.
 E. Original well pump column size: _____ inches. F. Abandonment completed on _____
 G. Will new well water the same tract of land as the abandoned well Yes No?
 H. How many acres has the well to be replaced irrigated? _____

5. Specifications of Intended Well and Pump:

Approximate date when construction will begin: JAN, 2004
 Pump column diameter: 8-10 inches. Estimated total well depth 300+ feet.
 Estimated pumping capacity: 900+ gallons per minute. Well casing diameter: 18 inches.
 Expected well log, if known. (Please provide a copy of drilling report, if available)

6. I certify that I am familiar with the information contained in this application, and that to the best of my Knowledge and belief such information is true, complete and accurate.

Date 10-9-03

Signature of applicant Bruce McLean

Date Approved _____

NRD Representative _____

SEE OTHER SIDE FOR IMPORTANT RULES AND REGULATIONS!!

Middle Republican NRD
 P.O. Box 81
 Curtis, NE 69025

Phone (308)367-4281
 800-873-5613

REQUEST FOR VARIANCE
of the Rules and Regulations of the
Middle Republican Natural Resources District
TEMPORARY SUSPENSION OF WELL DRILLING

VARIANCE
Date received: _____
Request #: _____
For District use only

Name Bruce McQuinn
Address 33412 So Forewest Road
City, State, Zip Wellfleet, MA 01970

I hereby request a variance of Rule number 3

Reason for requesting variance:

The irrigation well permit was filled out in full and returned to the NRP office in Cutler NE. At that time they would not sign the permit. This all took place before the temporary suspension meeting in McCook NE that was held on June 11, 2002.

Bruce McQuinn
signature

10-9-03
date

Application for a PERMIT TO CONSTRUCT A WELL and \$50.00 fee must accompany this request. Fee will be returned if request is denied. You should attach any relevant information or maps to this request.

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All requests for a variance will be acted upon after a hearing before the district. Because the hearing process involves defined time frames, for notice of such hearings, your request will be acted upon at the earliest possible date within those frames. You or your representative should be present at that hearing.

## Ground Water Inflows

Annual Average Amount in acre-feet (RRCA Model, July 1, 2003)

| Years     | Inflows                     |                                    |                                    |                             |                      |                     |
|-----------|-----------------------------|------------------------------------|------------------------------------|-----------------------------|----------------------|---------------------|
|           | Recharge from Precipitation | Recharge from Excess GW Irrigation | Recharge from Excess SW Irrigation | Recharge from Canal Seepage | Recharge from Rivers | Decrease in Storage |
| 1921-1930 | 1,440,697                   | 0                                  | 0                                  | 0                           | 222,780              | 424,581             |
| 1931-1940 | 601,512                     | 1,264                              | 421                                | 15,996                      | 229,750              | 632,529             |
| 1941-1950 | 1,916,460                   | 15,262                             | 47,777                             | 632,988                     | 208,071              | 467,162             |
| 1951-1960 | 1,283,039                   | 69,083                             | 99,152                             | 652,719                     | 207,269              | 812,763             |
| 1961-1970 | 1,479,667                   | 237,718                            | 102,332                            | 598,784                     | 230,134              | 1,217,401           |
| 1971-1980 | 1,452,260                   | 595,112                            | 111,638                            | 665,139                     | 236,637              | 2,511,248           |
| 1981-1990 | 1,740,645                   | 572,102                            | 101,767                            | 623,134                     | 233,679              | 2,309,917           |
| 1991-2000 | 1,998,741                   | 498,803                            | 86,742                             | 607,402                     | 234,982              | 2,221,763           |

*McDonald & Morrissey*  
CONSULTANTS

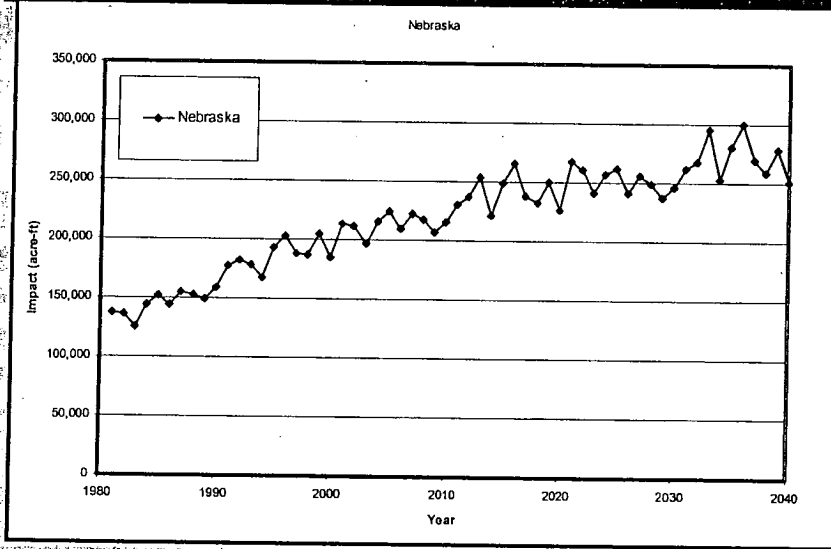
## Ground Water Outflows

Annual Average Amount in acre-feet (RRCA Model, July 1, 2003)

| Years     | Outflows        |                     |                    |                     | Net Increase in Storage |
|-----------|-----------------|---------------------|--------------------|---------------------|-------------------------|
|           | Discharge to ET | Discharge to Rivers | Discharge to Wells | Increase in Storage |                         |
| 1921-1930 | 477,250         | 680,748             | 6,227              | 923,836             | 499,255                 |
| 1931-1940 | 460,743         | 671,008             | 10,059             | 339,611             | -292,918                |
| 1941-1950 | 486,106         | 1,023,047           | 52,441             | 1,746,297           | 1,279,135               |
| 1951-1960 | 502,402         | 1,158,687           | 227,993            | 1,234,618           | 421,855                 |
| 1961-1970 | 542,580         | 1,149,087           | 898,512            | 1,276,170           | 58,769                  |
| 1971-1980 | 493,572         | 1,109,996           | 2,553,584          | 1,414,830           | -1,096,418              |
| 1981-1990 | 487,373         | 1,085,347           | 2,595,959          | 1,412,304           | -897,613                |
| 1991-2000 | 470,615         | 1,053,812           | 2,537,878          | 1,586,317           | -635,446                |

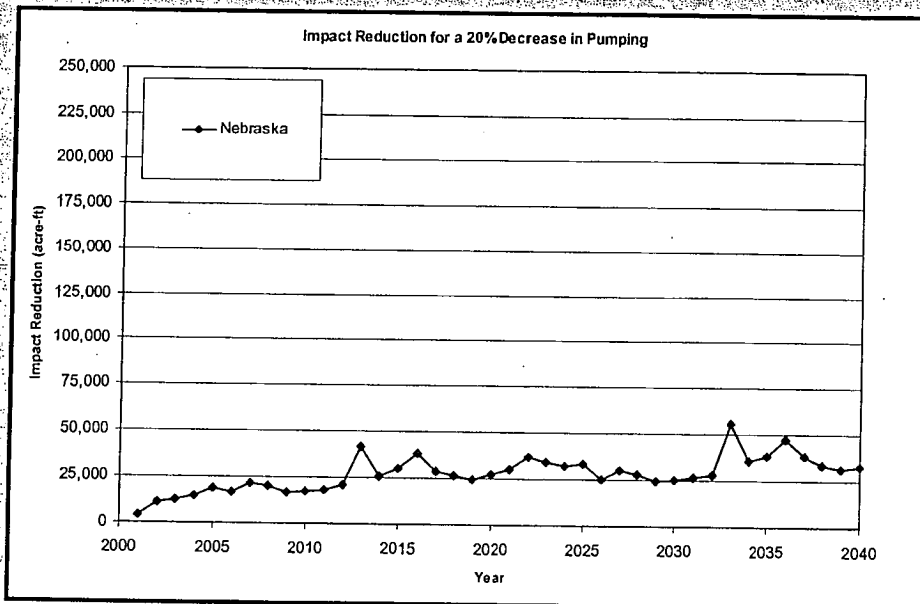
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## Impacts of Historic and Future Pumping on Baseflow in Nebraska



DRAFT

*McDonald Morrissey*  
AN IRVING-CLOUD COMPANY



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After fourteen months of intense settlement negotiations, Kansas, Nebraska and Colorado on December 15, 2002, entered into a Settlement Agreement resolving all claims brought in the Kansas v. Nebraska litigation. The terms of the Settlement Agreement are described in Section \_\_. As part of the Settlement Agreement, the three States engaged in a joint groundwater modeling effort to create and adopt a functional joint groundwater model by July 1, 2003.

On April 15, 2003, the Special Master appointed by the United States Supreme Court formally recommended to the Court approval of the settlement agreement entered into by Kansas, Nebraska and Colorado. On May 19, 2003, the United States Supreme Court approved the Final Settlement Stipulation entered into by Kansas, Nebraska and Colorado. On September 17, 2003, the Special Master submitted his Final Report to the United States Supreme Court approving the RRCA Joint Groundwater Model adopted by the States on July 1, 2003.

### **Statutory Requirements**

The Nebraska Legislature in 1996 passed LB 108 that allowed Natural Resource Districts to consider whether a whether a management area for integrated management of hydrologically connected ground water and surface water or that controls in a management area should be adopted to include such integrated management is necessary (LB 108 is codified at Neb. Rev. Stat. § 46-656.28). If a District has reason to believe integrated management is necessary, a District may utilize the procedures established in 46-656.19 to 46-656.21 or may request that the affected appropriators, the affected surface water project sponsors, and the Department consult with the district and that studies and a hearing be held on the preparation of a joint action plan for the integrated management of hydrologically connected ground water and surface water.

### **LB 108 Study Requests**

In July 1996, the Basin NRDs requested that the Department begin the studies and hearing process provided for in 46-656.28 (LB 108). The Department, pursuant to Neb. Rev. Stat. 46-656.28(2), made a preliminary determination, based on information available to the Department, 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.

Based on the nature of claims by Kansas against Nebraska, the Attorney General's Office determined that continuing the 46-656.28 (LB 108) process would compromise Nebraska's defense of the Kansas lawsuit. At the request of the Attorney General's Office, in June, 1999 the Republican River Natural Resource Districts asked the Department to suspend the 46-656.28 (LB 108) process pending resolution of the Kansas lawsuit. The Department complied with the Republican River Districts requests.

In anticipation of the resolution of the Kansas v. Nebraska, No. 126 Original, litigation, the Republican River Districts requested that the Department resume the 46-656.28 (LB 108) process and utilize the settlement joint groundwater modeling efforts in carrying out the Department's duties under 46-656.28(2).

### **Nebraska Department of Natural Resources Determination**

The Department examined the ongoing joint modeling efforts and determined sufficient information existed from which to make preliminary findings pursuant to Neb. Rev. Stat. § 46-656.28(2). On May 20, 2003, the Department made the following determination:

Pursuant to §46-656.28 and the preliminary findings in this report, the Department determines that present and future Compact disputes arising out of the use of hydrologically connected ground water and surface water resources in the Republican River Basin can be eliminated or reduced through the adoption of a joint action plan.

Consistent with the resolution of the litigation between Kansas, Nebraska and Colorado, and the scarcity of resources to conduct large scale studies, the Department limited its analysis to 46-656.28(2)(b). The Department's determination addresses the extent to which use of hydrologically connected ground water and surface water resources is contributing to disputes over interstate compacts or decrees. The Department's review was limited solely to the Republican River Basin as the Republican River Compact defines those boundaries and as the States of Kansas, Nebraska, and Colorado have interpreted that definition. A map of the Basin boundaries is attached.

### **Summary of Authorities**

#### **Statutes**

##### **46-656.28**

Joint action plan for integrated management of ground and surface water; preparation; when; procedure; factors; notice; hearing; determination; order; publication; modification; water use monitored; temporary suspension of drilling; variance.

(1) If a district on its own motion or following a request by a surface water appropriator, surface water project sponsor, ground water user, the Department of Natural Resources, or another state agency has reason to believe that a management area should be designated for integrated management of hydrologically connected ground water and surface water or that controls in a management area should be adopted to include such integrated management, the district may utilize the procedures established in sections 46-656.19 to 46-656.21 or may request that the affected appropriators, the affected surface water project sponsors, and the Department of Natural Resources consult with the district and that studies and a hearing be held on the preparation of a joint action plan for the integrated management of hydrologically connected ground water and surface water.

(2) If, following a request from a district and as a result of information available to the Department of Natural Resources and following preliminary investigation, the Director of Natural Resources makes a preliminary determination that there is a 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 (a) conflicts between ground water users and surface water appropriators, (b) disputes over interstate compacts or decrees, or (c) difficulties fulfilling the provisions of other formal state contracts or agreements, the department shall, in cooperation with any appropriate state agency and district, conduct or coordinate any necessary studies to determine the cause of such conflicts, disputes, or difficulties and the extent of the area affected. Such studies shall be prioritized and completed within a reasonable time following such preliminary determination. The department shall issue a written report of such preliminary findings within ninety days after the completion of any such studies. The department shall consider all relevant portions of the ground water management plan developed by the district pursuant to sections 46-656.12 to 46-656.16 during the study required by this section.

(3) If the director determines from any studies conducted pursuant to subsection (2) of this section or from information otherwise available 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 conflicts between ground water users and surface water appropriators, to disputes over interstate compacts or decrees, or to difficulties fulfilling the provisions of other formal state contracts or agreements and that conflicts between ground water users and surface water appropriators, disputes over interstate compacts or decrees, or difficulties fulfilling the provisions of other formal state contracts or agreements could be eliminated or reduced through the exercise of the authority granted by subsection (5) of this section, he or she shall, within thirty days after completion of the report required by subsection (2) of this section, consult with the affected surface water appropriators and district containing the area affected by such conflicts, disputes, or difficulties and fix a time and place for a public hearing to consider the report, hear any other relevant evidence, and secure testimony on whether a joint action plan should be prepared. The hearing shall be held within ninety days after completion of the report, shall be open to the public, and shall be located within or in reasonable proximity to the area considered in the report. Notice of the hearing shall be published in a newspaper published or of general circulation in the area involved at least once each week for three consecutive weeks. The last publication shall be not less than seven days prior to the hearing. The notice shall provide a general description of all areas which will be considered for inclusion in the management area for which the district and director are considering in the preparation of a joint action plan.

(4) At the hearing, all interested persons shall be allowed to appear and present testimony. The Conservation and Survey Division of the University of Nebraska, the Department of Health and Human Services Regulation and Licensure, the Department of Environmental Quality, the affected surface water project sponsor or sponsors, and the appropriate surface water appropriators and district or districts may offer as evidence any information in their possession relevant to the purpose of the hearing. Within ninety days after the hearing or after any further studies or investigations conducted by or on

behalf of the director, as he or she deems necessary, the district shall determine by order whether to proceed with developing a joint action plan for integrated management.

If the district determines that it should proceed and the district and the director determine that a joint action plan should be prepared, the district and the director shall develop a joint action plan to be utilized within the area in order to mitigate or eliminate conflicts between ground water users and surface water appropriators, disputes over interstate compacts or decrees, or difficulties fulfilling the provisions of other formal state contracts or agreements.

(5) The district's portion of the joint action plan developed under this section shall include one or more of the controls authorized by section 46-656.25 and shall be completed within one year after the date of the district's resolution to proceed. The portion of the joint action plan developed by the Department of Natural Resources shall be completed within one year after the date of the district's resolution to proceed and shall include one or more of the following measures concerning the use of surface water:

(a) Increased monitoring and enforcement of surface water diversion rates and amounts diverted annually;

(b) The prohibition or limitation of additional surface water appropriations;

(c) Requirements for surface water appropriators to apply or utilize reasonable conservation measures or best management practices consistent with the good husbandry and other requirements of section 46-231; or

(d) Other reasonable restrictions on surface water use that are consistent with the intent of section 46-656.05 and the requirements of section 46-231.

If the department determines that surface water appropriators should be required to apply or utilize reasonable conservation measures or best management practices, the department's portion of the joint action plan shall 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 department, to identify the conservation measures or best management practices to be applied or utilized and a schedule for such application and utilization.

(6) In developing their respective portions of the joint action plan authorized by subsection (5) of this section, the department and the district shall consider, but not be limited to considering, whether it reasonably appears that such action would mitigate or eliminate the condition which led to designation of the management area or the adoption of a joint action plan for the management area or will improve the administration of the management area.

(7) The district shall also determine that designation of a management area and adoption of a joint action plan would be in the public interest.

(8) Neither well registration dates nor appropriation dates shall be a factor in determining whether a management area shall be designated or a joint action plan prepared.

(9) In determining whether designating a management area or adopting a joint action plan would be in the public interest, the district shall consider (a) the impacts of the existing or projected diminution or degradation of water resources on (i) surface water appropriators, (ii) ground water users, (iii) public health and safety, (iv) social, economic, and environmental values in the affected area or areas, and (v) compliance with state laws, rules, or regulations, including, but not limited to, constitutional and



statutory preferences in the use of water and interstate compacts or decrees, and (b) whether designation and implementation of a management area or adoption and implementation of a joint action plan would prevent or alleviate the impact of such diminution or degradation of water resources.

(10) Following completion of the district's and the director's portions of the joint action plan, the district, in order to establish a management area, shall fix a time and place for a public hearing to consider the joint action plan information and to hear any other relevant evidence. The hearing shall be held within sixty days after completion of the joint action plan and shall be located within or in reasonable proximity to the area proposed for designation as a management area.

Notice of the hearing shall be published at the expense of the district in a newspaper published or of general circulation in the area involved at least once each week for three consecutive weeks. The last publication shall be not less than seven days prior to the hearing. The notice shall provide a general description of the contents of the joint action plan and of the area which will be considered for inclusion in the management area and shall provide the text of all controls proposed for adoption by the district and the department.

All interested persons shall be allowed to appear and present testimony. The hearing shall include testimony of a representative of the department and shall include the results of any studies or investigations conducted by the district or the director.

(11) Within ninety days after the hearing the district shall determine by order whether a management area shall be designated.

If the district determines that a management area shall be established, the district shall by order designate the area as a management area and shall adopt the joint action plan, to include one or more controls authorized by section 46-656.25 and subsection (5) of this section to be utilized within the area in order to mitigate or eliminate the conflicts, disputes, or difficulties described in subsection (9) of this section. Such an order shall include a geographic and stratigraphic definition of the area. The boundaries and controls shall take into account any considerations brought forth at the hearing and administrative factors directly affecting the ability of the district to implement and carry out local ground water management.

The controls adopted shall not include controls substantially different from those set forth in the notice of the hearing. The area designated by the order shall not include any area not included in the notice of the hearing.

(12) The district shall cause a copy of any order adopted pursuant to subsection (11) of this section to be published once each week for three consecutive weeks in a local newspaper published or of general circulation in the area involved. The last publication shall be not less than ten days prior to the effective date of the order. The order shall become effective on the date specified by the district but not later than ninety days after the date of establishment of the management area.

(13) Modification of a district's portion of a joint action plan may be accomplished utilizing the procedure established for the initial adoption of the joint action plan. Modification of the boundaries of a district-designated management area for integrated management or dissolution of such an area shall be in accordance with the procedures established in sections 46-656.19 to 46-656.21. Hearings for such

modifications or for dissolution may not be initiated more often than once a year. Modification of controls also may be accomplished using the procedure in such sections.

(14) Each district in which a joint action plan for a management area has been adopted shall, in cooperation with the surface water appropriators, any surface water project sponsors, and the department, establish a program to monitor use of hydrologically connected ground water and surface water resources in the area which is contributing to or is in the reasonably foreseeable future likely to contribute to conflicts between ground water users and surface water appropriators, to disputes over interstate compacts or decrees, or to difficulties fulfilling the provisions of other formal state contracts or agreements.

(15) For the purpose of determining whether conflicts exist between ground water users and surface water appropriators, surface water appropriators under the Nebraska Ground Water Management and Protection Act does not include holders of instream flow appropriations under sections 46-2,107 to 46-2,119.

(16)(a) If a district, in accordance with subsection (1) of this section, has initiated the process for the preparation of a joint action plan for the integrated management of hydrologically connected ground water and surface water, the district may adopt regulations to require a temporary suspension in the drilling of certain new wells in the district or portion of the district for which the preparation of the joint action plan is proposed. If such temporary suspension is imposed, it shall apply to all new wells in the geographic area involved except (i) test holes or dewatering wells with an intended use of ninety days or less, (ii) water wells designed and constructed to pump fifty gallons per minute or less, and (iii) water wells defined by the district to be replacement water wells. The regulations to impose such temporary suspension may be adopted only after a public hearing for which notice has been given as provided in section 46-656.19. Any such temporary suspension could be imposed initially for not to exceed three years, but could be extended thereafter on an annual basis for not to exceed two years if necessary to allow adoption and implementation of a management area and action plan in accordance with subsections (11) and (12) of this section; (b) Any such temporary suspension shall be immediately rescinded for the applicable portion or portions of the geographic area involved if any of the following events occur: (i) The director determines, in accordance with subsection (2) or (3) of this section that there is no reason to believe that the conditions described in such subsections exist and that therefor no hearing is required on a question of whether a joint action plan should be prepared; (ii) the district determines, pursuant to subsection (5), (6), (7), (8), or (9) of this section that it should not proceed to develop a joint action plan; (iii) the district determines pursuant to subsection (11) of this section that a management area should not be adopted; or (iv) an order adopted by the district pursuant to subsection (11) of this section becomes effective and designates the area or areas involved as a management area and adopts a joint action plan which includes one or more controls authorized by section 46-656.25; (c) The district may grant a variance from the temporary suspension if it determines that construction of a new well is necessary to alleviate an emergency situation involving the provision of water for human consumption.

## **Compact**

[Insert Compact reference]

## **Settlement**

[Insert FSS reference]

## **Findings and Studies Conducted**

Pursuant to 46-656.28(2) the Department, in cooperation with the Basin NRDs, studies to determine the cause of possible interstate compact disputes in the Republican River Basin and the extent of the area. The Department contracted with the Conservation and Survey Division of the University of Nebraska ("CSD") to undertake a limited hydrological study of the Republican River Basin at selected sites along the main stem of the river and two tributaries thereof. The CSD was contracted by the Department in 1997 to conduct an investigation that included pumping tests, a cross-sectional computer model of the hydrogeologic system, geochemical and isotopic characterization of surface water and groundwater, test-hole log books, and soil surveys. The work included pumping test analysis and evaluation of the impact of irrigation well pumpage on the stream-aquifer systems along the Republican Valley and Groundwater modeling and analysis of streamflow depletion in Franklin and Red Willow counties. The work of the CSD, ultimately was superseded by the work of the States in the Kansas v. Nebraska litigation and settlement process.

During the course of settlement negotiations to resolve the Kansas v. Nebraska, No. 126 Original, litigation, the States of Kansas, Nebraska and Colorado worked together in a joint examination of the hydrology, geology and other conditions in the Republican River Basin by creating a joint groundwater model. The States created a Modeling Committee, comprised of members designated by the States and the United States. The Modeling Committee developed a groundwater model acceptable to the States ("RRCA Groundwater Model") to accomplish the purposes identified in the Settlement Agreement, including determination of stream flow depletions caused by well pumping of groundwater.

The Basin NRDs and the Department will utilize the RRCA Groundwater Model and any other relevant analytical tools on an ongoing basis to manage and administer hydrologically connected surface water and groundwater in the Republican River Basin.

## **Authority for JAP**

On May 20, 2003, the Department made the following determination:

Pursuant to §46-656.28 and the preliminary findings in this report, the Department determines that present and future Compact disputes arising out of the use of hydrologically connected ground water and surface water

resources in the Republican River Basin can be eliminated or reduced through the adoption of a joint action plan.

Each of the Republican River Natural Resource Districts has, pursuant to Neb. Rev. Stat. §46-656.28(4), issued an order requiring the development of a Joint Action Plan.

### **BCCP/JAP Goals**

To resolve the dispute over the Republican River Compact in *Kansas v. Nebraska*, No. 126 Original, implement and comply with the Compact and the United States Supreme Court approved settlement agreement, the Department and each of the Basin NRDs will need to develop a Joint Action Plan, which includes an integrated management plan, to administer, regulate and manage the use of hydrologically connected ground water and surface water resources in the Republican River Basin.

### **BCCP/JAP Objectives**

#### **Consultation Process**

The BCCP should provide the mechanism for determining what is necessary to comply with the Compact in any year, five-year, and two-year period. In the BCCP the Department, the Basin NRDs and other groups (as statutorily required or otherwise agreed to) should establish a process to determine:

Available supplies – for example state allocation and available supply in each NRD;

Timing of consultation process; and

Participation in consultation process.

The Joint Action Plans will then address how each Basin NRD intends to meet compliance objective. [This provides the Basin NRDs flexibility without the need to revise Rules and Regulations every year to meet changing supply and use conditions]

#### **Define Boundaries**

The geographic area governed by the BCCP is the Republican River Basin as the Republican River Compact defines those boundaries and as the States of Kansas, Nebraska, and Colorado have interpreted the Compact definition in the Settlement Agreement. A map of the Basin boundaries is attached. Each Basin NRD can, as part of a Joint Action Plan adopted consistent with the BCCP, extend the geographic area to include the entire area of the NRD.

#### **Identify Hydrologically Connected Surface Water and Ground Water**

The Settlement Agreement provides that Compact compliance will be determined pursuant to the RRCA Accounting Procedures agreed to by the States. The RRCA Accounting Procedures will utilize the RRCA Groundwater Model to quantify within the Republican River Basin the amount, location, and timing of depletions to stream flow from ground water pumping. Sufficient information has been examined, studied and agreed to by the States such that the Department can make preliminary findings regarding the extent to which the use of hydrologically connected ground water and surface water resources is contributing to disputes over interstate compacts or decrees.

As part of the joint groundwater modeling efforts, the States studied, examined and ultimately agreed to a general determination of the extent of hydrological connection of ground water and surface water resources in the Republican River Basin. The States did not agree as to the specific connection of each individual use. The States did agree that the analysis performed by technical consultants for each State and the United States Government revealed a general level of connectivity for the Republican River Basin as a whole and for specific streams therein. The analysis conducted was a baseflow hydrograph separation analysis and is documented at Appendix J1 of the Final Settlement Stipulation. Hydrograph baseflow separation is a technique that partitions the amount of surface water and ground water that is measured as total streamflow at a river gaging station. Determining the component of total streamflow that is contributed by ground water (also called baseflow) requires professional expertise and judgment. The hydrograph separation analysis used in this application is referred to as the Pilot Point method. This procedure was adopted for application in this ground water model since it combines the increased accuracy of graphical baseflow analysis with the computational efficiency afforded by electronic spreadsheets. For the RRCA Ground Water Model, fifty-seven (57) independent baseflow analyses were performed. In general terms, the States agreed that the baseflow analyses provided an overall assessment of the level of hydrologic connectivity between ground water and surface water resources in the analyzed streams.

For purposes of Compact compliance, the RRCA Groundwater Model will determine the extent of hydrologic connectivity. The Department and the Republican River Natural Resource Districts may use the RRCA Groundwater Model and such other analytical and technical tools as necessary to develop a joint integrated management plan to administer, regulate and manage the use of hydrologically connected ground water and surface water resources in the Republican River Basin that provides for compliance with the Compact and the United States Supreme Court approved settlement.

### **Identify Management Alternatives and Tools**

The Department and the Republican River Natural Resource Districts may use the RRCA Groundwater Model and such other analytical and technical tools as necessary to develop a joint integrated management plan that provides for compliance with the Compact and the United States Supreme Court approved Settlement Agreement. The management alternatives and tools for integrated management of hydrologically connected surface water and groundwater adopted by each Basin NRD Joint Action Plan need to be

sufficient to achieve Compact compliance while maximizing the economic and social benefits of using available water supplies

**Management area**

**Available Controls**

**Analytic tools**

**Monitoring**

**Social and Economic Impacts of Management Alternatives**

**Periodic review of BCCP and Basin NRDs' Joint Action Plans**

**Modification to meet new conditions**

**Revision of Goals & Objectives**

**Public education and out reach**