



DIVISION OF WATER RESOURCES

Bill Ritter, Jr.
Governor

Harris D. Sherman
Executive Director

Dick Wolfe, P.E.
Director/State Engineer

**APPLICATION FOR APPROVAL OF AN AUGMENTATION
PLAN AND RELATED ACCOUNTING PROCEDURES UNDER
SUBSECTION III.B.I.K. OF THE FINAL SETTLEMENT
STIPULATION IN KANSAS V. NEBRASKA AND COLORADO,
NO. 126, ORIGINAL**

**The Republican River
Compact Compliance Pipeline**

Submitted by

The State of Colorado

And

**The Republican River Water Conservation District, acting by and
through its Water Activity Enterprise**

March 2008

STATE OF COLORADO
DIVISION OF WATER RESOURCES
1313 Sherman Street, Room 818
Denver, Colorado 80203
(303) 866-3581

Colorado Compact Commissioner
Colorado Engineer Advisor

Dick Wolfe
Ken Knox

REPUBLICAN RIVER WATER CONSERVATION DISTRICT
410 MAIN STREET, SUITE 8
WRAY, COLORADO 80758
(970) 332-3552

BOARD MEMBERS

Dennis Coryell, President
Kim Killin, Vice President
Tim Pautler, Secretary
Rick Seedorf, Treasurer
Eugene Bauerle
Grant Bledsoe
Jack Dowell
Raymond Enderson
Jay Harris
Garry Kramer
Steve Kramer
Bruce Latoski
Stan Laybourn
Wayne Skold
Greg Terrell

MANAGEMENT AND STAFF

Stan Murphy, General Manager
Dana Barnett, Administrative Assistant

CONSULTING ENGINEERS

Pipeline Design and Construction

Richard Westmore, P.E.
Steven Townsley, P.E.
GEI Consultants, Inc.
6950 S. Potomac St., Suite 300
Centennial, CO 80112-4050
(303) 662-0100

Water Rights and Hydrogeology

James E. Slattery, P.E.
Slattery Aqua Engineering LLC
8357 Windhaven Drive
Parker, CO 80134
(720) 851-1619

Randy Hendrix, P.E.
Helton & Williamsen, P.C.
384 Inverness Parkway, Suite 144
Englewood, CO 80112
(303) 792-2161

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1.	The Republican River Compact Compliance Pipeline	1
1.2.	Project Sponsor – The Republican River Water Conservation District, acting by and through its Water Activity Enterprise.....	2
2.0	AUGMENTATION PLAN AND RELATED ACCOUNTING PROCEDURES	3
3.0	ENGINEERING ANALYSIS FOR THE COMPACT COMPLIANCE PIPELINE.....	4
3.1.	Water Quality	5
3.2.	Pipeline Design.....	5
4.0	REQUEST FOR APPROVAL	7

LIST OF TABLES (follow text)

- Table 1: Rights to Designated Groundwater Purchased by the RRWCD WAE
- Table 2: Comparison of stream water quality in the North Fork to the ground water quality in the Ogallala Formation.
- Table 3: Cost Estimate for the Compact Compliance Pipeline Project
- Table 4: Compact Compliance Pipeline Key Milestone Dates.

LIST OF FIGURES (follow Tables)

- Figure 1: General Location Map
- Figure 2: Republican River Water Conservation District Boundaries
- Figure 3: Location Map of Irrigated Lands and Compact Compliance Pipeline
- Figure 4: Irrigated Lands and Alternate Points of Diversions

1.0 INTRODUCTION

1.1. The Republican River Compact Compliance Pipeline

Subsection III.B.1.k of the Final Settlement Stipulation in *Kansas v. Nebraska and Colorado*, No. 126, Original (U.S. Sup. Court) allows the acquisition or construction of wells for the purpose of offsetting stream depletions in order to comply with a State's Compact Allocations. Subsection III.B.1.k states that these wells "shall not cause any new net depletion to stream flow either annually or long-term." It further states: "The determination of net depletions from these Wells will be computed by the RRCA Groundwater Model and included in the State's Computed Beneficial Consumptive Use. Augmentation plans and related accounting procedures submitted under this Subsection III.B.1.k shall be approved by the RRCA [Republican River Compact Administration] prior to implementation."

The Republican River Water Conservation District (RRWCD) was formed in 2004 to assist the State of Colorado to comply with the Compact, and the RRWCD, acting through its Water Activity Enterprise (WAE), has entered into contracts to purchase rights to ground water located north of the North Fork of the Republican River in the Republican River Basin in Colorado. These rights have an historical consumptive use of approximately 15,000 acre-feet per year. The RRWCD WAE is currently in the process of completing the engineering design of a 12.7 mile Compact Compliance Pipeline to deliver this water to the North Fork of the Republican River to offset stream depletions in order to comply with Colorado's Compact Allocations. The general location of the compact compliance pipeline is shown in Figure 1. The design is scheduled for completion in August of this year. Selection of the construction contractor is anticipated to be finalized by the first of October and construction on the pipeline and related facilities will commence in November. Construction of the pipeline is scheduled for completion of June of 2009 and approximately 11,000 ac-ft will be delivered between June and December to allow Colorado to meet its compact obligation in 2009.

The RRWCD WAE has applied for, and received preliminary approval, a \$60.6 million loan from the Colorado Water Conservation Board Water Project Construction Fund to purchase these rights to and to construct the Compact Compliance Pipeline to offset stream depletions in order to comply within Colorado's Compact Allocations.

The State of Colorado on behalf of the RRWCD WAE requests that the RRCA approve an augmentation plan and related accounting procedures described in this

application under Subsection III.B.1.k of the Final Settlement Stipulation for the Republican River Compact Compliance Pipeline.

1.2. Project Sponsor – The Republican River Water Conservation District, acting by and through its Water Activity Enterprise

The RRWCD is managed and controlled by a 15-member board of directors comprised of one member appointed by the county commissioners of each of the seven counties wholly or partially within the RRWCD, one member appointed by the boards of the seven ground water management districts within the RRWCD, and one member appointed by the Colorado Ground Water Commission. The RRWCD Board of Directors established the RRWCD Water Activity Enterprise (WAE) in October 2004.

The RRWCD Board of Directors imposed a use fee on the diversion of water within the District of \$5.50 per assessed irrigated acre on diversions of ground water for irrigation use by post-compact wells within the District. The RRWCD Board recently increased the use fee to \$14.50 per assessed irrigated acre to pay for the Republican River Compact Compliance Pipeline. There are approximately 500,500 assessed irrigated acres in the basin irrigated by post-compact wells and the RRWCD fee will generate approximately \$7.3 million per year for operating expenses and to pay back the loans used to acquire the water rights and construct the compact compliance pipeline.

The RRWCD WAE uses a portion of the revenues collected from use fees to provide local cost-sharing for federal programs designed to retire irrigated acreage in the basin, including the Republican River Conservation Reserve Enhancement Program (CREP) and the Environmental Quality Improvement Program (EQIP). To date, approximately 30,000 irrigated acres have been voluntarily retired in the basin under CREP and EQIP, or approximately five percent (5%) of the irrigated acreage in the basin. An amendment to the Republican River CREP designed to retire an additional 30,000 irrigated acres has been submitted to the U.S. Department of Agriculture for approval. The RRWCD WAE has committed to provide local cost-sharing for a second Republican River CREP amendment that is proposed to retire an additional 30,000 acres. The CREP program is an important part of the RRWCD efforts to implement conservation measures in the basin to reduce groundwater pumping in Colorado to assist in meeting compact compliance obligations.

The RRWCD is located in northeastern Colorado and includes all of Yuma and Phillips Counties and those portions of Kit Carson, Lincoln, Logan, Sedgwick, and Washington Counties that overlie the Ogallala Aquifer. The RRWCD encompasses about 7,761 square miles or about 7.5% of Colorado's 104,247 square miles. There is currently about 545,000 irrigated acres within the Ogallala Aquifer in Colorado with 500,500 irrigated acres located within the RRWCD boundaries. With the exception of approximately 3,000 acres irrigated by surface water, virtually all the acreage in the basin is irrigated with ground water from the Ogallala Aquifer. A map of the RRWCD boundaries is shown in Figure 2.

2.0 AUGMENTATION PLAN AND RELATED ACCOUNTING PROCEDURES

The State of Colorado has exceeded its compact allocation by approximately 11,000 ac-ft/yr for period of 2003-2007. In order to comply with the State of Colorado's Compact Allocations, the RRWCD WAE has entered into contracts to acquire ground water rights that were historically used for irrigation in the Republican River Basin. The location of the lands that were historically irrigated with the water rights acquired by the RRWCD WAE is shown in Figures 3 and 4.

The RRWCD WAE will change the use of these existing rights and consolidate these rights at fifteen existing Republican River Compact Compliance Wells (Compact Compliance Wells) that will be used for the sole purpose of offsetting stream depletions in order to comply with the State of Colorado's Compact Allocations. Initially only eight of the wells will be active with an additional seven existing wells that will serve as backup if additional well capacity is needed in the future. The locations of the 15 wells are shown in Figure 4 (wells A1 through A8 are the initial wells, and the wells numbered B1 through B7 are the backup wells).

The compact compliance wells are located in the area of the Ogallala Aquifer in Colorado that has the greatest saturated thickness. The wells typically have 250 to 300 feet of saturated thickness. The well field is also located in the sand hills region of Colorado that has the highest recharge rates of any location in the Republican River Basin.

The Computed Beneficial Consumptive Use of the compact compliance wells, specifically the ground water impacts of these wells upon the stream system, will be

determined by use of the RRCA Groundwater Model as the difference in streamflows using two runs of the model that is consistent with Section III.D.1 of the Republican River Compact Administration Accounting Procedures and Reporting Requirements.

The historical consumptive use of the rights that will be diverted at the Compact Compliance Wells was determined based on irrigation system and pump efficiency tests, power records, and crop records for ten year period from 1998 to 2007 as summarized in Table 1. The procedures for changing the use of existing rights to designated ground water based on historical consumptive use are established in the current Colorado Ground Water Commission rules. The Compact Compliance Wells will cause no new net depletions because pumping will be limited to the historical consumptive use of the existing rights.

The pumping under this plan for augmentation will be limited to the historical consumptive use of existing groundwater rights as determined by the Colorado Ground Water Commission pursuant to its rules and regulations, which permit banking of ground water once a change has been based on historical consumptive use. Pumping from the Compact Compliance Wells will be metered and included in the RRCA Groundwater Motel. The groundwater pumped by the Compact Compliance Wells will be delivered by a pipeline to the North Fork of the Republican River a short distance upstream from the streamflow gage at the Colorado-Nebraska state line (USGS gaging station number 06823000, North Fork Republican River at the Colorado-Nebraska State Line). The augmentation discharge will be measured and subtracted from the gaged flow of the North Fork of the Republican River to calculate the Annual Virgin Water Supply. The augmentation discharge to the North Fork of the Republican River from the Compact Consumptive Pipeline will be the Augmentation Credit for the purpose of offsetting stream depletions to comply with the State of Colorado's Compact Allocations and shall be counted as a credit/offset against the Computed Beneficial Consumptive use of water allocated to Colorado

3.0 ENGINEERING ANALYSIS FOR THE COMPACT COMPLIANCE PIPELINE

Approximately 11,000 acre-feet of water per year needs to be supplied by the compact compliance pipeline to meet Colorado's Compact obligation. The initial capacity of the main trunk of the pipeline will be 15,000 acre-feet per year using a nine-month delivery season. The pipeline is being designed so that it will be capable of

delivering up to 25,000 ac-ft/yr by adding a pumping facility to deliver the water under a higher pressure.

3.1. Water Quality

All of the streamflow in the North Fork of the Republican River, with the exception of the occasional rainstorm event, is derived from groundwater inflow from the Ogallala Aquifer. The compact compliance pipeline will deliver groundwater from the Ogallala aquifer to the North Fork of the Republican River at the state line. Table 2 presents the ground water quality of the Ogallala aquifer relative to the water quality standards for the North Fork of the Republican River, as published by the Colorado Water Quality Control Commission. The water quality of the Ogallala Aquifer meets or exceeds drinking water standards. This is to be expected because the groundwater management districts in Colorado carefully monitor the water quality in the Ogallala Aquifer since the groundwater supplies agriculture uses along with domestic, municipal, and industrial uses. Thus, the water quality of ground water for the Republican River Compact Compliance Pipeline is appropriate for delivery to the North Fork of the Republican River to offset stream depletions.

3.2. Pipeline Design

The RRWCD WAE contracted with GEI Consultants to perform a preliminary feasibility study for the design of a compact compliance pipeline. The \$50,000 study was completed in January of 2008. Based on the recommendations in this report, the RRWCD WAE has contracted with GEI Consultants to proceed with the final design of the compact compliance pipeline. The final design of the compact compliance pipeline is scheduled to be completion in August of 2008 and is budgeted to cost approximately \$1 million dollars.

The preliminary design of the Republican River Compact Compliance Pipeline has been completed and is summarized in the following paragraphs. This summary is based on the preliminary design and the design refinements made in the last two months. The final design is currently under way and the general description included in this report will probably somewhat in the next few months as the design is finalized.

The well field to pump the water will consist of 8 wells numbered A1 through A8 as shown in Figure 4. The design of the pipeline will also allow for an additional 7 wells

numbered B1 through B7 in Figure 4. These 7 additional wells will not initially be connected to the pipeline, but are available for future use if needed.

Water pumped from the individual wells will be collected in a series of pipes that will vary in size from 12" to 18" and the water will then be conveyed to a 1 million gallon re-regulating storage tank. The storage tank will provide reserve capacity allowing the main pipeline to operate for 2 hours at two-thirds capacity with no inflow to the tank from the well field. The storage tank will also provide protection of the main pipeline from surge and negative pressures that could develop if the main pipeline were connected directly to the well field collection system.

From the storage tank the water will flow by gravity through the main water 36-inch diameter conveyance pipeline approximately 12.7 miles to the North Fork of the Republican River following the general alignment shown on Figure 3. Releases from the tank will be regulated by a valve located near the tank, and an ultra-sonic flow meter will be provided approximately 30 feet downstream of the release valve. The main conveyance pipeline will be designed so that a pump could be added at the outlet of the storage tank to increase the capacity of the pipeline to approximately 25,000 ac-ft/yr in the future.

At this time, the most likely type of pipe material is PVC. The pipeline will be buried with minimum cover of three feet above the crown of the pipe. To assure integrity, the pipe will be properly bedded prior to filling the trench with well-compacted backfill. Access manholes, air release valves, and drain valves will be provided at appropriate locations along the pipeline, as determined during the final design and confirmed during construction.

Table 3 contains summaries of the preliminary cost estimates developed by GEI during the preliminary feasibility study for the Compact Compliance Pipeline project. The final cost estimates will be dependent upon the final design and the bids received by the contractors. The key milestone dates discussed in previous sections of this report are summarized Table 4. Achieving this schedule will enable full delivery of water to begin in the latter part of June 2009. The project should be able to deliver close to 11,000 acre-feet of water in by year-end 2009.

4.0 REQUEST FOR APPROVAL

The State of Colorado on behalf of the RRWCD WAE requests that RRCA approve an augmentation plan and related accounting procedures described above under Subsection III.B.1.k of the Final Settlement Stipulation for the Republican River Compact Compliance Pipeline.