SPDSS Memorandum
Final

To: Ray Alvarado and Ray Bennett

From: LRE, Erin Wilson, Beorn Courtney, and Rick Parsons

Subject: Task 5 – Key Structure Operating Memorandum – Burlington, FRICO–Barr, and Henrylyn Systems

Date: March 21, 2005 –Revised January 17, 2007

INTRODUCTION

One of the Task 5 objectives is to:

> *Develop and document an understanding of the operations of key water use facilities in the basin in order to facilitate consumptive use modeling and to support selected data needs for modeling being done by other contractors. This understanding will be developed through interviews with DWR personnel, operators of large canal and reservoir systems, and representatives of federal facilities.*

Types of key water use facilities include diversion structures, transmountain diversions, reservoirs, and reservoir systems.

- Key diversion structures, identified as part of Task 3, include structures representing 85 percent of net decreed rights, structures diverting greater than 10,000 acre-feet per year, and structures of administrative importance.
- Key transmountain diversions, identified as part of Task 4, include those structures that transport non-native water from another basin into the South Platte River basin.
- Key reservoirs, identified as part of Task 5, include reservoirs or reservoir systems with greater than 10,000 acre-feet capacity and/or reservoirs that should be included in potential future modeling efforts due to their impact on basin operations. Reservoir systems are defined as a group of reservoirs on the same tributary or filled by the same diversion structure that satisfy a common demand or are operated in a similar fashion.

A number of components in the Burlington Ditch Reservoir and Land Company (Burlington Company), Farmers Reservoir and Irrigation Company (FRICO) – Barr Division, and Henrylyn Irrigation District (Henrylyn) have been identified as key structures for the South Platte Decision Support System (SPDSS) consumptive use and surface water modeling efforts. The purpose of this Task 5 memorandum is to document physical, legal, and operational aspects of those key structures identified in the System.

The information provided in this memorandum was developed from publicly accessible sources and discussions with Bob Stahl (Water District 2 Commissioner), Manuel Montoya (FRICO

General Manager), Duane Helton (water rights engineer for FRICO), Steven Janssen (attorney for Henrylyn), and Marc Sirios (former Henrylyn Manager). FRICO personnel did not review this memorandum. Information in this memorandum is believed to be accurate. However, information should not be relied upon in any legal proceeding.

SYSTEM OVERVIEW

The Burlington Company began diverting through the Burlington Ditch in 1885. At that time, the Burlington Ditch terminated at two natural depressions: first at the original Barr Lake and then into the adjacent Oasis Reservoir. Both storage facilities were decreed for storage in 1885 and the Burlington Company became the sole owner of both in the early 1900s. Two divisions were created within the Burlington Company: shareholders in the O'Brian Division were served by direct flow and storage water in the Barr Lake system while shareholders in the Little Burlington Division and under the Brighton Lateral at the end of the Little Burlington Ditch were served only by direct flow due to location away from the reservoir. To provide storage for the Little Burlington Division, two reservoirs on tributaries of the North Fork of the South Platte River provide supplemental water to the Burlington Company: Wellington Reservoir on Buffalo Creek and Altura Reservoir (a.k.a. Duck Lake) on Geneva Creek. Upon securing sole ownership, the Burlington Company began seeking to enlarge the Burlington Ditch and jointly enlarge Barr Lake and Oasis Reservoirs into one large Barr Lake.

The Burlington Company did not fully construct the enlargements. In 1909, the enlargement rights and subsequent operation and ownership of the enlarged Barr Lake were transferred to FRICO; the Burlington Company kept its original direct flow and storage rights. FRICO acquired land and the associated Burlington Company stock surrounding Barr Lake.

Henrylyn was also involved in completing a portion of the FRICO System and received FRICO shares in exchange. The FRICO water was used to supplement Henrylyn's primary supply taken through the Denver-Hudson Canal. Henrylyn constructed four storage facilities in the early 1900s: Horse Creek and Prospect Reservoirs are still in use today, Boot Leg Reservoir is silted in, and Olds Reservoir operates as a recharge area.

Today, the Burlington Ditch delivers water from the South Platte River to the Burlington Company, FRICO, and Henrylyn. The Burlington Ditch is also a decreed alternate point of diversion for several of Thornton's water rights and a carriage ditch for several of Thornton's water rights. The Burlington Ditch can also receive water from the Metro Wastewater Treatment Plant, which is located about 1.5 miles downstream from the Burlington Ditch headgate. The Metro WWTP was moved in the early 1970s from above Burlington Ditch headgate to its current location below Burlington Ditch. During the irrigation season, Metro generally discharges to the South Platte below the Burlington Ditch headgate. However, when the Burlington Ditch is diverting to store in Barr Lake, Metro can pump their discharge directly into the Burlington Ditch. According to Duane Helton, the water pumped from the plant is either water that is fully consumable by Denver under its decrees or water that would otherwise be available to FRICO under the exercise of its South Platte River water rights.

The Burlington Company direct diversions and use of upstream storage through the Little Burlington and Brighton Lateral are straightforward and not deemed to require detailed operating

information. This memorandum details only the FRICO–Barr and Henrylyn system diversions associated with the Burlington headgate. Key structures identified in each system are as follows:

1. FRICO–Barr System
   - Burlington Ditch/O'Brian Canal
   - Barr Lake
     - Barr Lake Delivery Canals
2. Henrylyn System
   - Denver-Hudson Canal
   - Henrylyn Reservoir System
     - Horse Creek Reservoir
     - Prospect Reservoir

Note that Burlington Ditch/O'Brian Canal information is provided under the FRICO–Barr System for this memorandum because it is the carrier ditch to Barr Lake. While the Burlington Company is not discussed here in detail, the following information pertains specifically to the Burlington Company:

- In addition to its South Platte water rights, the Burlington Company also has Sand Creek water rights but cannot physically divert from Sand Creek. The Burlington/O'Brian can intercept flows from First, Second, and Third Creeks and several other unnamed tributaries. However, amounts are typically only significant during rainfall events, when there is unlikely to be a call on the South Platte. The amount of water captured from these creeks is not measured.
- The Burlington Company has storage water rights in upstream Wellington Reservoir (8003829) on Buffalo Creek, and Altura Reservoir (8003828), also known as Duck Reservoir, on Geneva Creek. These rights are diverted through the Burlington Ditch to supplement direct flow rights, generally in July and August.
- The capacities of the Little Burlington Ditch and Brighton Lateral are about 150 cfs and 75 cfs at their respective bifurcations.
- There are approximately 6,000 irrigated acres, based on the SPDSS 2001 Irrigated acreage assessment. Irrigated lands include approximately 40 percent alfalfa, 20 percent grass pasture, 20 percent corn, and 5 percent small grains. Approximately 10 percent of the irrigated lands are sprinkler irrigated.

PHYSICAL INFORMATION

The locations of the FRICO–Barr and Henrylyn System features are shown in **Figure 1**. The FRICO–Milton System is also shown in Figure 1 but is discussed in the Task 5 – Key Structure Operating Memorandum for the FRICO–Milton Division. None of the reservoirs described in the memorandum are operated for flood control or hydropower.

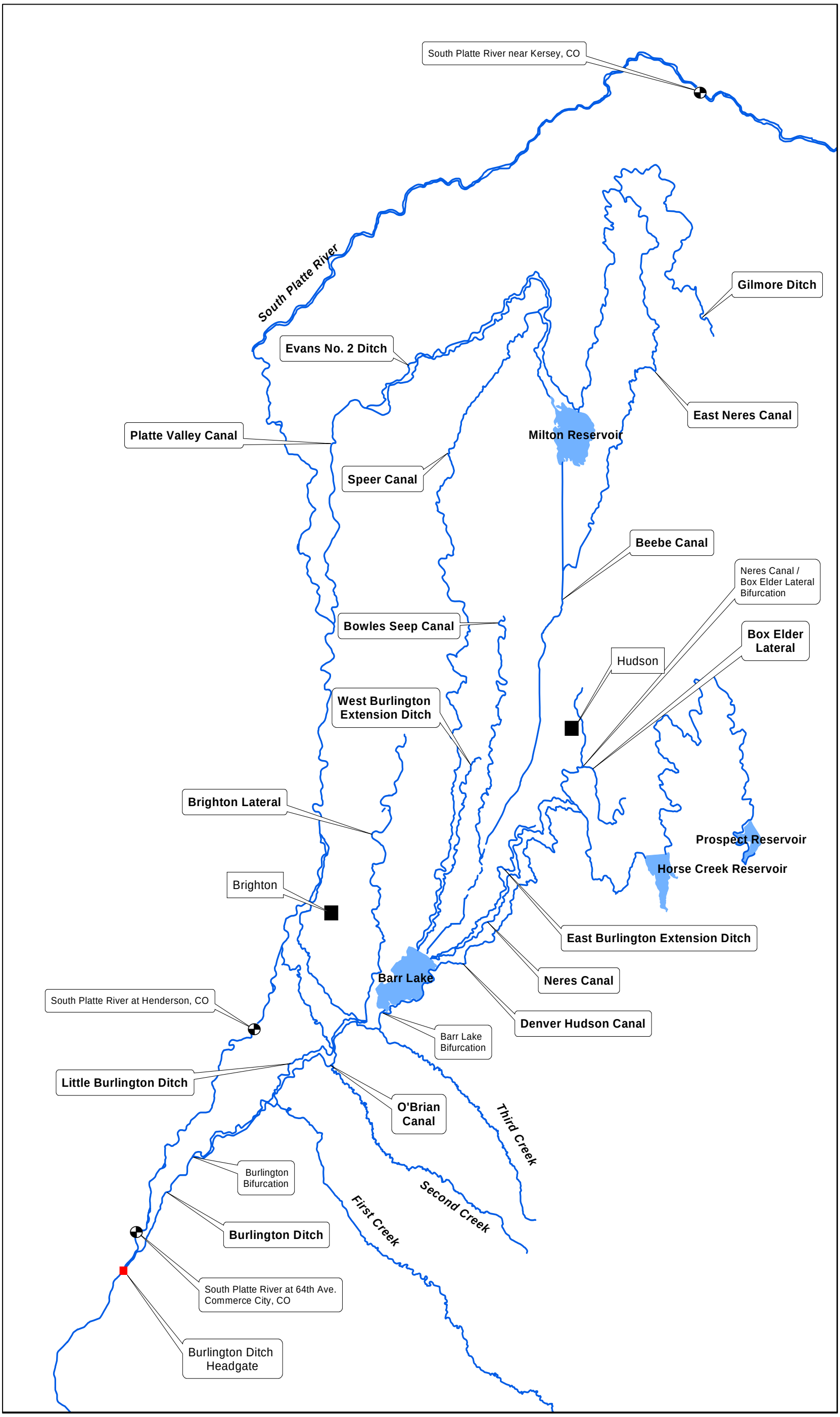

Figure 1: FRICO–Barr and Henrylyn System

1) FRICO–Barr System

The Farmers Reservoir and Irrigation Company was formed in the early 1900s to provide irrigation water to lands north of Denver and west of the South Platte River. Major sources of water in these areas were identified and the following four principal reservoirs were constructed to regulate and store water for irrigation: Barr Lake, Marshall Lake, Milton Lake (Reservoir), and Standley Lake. Today, FRICO is a mutual ditch company with four Divisions operating independently around each of the major reservoirs. The FRICO–Barr Division is located in Water District 2 on the east side of the South Platte River in Adams County, Colorado.

The Farmers Reservoir and Irrigation Company and
The Burlington Ditch Reservoir and Land Company
80 South 27th Avenue
Brighton, Colorado 80601
Phone: 303.659.7373

Burlington Ditch/O'Brian Canal (Structure ID 0200802)

The Burlington Ditch headgate is located near Riverside Cemetery on the east side of the South Platte River. The ditch travels in a northeasterly direction for about 10 miles until a point of bifurcation (Burlington bifurcation), whereby the west branch becomes the Little Burlington Ditch and the east branch becomes the O'Brian Canal. Prior to 1992, the Little Burlington headgate was located 5.4 miles downstream from the Burlington Ditch headgate. In 1992, the Little Burlington headgate was moved 1.5 miles downstream and in 2002 it was moved an additional 2.5 miles downstream to its current location (about 10 miles downstream from the Burlington Ditch headgate). Delivering water to Burlington Company lands, the Little Burlington continues northeasterly for approximately 7 miles where it terminates at the Brighton Lateral, which then continues north for about 10 miles. From the Burlington bifurcation, the O'Brian Canal travels approximately 7 miles to a second bifurcation with the Denver-Hudson Canal (the Barr Lake bifurcation). The O'Brian Canal continues north and serves as the inlet to Barr Lake, which is owned and operated by FRICO. The Denver-Hudson Canal continues northeasterly and serves Henrylyn lands as described below.

Length: The entire ditch length from the Burlington Ditch headgate on the South Platte River to the Barr Lake inlet is approximately 17.5 miles.

Capacity: The capacity of the Burlington Ditch/O'Brian Canal is approximately 1,000 cfs. The capacity of the Burlington Ditch/O'Brian Canal does not serve as a constraint on the amount diverted into the system.

Conveyance Efficiency: Portions of the canal are lined, however, the majority of the canal remains unlined. Conveyance losses are typically around 10 percent from the headgate to the existing Burlington bifurcation; an additional 18 percent from the O'Brian to the Barr Lake bifurcation; an additional 16 percent down the Little Burlington Ditch from the bifurcation to the Brighton Lateral; and a further additional 36 percent along the Brighton Lateral. Therefore, water diverted for Barr Lake and the Denver-Hudson Canal experiences a total of about 28 percent ditch loss; water diverted to farms under the Little Burlington Ditch experiences a total of about 26 percent ditch loss; and water diverted to

farms under the Brighton Lateral experiences a total of about 53 percent ditch loss. Thornton diverts its changed water rights into its East Gravel Lakes (ID 0203700) above the bifurcation and experiences a loss of about 10 percent for its changed shares. Brighton plans to divert its changed water rights off the Brighton Lateral and will experience a projected loss of about 53 percent for its changed shares. FRICO estimates that the conveyance losses are comprised of up to 95 percent seepage and at least 5 percent evaporation and transpiration. Land owners in the District share proportionately in the overall system losses.

Measurement Device: Burlington Ditch headgate diversions from the South Platte River and effluent pumped from Metro Wastewater Treatment Plant is measured in a long-throated flume just downstream from Sand Creek and includes the total amount diverted through the structure under all associated water rights. Diversions into Barr Lake are measured through a rectangular sharp-crested weir located just downstream of the Barr Lake bifurcation. Water released to the Little Burlington Ditch is measured in a broad-crested weir and water released to the Brighton Lateral is measured in a modified broad-crested weir. Diversions can be returned to the South Platte River via wasteways.

HydroBase Data: Daily diversion data for the Burlington Ditch are available through HydroBase for the irrigation season of 1950 through 1969 and for the entire year starting in 1970. Diversions are coded separately by source, from, use, and type. Between calendar year 1950 and 2003 the average total annual diversions through the Burlington Ditch were 80,877 acre-feet per year including all diversions for storage and direct irrigation use.

Barr Lake (Structure ID 0203837)

Barr Lake

Barr Lake is an off-channel reservoir located southeast of the City of Brighton. Barr Lake and the majority of the irrigated lands within the FRICO–Barr Division are located within Beebe Draw, a drainage basin located east of the South Platte River valley and west of the Box Elder Creek drainage basin. Water is conveyed to Barr Lake for storage through a series of canals and ditches: first from the South Platte River via the Burlington Ditch, which bifurcates into the Little Burlington Ditch and the O'Brian Canal just north of First Creek; a second bifurcation is located immediately upstream of Barr Lake, where the west branch serves as the inlet to Barr Lake and the east branch becomes the Denver-Hudson Canal. Storage water is released from two outlets that feed four canals: Neres Canal and East Burlington Extension Ditch are fed by the east outlet and the Speer Canal and West Burlington Extension Ditch are fed by the west outlet. Additionally, seepage from Barr Lake supplies Beebe Canal.

Construction of the entire enlarged system was completed in 1911. Since that time, FRICO has owned and operated Barr Lake. Recreational uses officially began in 1977 when Colorado State Parks opened Barr Lake State Park. The park has not affected water operations. More recently, some Burlington Company and FRICO shares have been purchased by municipal suppliers including the City of Brighton, City of Thornton, South Adams Water and Sanitation District.

Barr Lake is impounded by Barr Lake Dam. The concrete facing on the upstream slope was replaced in 1984 or 1985 and allowed an increase in the normal winter fill capacity. The new concrete facing also reduced reservoir seepage. This allowed the normal winter fill to increase from around a gage height of 30 feet to a gage height of 34 feet (approximately 32,000 acre-feet).

Capacity:

- Total Storage: Approximately 32,000 acre-feet.
- Active Storage: Approximately 31,700 acre-feet.
- Dead Storage: Less than 300 acre-feet.
- Area/Capacity Data: The capacity data shown in **Table 1** are based on an unknown date of survey (data was obtained from FRICO engineer). The capacity data presented in Table 1 do not include the less than 300 acre-feet of dead storage.

Table 1
Barr Lake Gage Height-Area-Capacity

Elevation (ft)	Gage Height (ft)	Area (acres)	Cumulative Capacity (ac-ft)
5,060	0	191	0
5,065	5	367	896
5,070	10	551	3,199
5,075	15	765	6,446
5,080	20	1,064	10,959
5,085	25	1,350	16,931
5,090	30	1,681	24,503
5,094	34	1,879	31,652

Reservoir Storage Measurement: Storage levels in Barr Lake are measured using a staff gage which has been equipped with a SCADA system for approximately ten years.

Reservoir Seepage Information: Barr Lake experiences a moderate amount of seepage, although most is collected in the Beebe Canal and conveyed to Milton Reservoir. FRICO indicates that seepage presently occurs at a rate of 19.8 cfs at a gage height of 33 feet, with approximately 31 percent of the total seepage accruing to the Beebe Canal upstream of the Beebe Canal measuring station. Evaporation is not measured at the site but gross reservoir evaporation is estimated to be approximately 3,000 acre-feet per year.

Irrigated Acreage and Crop Types: There are approximately 21,000 irrigated acres under the FRICO–Barr System, based on the SPDSS 2001 Irrigated acreage assessment and estimates provided by FRICO. Some dryland farming of wheat and small grains takes place on lands within the system. Irrigated lands include over 50 percent alfalfa,

approximately 20 percent corn, and smaller percentages of grass pasture, small grains, beans, and orchard. Approximately half of the irrigated lands are sprinkler irrigated.

Ground Water Use: There is a significant amount of ground water use under the FRICO–Barr System. Ground water is used as a supplemental source in some areas and as the only water source on many lands in the Beebe Draw area. Ground water pumping is generally covered under augmentation plans through the Central Colorado Water Conservancy District, previously through GASP, and through the South Platte Well Users Association.

Return Flow Locations: The majority of return flows from FRICO–Barr lands drain to Beebe Canal and Milton Reservoir. Seepage losses from operation of the inlet canal occur at a fairly uniform rate because of year-round diversions. The Milton Reservoir storage decree specifically allows for delivery through the Burlington Ditch, although there is not a decree for return flows.

HydroBase Data: Historical end-of-month storage records are available for Barr Lake in HydroBase under Structure ID 0203837 for most of the 1950 through 2003 SPDSS study period. Diversion records for Barr Lake are available in HydroBase under the same Structure ID for 1989 through 2003.

The annual pattern exhibited in the end-of-month reservoir storage, as shown in **Figure 2**, reflects the typical operating schedule discussed in the subsequent Operational Information section of this memo. Reservoir storage typically reaches a maximum each year between April and July. Reservoir levels drop throughout the irrigation season reaching the lowest level late in the irrigation season, typically between September and November. Through the winter storage period of November through May, a minimal amount of water is collected in the reservoir, which slowly increases the end-of-month storage level. Except during significant drought years such as 2002, Barr Lake is typically filled to capacity. Water is typically released for irrigation beginning in May and continuing through September or October.

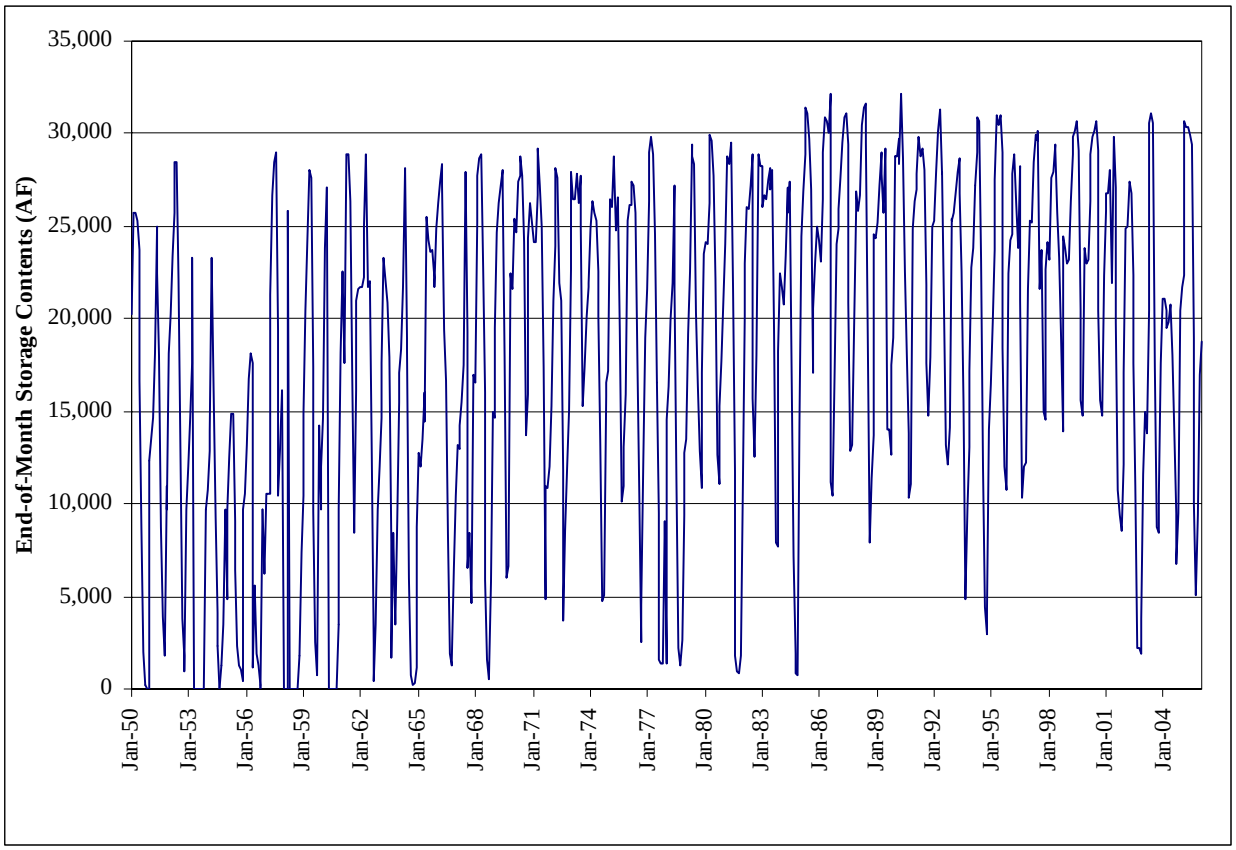

Figure 2: Barr Lake Historical End-of-Month Storage

Diversion coding of the historical diversion records indicates that water is diverted into Barr Lake through the Burlington Ditch. Historical reservoir release records are not available through HyrdoBase, however, inflow and releases are measured by FRICO and provided to the Water Commissioner.

Barr Lake Delivery Lands: The following canals deliver water from Barr Lake to lands within the FRICO–Barr System.

Neres Canal

Water is released from Barr Lake through the Barr Lake East Outlet to the Neres Canal for delivery to FRICO lands in Beebe Draw and Henrylyn lands in the Box Elder drainage. Owned and operated by FRICO, the unlined canal generally travels in a northeasterly direction for approximately 17.5 miles. The Neres Canal bifurcates after about 14 miles, producing the Box Elder Lateral, which is owned by Henrylyn and serves Henrylyn lands in the Box Elder drainage. The Neres Canal continues north and terminates approximately one mile north of the Town of Hudson. At the termination point, a cutoff was constructed to connect the Beebe Canal with the lower Neres Canal. Tailwater from the Neres Canal only reaches the Beebe Canal as surface water flow when FRICO flushes the canal or due to inflow from heavy rainstorms.

Releases from the reservoir into the outlet canal are measured at a weir located a few hundred feet downstream of the Barr Lake East Outlet. Another weir measures flows from the Neres Canal into the Box Elder Lateral. A venturi flume is used to measure tailwater at the end of the Neres Canal. These measurements are not recorded in HydroBase.

East Burlington Extension Ditch

Water is also released through the Barr Lake East Outlet to the East Burlington Extension for delivery to FRICO lands in Beebe Draw. Releases from Barr can be made independent or in conjunction with releases to the Neres Canal. Owned by the Burlington Extension Company with construction commencing in 1894, the unlined canal generally travels in a northeasterly direction for approximately 9 miles, paralleling the Neres Canal at a lower elevation. FRICO owns shares in the Burlington Extension Company which is solely a carrier company. Tailwater seldom, if ever, reaches the Beebe Canal as surface flow.

Releases from the reservoir into the outlet canal are measured at a weir located a few hundred feet downstream of the Barr Lake East Outlet. These measurements are not recorded in HydroBase.

Speer Canal

Water is released through the Barr Lake West Outlet to the Speer Canal for delivery to FRICO lands in Beebe Draw and the South Platte River basin. Owned and operated by FRICO, portions of the canal are lined; however, the majority of the canal remains unlined. FRICO began lining these portions of Speer Canal and Platteville Lateral in the early 1980s. The canal generally travels north for about 32 miles. The Speer Canal bifurcates after about 22 miles where both branches enter the South Platte River basin. The west branch becomes the Platteville Lateral, which extends to and terminates at the Platte Valley Canal, a feeder to the FRICO–Milton System. The east branch, keeping the Speer Canal name, travels northeasterly for about 10 miles until also tailing into the Platte Valley Canal upstream of Milton Reservoir. Except for irrigation east of the Speer Canal in the last two to three miles of the Speer Canal, water past the bifurcation is lost from Beebe Draw. Tailwater from the Speer Canal and Platteville Lateral only reaches the Platte Valley Canal as surface water flow when FRICO flushes the canal or due to heavy rainstorms.

Releases from the reservoir into the outlet canal are measured at a weir located a few hundred feet downstream of the Barr Lake West Outlet. A flume was constructed at Road 22 in 1983. Two weirs are located downstream of the bifurcation on the Speer Canal and Platteville Lateral. These measurements are not recorded in HydroBase.

West Burlington Extension Ditch

Water is also released through the Barr Lake West Outlet to the West Burlington Extension for delivery to FRICO lands in Beebe Draw. Releases from Barr can be made independent or in conjunction with releases to the Speer Canal. Owned by Burlington

Extension Company with construction commencing in 1894, the unlined canal generally travels in a northeasterly direction for about 9 miles, paralleling Speers Canal at a lower elevation before terminating at an un-named reservoir approximately three miles west-southwest of the Town of Hudson. FRICO owns shares in Burlington Extension Company which is solely a carrier company.

Releases from the reservoir into the outlet canal are measured at a weir located about downstream of the Barr Lake West Outlet. The weir was installed in 1984. Prior to 1984, West Burlington Extension flows were estimated from the total releases through the Barr Lake West Outlet (based on reservoir gage height and valve opening) minus measured flows in the Speer Canal.

Beebe Canal

Beebe Canal is fed by seepage from Barr Lake and seepage and return flows from the other canals diverting from Barr Lake. Although Beebe Canal has always been a natural low point, in the years after 1914, FRICO extended the canal up to Barr Lake and deepened sections of the canal. Owned and operated by FRICO, the unlined canal travels north along the Beebe Draw thalweg for approximately 19 miles and conveys flows to a series of reservoirs. Beebe Canal bifurcates approximately 4 miles downstream from Barr Lake. The west branch becomes the Bowles Seep Canal and generally continues in a northern direction. Further north, a second bifurcation of the Beebe Canal produces the East Neres Canal. Beebe Canal continues north to Milton Reservoir. A majority of the return flows in the area are collected in the Beebe Canal and conveyed to Milton Reservoir.

During the non-irrigation season, typical seepage water flow collected in Beebe Canal near the toe of Barr Lake is estimated at 3 cfs to 5 cfs and increases to 5 cfs to 8 cfs at Piccadilly Road. Water continues north and is conveyed through a series of reservoirs until it reaches the Milton Reservoir. During the non-irrigation season, the Bowles Seep and East Neres headgates are closed. The flow at Milton Reservoir is estimated to be around 10 cfs to 15 cfs.

During the irrigation season, water can be released from Barr Lake to the Beebe Canal via the West Burlington Extension Ditch in conjunction with or independent of releases to the Speer and West Burlington and via the Neres Canal in conjunction with or independent of deliveries from Barr to the Neres or East Burlington Extension Ditch. Throughout the irrigation season, all flows are diverted from the Beebe Canal into the East Neres Canal. The Beebe Canal headgate to Milton remains closed except during large runoff events. Diversions to Beebe Canal are not measured but estimated by the ditch rider to be about 10 cfs to 15 cfs at Barr Lake to obtain 20 cfs to 25 cfs at the East Neres headgate.

Bowles Seep Canal

The Bowles Seep Canal diverts from the Beebe Canal just north of I-76 and east of Lochbuie, about 4 miles downstream from Barr Lake, and generally runs in a northern direction for about 8 miles. Owned by FRICO, the unlined canal alignment has been

changed to run parallel to the Section line north of Highway 52. The water enters a pipe about ¼ mile north of Highway 52, runs northeast to Road 14, and then discharges to an open canal that continues east along the Section line. Tailwater seldom, if ever, reaches the Bowles Seep Canal as surface flow.

Diversion measurements on the Bowles Seep Canal are made using a rectangular weir located just downstream of the headgate. A venturi meter located at the intersection of Roads 14 and 41 measures tailwater.

East Neres Canal

The East Neres Canal diverts from Beebe Canal just south of Weld County Road 24, about 16 miles downstream from Barr Lake, and runs in a northerly direction for about 15 miles. Owned and operated by FRICO, the unlined canal crosses into the Box Elder Creek basin about ¼ mile downstream from its point of diversion and then crosses back into the Beebe Draw drainage about 14 miles downstream from its point of diversion. Tailwater seldom, if ever, reaches the East Neres Canal. The Neres Canal ends at the Gilmore Ditch which is part of the FRICO–Milton System.

Box Elder Lateral

Henrylyn receives its FRICO shares from Barr Lake releases to the Neres Canal and then to the Box Elder Lateral. The unlined canal is U-shaped, first traveling southeast from its headgate off the Neres Canal and eventually winding its way back north.

2) Henrylyn System

The Henrylyn System is located east of the FRICO–Barr System in Water District 2 in Adams and Weld County. Henrylyn shares several features with FRICO and the Burlington Company. FRICO, Burlington Company, and Henrylyn waters are conveyed through the Burlington Ditch/O'Brian Canal to the bifurcation with the Denver-Hudson Canal. Henrylyn owns 560 shares in FRICO and 123 shares in the Burlington Company which are delivered from Barr Lake through the Neres Canal to Box Elder Lateral. Henrylyn lands are located in Sections 63, 64, and 65, east of Barr Lake and Beebe Draw in both the Box Elder and Lost Creek basins. The majority of lands served by the Henrylyn System are not co-mingled with FRICO or Burlington Company lands. However, there are some lands in the Box Elder basin served solely by FRICO water and not served by Henrylyn water.

Henrylyn Irrigation District
P.O. Box 85
617 Birch Street
Hudson, Colorado, 80642
Phone: 303.536.4702

Denver-Hudson Canal (Structure ID 0200805)

The Denver-Hudson Canal travels in a northeasterly direction from its bifurcation with the O'Brian Canal. The unlined canal supplies Horse Creek and Prospect Reservoirs as well as several laterals that deliver direct irrigation water to Henrylyn parcels.

Length: Approximately 13 miles of the Denver-Hudson Canal are located in the Beebe Draw drainage. There is approximately 25 miles of ditch length between Barr Lake and Horse Creek Reservoir and approximately 25 miles between Horse Creek Reservoir and Prospect Reservoir.

Capacity: The capacity of the Denver-Hudson Canal is approximately 350 cfs.

Conveyance Efficiency: The canal is unlined. In an average year, Henrylyn diverts approximately 40,000 acre-feet at the Burlington Ditch headgate and approximately 20,000 acre-feet are delivered to the Henrylyn farm headgates. The average seepage losses of approximately 50 percent include losses through the Burlington Ditch, Denver-Hudson Canal, and Henrylyn laterals. Land owners in the District share proportionately in the overall system losses.

Irrigated Acreage and Crop Types: There are approximately 32,754 irrigated acres under the Henrylyn Irrigation District, based on the SPDSS 2001 Irrigated acreage assessment and estimates provided by Henrylyn. According to Henrylyn, up to about 10,000 acres have supplemental ground water supplies. On an average basis, these lands are served by the methods shown in **Table 2** below.

Table 2
Method of Water Delivery to Henrylyn Lands

Delivery Method	Acreage (acres)
Box Elder Basin	
Barr Lake releases to Neres & Denver-Hudson Canals	909
Barr Lake releases to Box Elder Lateral	2,181
Horse Creek Reservoir releases	13,901
TOTAL Box Elder Basin	16,991
Lost Creek Basin	
Horse Creek Reservoir releases to the Lo Line Canal	6,550
Prospect Reservoir releases	9,213
TOTAL Lost Creek Basin	15,763

The following additional information related to irrigated acreage was provided by Henrylyn:

- Users that receive delivery of their Barr Lake or Burlington Ditch Company water via the Box Elder Lateral do not receive additional water through Horse Creek Reservoir or the Denver-Hudson Canal.
- All of the parcels served by Horse Creek Reservoir releases are irrigated with surface water only.
- There are parcels with sprinkler irrigation supplied solely by surface water.
- There are approximately 1,035 additional acres located in the vicinity of the Henrylyn parcels that receive water from FRICO or the Burlington Company but no water from Henrylyn.

- Additionally, there is a small portion of dryland irrigation of wheat and sunflowers.

Farm headgate deliveries average 0.4 acre-feet per acre in an average hydrologic year and 0.6 acre-feet per acre in a wet year. Crops types irrigated over time include alfalfa, corn, wheat and barley, sunflowers, pinto beans and sugar beets. Fields are left fallow often when there is only a 30 percent pro-rata distribution. Based on the SPDSS 2001 Irrigated acreage assessment, irrigated lands include approximately over 50 percent alfalfa, 20 percent corn, and smaller percentages of grass pasture, small grains, beans, and orchard. Approximately 20 percent of the irrigated lands are sprinkler irrigated.

Ground Water Use: Approximately 8,000 acres to 10,000 acres of Henrylyn lands are supplemented with ground water. Of these lands, approximately 1,500 acres are in the Box Elder basin. Approximately 40 percent of the parcels served by Prospect Reservoir are irrigated with surface water only and the remainder is supplemented by ground water.

HydroBase Data: Water delivered to the Denver-Hudson Canal has been measured in a modified broad-crested weir, located just downstream from the Burlington bifurcation, for the past 9 years. Previously, measurements were made at a rated section at the same location. There is some daily and monthly diversion data for the Denver-Hudson Canal available through HydroBase for the irrigation seasons of 1958, 1964-1970, and 2001-2002 under Structure ID 0200805. There are also some daily and monthly diversion data for the Denver-Hudson Canal stored under the Burlington Ditch Structure ID 0200802 (Div Class S:1, F:805, U:Q, T:3) for the irrigation seasons of 1990-1992. Between calendar year 1958 and 2002, the average annual diversions reported under the Denver-Hudson Canal Structure ID 0200805 were 64,467 acre-feet per year. During calendar year 1990 and 1992, the average annual diversions reported under the Burlington Ditch going to the Denver Hudson-Canal were 39,763 acre-feet per year. Additional records provided by FRICO indicating both direct flow deliveries and storage releases made to users under the Henrylyn System are located in **Attachment A**.

Henrylyn Reservoir System

There are two additional storage facilities associated with the Henrylyn System, Horse Creek Reservoir and Prospect Reservoir. These two reservoirs will be modeled together as a reservoir system. Henrylyn also owns Olds Reservoir and Lord Reservoir. Lord Reservoir is used as a regulating reservoir and Olds Reservoir is no longer operational due to sedimentation. The Henrylyn System has about 9 laterals that do not show up on maps and lateral losses are reportedly high. The longest lateral is about 5 miles long off of the Denver-Hudson Canal. The Henrylyn System is water short.

Horse Creek Reservoir (Structure ID 0203592)

Horse Creek Reservoir is an off-channel storage facility located in the Box Elder drainage and is owned and operated by Henrylyn. Construction of the reservoir was completed in 1907 and water was first diverted in 1912. Water is conveyed to Horse Creek Reservoir for storage through the Denver-Hudson Canal. Storage water is released from Horse Creek Reservoir to the Denver-Hudson Canal for direct irrigation of

Henrylyn lands through several laterals within the Box Elder drainage and for conveyance to storage in the down-channel Prospect Reservoir.

Capacity:

- Total Storage: 16,965 acre-feet water right but due to sedimentation, actual capacity is approximately 15,000 acre-feet
- Dead Storage: Undetermined at this time, estimated around 1,000 acre-feet to 2,000 acre-feet.
- Area/Capacity Data: The capacity data shown in **Table 3** are based on an unknown date of survey (data was obtained from Henrylyn).

Table 3
Horse Creek Reservoir Gage Height-Area-Capacity

Gage Height (feet)	Area (acres)	Cumulative Capacity (ac-ft)
1	282	288
4	350	1,211
7	410	2,320
10	469	3,608
13	541	5,077
16	636	6,786
19	685	8,741
22	771	10,907
26	885	14,156
29	964	16,882

Reservoir Storage Measurement: Storage levels in Horse Creek Reservoir are measured using a staff gage. Henrylyn estimates that approximately one-third of the amount of water stored (around 4,000 acre-feet per year) is lost to evaporation and seepage. Average evaporation losses are from 8 acre-feet to 10 acre-feet per day at a gage height of 25 feet during the water delivery season.

HydroBase Data: Historical end-of-month storage records are available for Horse Creek Reservoir in HydroBase under Structure ID 0203592 for most of the 1950 through 2003 SPDSS study period. Storage records are also available under Structure ID 0103592 but these records are not as complete and slightly different than those available under Structure ID 0203592.

The annual pattern exhibited in the end-of-month reservoir storage, as shown in **Figure 3**, reflects the typical operating schedule discussed in the subsequent Operational Information section of this memo. Reservoir storage typically reaches a maximum each year between April and June. Reservoir levels drop throughout the irrigation season reaching the lowest level late in the irrigation season, typically between August and October. Through the winter storage period of November through May, a minimal amount of water is collected in the reservoir, which slowly increases the end-of-month storage level. Horse Creek Reservoir is often filled to capacity.

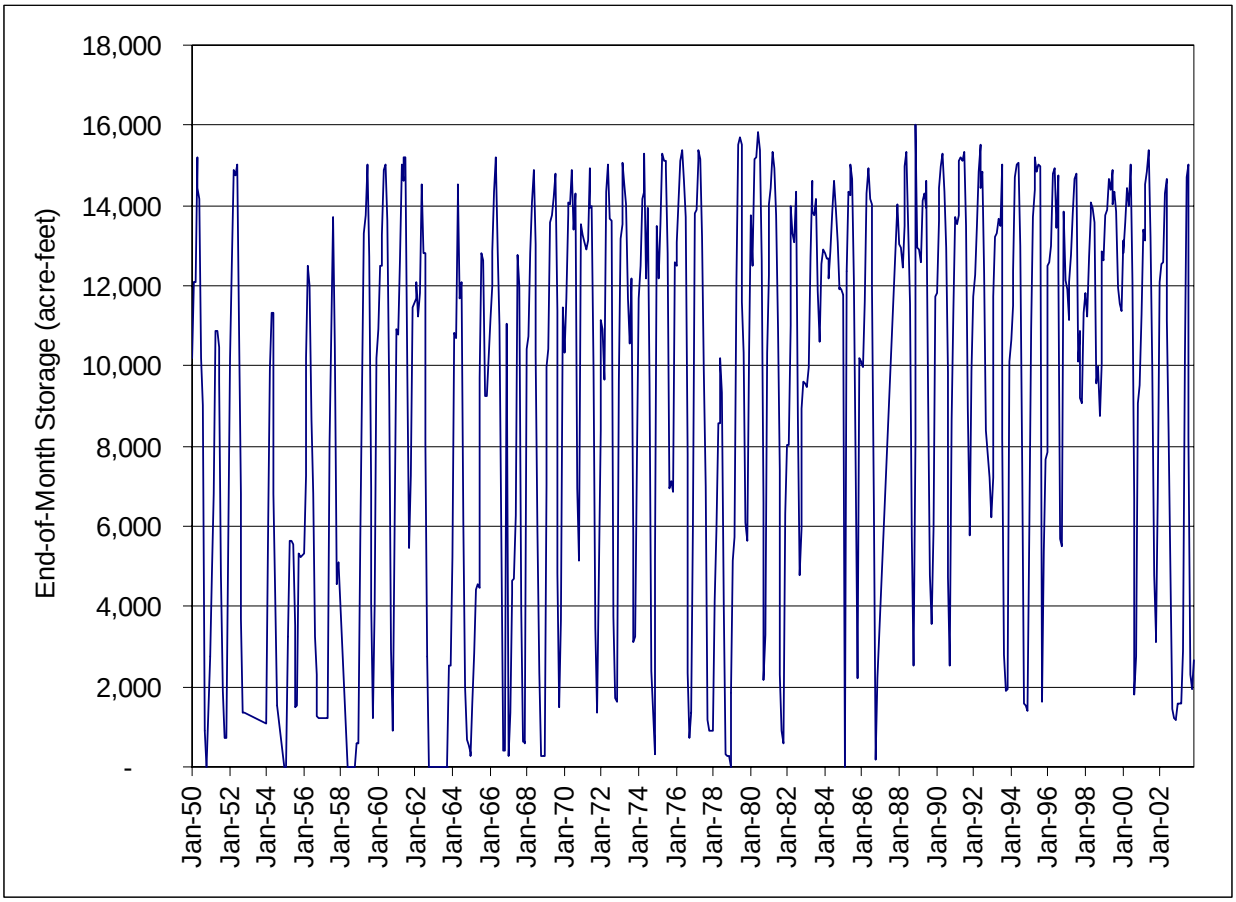

Figure 3: Horse Creek Reservoir Historical End-of-Month Storage

Prospect Reservoir (Structure ID 0203609)

Prospect Reservoir is an off-channel storage facility located in the Lost Creek drainage basin and is owned and operated by Henrylyn. Prospect Reservoir was constructed in 1907 and water first diverted in 1912. Storage water is released from Prospect Reservoir to the Denver-Hudson Canal for irrigation of Henrylyn lands through several laterals within the Lost Creek drainage basin.

Capacity:

- Total Storage: 5,970 acre-feet water right but actual capacity is around 5,400 acre-feet.
- Dead Storage: Undetermined at this time, estimated around 500 acre-feet to 1,000 acre-feet.
- Area/Capacity Data: The capacity data shown in **Table 4** are based on an unknown date of survey (data was obtained from Henrylyn).

Table 4
Prospect Reservoir Gage Height-Area-Capacity

Gage Height (feet)	Area (acres)	Cumulative Capacity (ac-ft)
5	47	133
9	68	353
13	98	670
17	141	1,122
21	192	1,756
24	221	2,362
28	278	3,343
32	284	4,538
35	406	5,589
37	414	6,368

Reservoir Storage Measurement: Storage levels in Prospect Reservoir are measured using a staff gage. Average annual evaporation losses are 3 acre-feet to 5 acre-feet per day (estimated by Henrylyn based on Horse Creek Reservoir evaporation losses and considering that Prospect Reservoir has more tree cover, lies in lower valley, and experiences less wind).

HydroBase Data: Historical end-of-month storage records are available for Prospect Reservoir in HydroBase under Structure ID 0203609 for most of the 1950 through 2003 SPDSS study period. Storage records are also available under Structure ID 0103609 but these records are not as complete and a number of data issues have been identified with these records.

The annual pattern exhibited in the end-of-month reservoir storage, as shown in **Figure 4**, reflects the typical operating schedule discussed in the subsequent Operational Information section of this memo. Reservoir storage typically reaches a maximum each year between April and June. Reservoir levels drop throughout the irrigation season reaching the lowest level at the end or after the irrigation season, typically between October and December. Through the winter storage period of November through May, a minimal amount of water is collected in the reservoir, which slowly increases the end-of-month storage level. Horse Creek Reservoir is often filled to capacity.

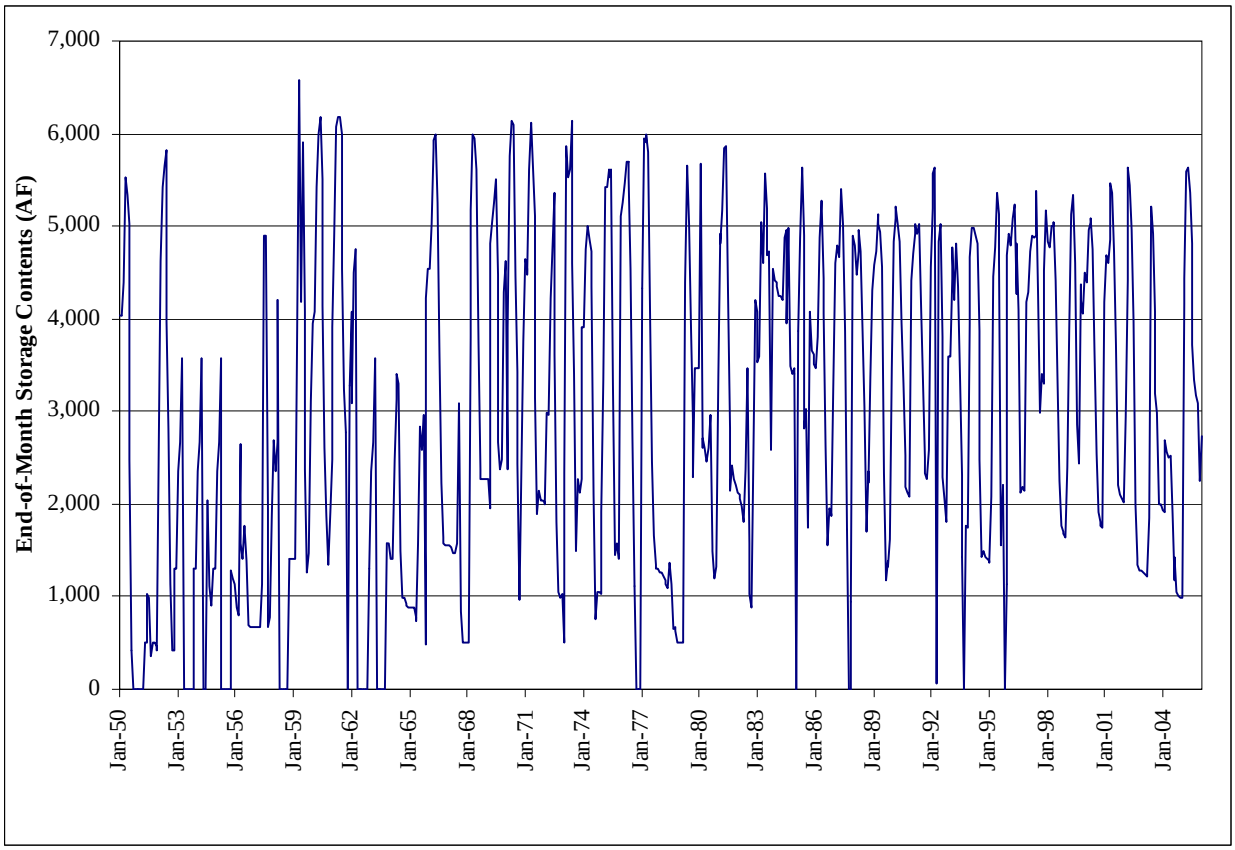

Figure 4: Prospect Creek Reservoir Historical End-of-Month Storage

WATER RIGHTS

Although not discussed in detail in this memorandum, **Table 5** shows the direct flow and storage rights owned by the Burlington Company.

Table 5
Water Rights – Burlington Company [1]

Source	Structure Name	Appropriation Date	Adjudication Date	Admin. No.	Decreed Amount	Decreed Uses
South Platte River	Burlington Ditch	8/14/1918	6/2/1862	4536.00000	3 cfs	Irrigation
South Platte River	Burlington Ditch	4/28/1883	4/1/1864	5205.00000	27.4 cfs	Irrigation
South Platte River	Burlington Ditch	7/8/1893	11/20/1885	13108.00000	350 cfs	Irrigation
South Platte River	Barr Lake	11/20/1885	8/7/1893	13108.00000	11,081.25 af	Storage for irrigation
Sand Creek	Burlington Ditch	7/8/1894	12/1/1885	13119.00000	250 cfs	Irrigation
First Creek	Burlington Ditch	7/8/1895	9/1/1886	13393.00000	50 cfs	Irrigation
Second Creek	Burlington Ditch	7/8/1896	11/15/1886	13468.00000	250 cfs	Irrigation
Third Creek	Burlington Ditch	7/8/1897	9/15/1887	13772.00000	250 cfs	Irrigation
South Platte River	Burlington Ditch	11/12/1924	6/1/1919	25353.00000	20.25 cfs	Storage
South Platte River	Burlington Ditch	11/12/1924	6/5/1921	26088.00000	20.25 cfs	Storage
South Platte River	Burlington Ditch	11/24/1924	6/15/1922	26463.00000	150 cfs	Storage
South Platte River	Burlington Ditch	11/12/1924	7/20/1922	26498.00000	450 cfs	Storage
South Platte River	Burlington Ditch	12/31/1986	11/24/1984	49673.49271	20 cfs	Storage

Notes: [1] Source: Colorado Water Rights Tabulation

1) FRICO–Barr System

Table 6 shows the direct flow and storage rights owned by the FRICO–Barr division.

Table 6
Water Rights – FRICO–Barr Division [1]

Source	Structure Name	Appropriation Date	Adjudication Date	Admin. No.	Decreed Amount	Decreed Uses
South Platte River	Burlington Ditch	8/2/1918	3/9/1908	21252.00000	600 cfs	Irrigation
South Platte River	Burlington Ditch	8/2/1918	1/13/1909	21562.00000	900 cfs	Storage
South Platte River	Barr Lake	1/13/1909	8/2/1918	21562.00000	54,941.262 af (includes refill)	Storage for irrigation

Notes: [1] Source: Colorado Water Rights Tabulation

2) Henrylyn System

Table 7 shows the direct flow and storage rights owned by Henrylyn.

Table 7
Water Rights – Henrylyn [1]

Source	Structure Name	Appropriation Date	Adjudication Date	Admin. No.	Decreed Rate	Decreed Uses
South Platte River	Burlington Ditch	8/2/1918	11/28/1907	21150.00000	300 cfs	Irrigation
Prospect Creek	Prospect Reservoir	4/1/1911	1/13/1936	26302.22370	1,500 af	Storage for irrigation
South Platte River	Burlington Ditch	8/2/1918	3/17/1911	22355.00000	400 cfs	Storage – Horse Creek Res
South Platte River	Horse Creek Reservoir	3/17/1911	8/2/1918	22355.00000	16,965.1 af	Storage for irrigation
Horse Creek	Horse Creek Reservoir	4/18/1908	1/13/1936	26302.21292	729 af	Storage for irrigation
South Platte River	Burlington Ditch	11/24/1924	11/21/1910	25050.22239	500 cfs	Storage – Prospect Res
South Platte River	Burlington Ditch	11/24/1924	1/28/1918	25050.24864	150 cfs	Storage – Olds Res
South Platte River	Olds Reservoir	1/28/1918	11/12/1924	25050.24864	533.71 af	Storage
South Platte River	Olds Reservoir	6/15/1922	11/12/1924	26463.00000	547.75 af	Storage
Box Elder Creek	Bootleg Reservoir	4/1/1909	1/15/1914	21640.00000	3,035 af	Storage & Irrigation
South Platte River	Burlington Ditch	12/31/1994	4/12/1907	52595.20920	60 cfs	Storage – Lord Res
South Platte River	Lord Reservoir No. 4	4/12/1907	12/31/1994	52595.20920	775 af	Storage & Irrigation

Notes: [1] Source: Colorado Water Rights Tabulation

Administration: Administration of the water rights associated with Barr Lake involves interaction with other water rights in Water District 2. FRICO is in frequent contact with the District 2 Water Commissioner. FRICO has initiated the process to change the designated uses for storage water in Barr Lake to include municipal and other uses.

In 1991, FRICO adjudicated a plan for augmentation (Case No. 84CW90). Replacement water is diverted under a February 4, 1984 priority and conveyed to Barr Lake through the Burlington Ditch/O'Brian Canal or to Milton Reservoir through the Platte Valley Canal. Water can be delivered from Barr Lake directly to stockholders or to Beebe Draw to establish recharge credits for subsequent pumping from 43 wells. From Milton, water can be delivered to stockholders on the Gilmore Canal.

OPERATIONAL INFORMATION

1) FRICO–Barr System

The Burlington Company, FRICO, and Henrylyn entities operate their combined storage and direct flow water rights through the Burlington Ditch/O'Brian Canal under the 1921 Agreement. FRICO manages the call and allocation of water to the three entities. The following is a general description of the operating procedures.

During the irrigation season, FRICO–Barr irrigation demands are first met from direct flow from the South Platte River. Releases from Barr Lake are made to meet the remaining irrigation demands.

Irrigation Season

Irrigation and domestic demands are met based on water rights priorities within the system.

Non-Irrigation Season

Beginning October 1 each year, any water diverted in excess of the Burlington Company first priority requirements is stored in Barr Lake until the original Barr Lake/Oasis Reservoir 1885 storage right of 11,081 acre-feet is satisfied. The beginning date for filling the Barr Lake First Enlargement, Horse Creek Reservoir, and Prospect Reservoir is November 1 (unless otherwise noted by the State Engineer).

After the original Barr/Oasis storage right is satisfied, water in excess of irrigation and domestic needs of the Burlington Company is evenly divided (50/50) at the Barr Lake bifurcation between FRICO for delivery to Barr Lake and Henrylyn for delivery to the Denver-Hudson Canal *except* beginning on April 1, all water is delivered into Barr Lake until it has reached its safe maximum capacity or normal winter fill. The even distribution resumes after Barr Lake reaches its safe capacity. An adjustment is made in the determination of Barr Lake filling for any water released from Barr Lake by FRICO. The agreement allows for the division of water between FRICO and Henrylyn to be accomplished in rotations in periods when an even division of water between Barr Lake and the Denver-

Hudson Canal would cause excessive conveyance losses and when ice or snow would make deliveries to the Denver-Hudson Canal difficult.

When all water reaching the bifurcation is being delivered into Barr Lake, Burlington Company stockholders below Barr Lake can use up to 25 percent of water flowing into Barr Lake for direct irrigation.

The 1999 Settlement Agreement between the Burlington Company, FRICO, Henrylyn, and the Denver Board of Water Commissioners also affects the system operations as it drives the allocation of water diverted into the Burlington/O'Brian Canal for storage in all of the Burlington Company, FRICO–Barr, and Henrylyn reservoirs. The following describes how this agreement affects operations during the non-irrigation season.

1. Unless otherwise determined by the State Engineer, the storage rights can begin filling on November 1st. The original Barr Lake/Oasis Reservoir 1885 storage right is satisfied first with water stored in Barr Lake. An adjustment is made for a "paper fill" for water available for diversion into the Burlington Ditch/O'Brian Canal but not actually diverted and Denver's direct diversions upstream under priorities junior to 1885 but senior to 1909.
2. The next 23,000 acre-feet diverted into the Burlington Ditch/O'Brian Canal and measured in the weir at the Barr Lake bifurcation (or the weir upstream from the Barr Lake bifurcation as necessary) is allocated to the 1909 Barr Lake First Enlargement storage right. Water may be delivered to Henrylyn prior to the complete filling to address safety concerns for the "winter fill" at Barr Lake and freezing and overtopping concerns with winter operation of the Denver-Hudson Canal.
3. Remaining storage space in any of the Burlington Company, FRICO–Barr, and Henrylyn reservoirs is filled under the remaining water storage rights. Calls under these water storage rights are exercised and satisfied in the sequence of their priorities, from senior to junior. The water measured counts against the calling water storage right regardless of the reservoir in which it is actually stored.

The effect of the "in-system exchange" described in Step 3 above is that when water diverted under the Barr Lake First Enlargement decree is stored in Horse Creek or Prospect Reservoir, Barr Lake must conclude its annual filling with the more junior Horse Creek or Prospect Reservoir decrees. The deferred filling of the Barr Lake First Enlargement is acceptable to the senior FRICO shareholders under the terms of the 1921 Agreement. This in-system exchange has never been adjudicated but is the subject of a recent water application (Case No. 02CW105).

Under the 1999 Settlement Agreement, Denver agreed to provide 5,000 acre-feet ("5K") of reusable water to the Burlington Company, FRICO–Barr, and Henrylyn each delivery year (May 1 to April 30). The water is to be used for municipal purposes in the Denver metro area and will be delivered at or upstream of the Henderson gage on the South Platte River at a maximum rate of 150 cfs with at least 2,000 acre-feet delivered at or above the Metropolitan Wastewater Treatment Plant outfall. In December 2001, South Adams acquired 500 acre-feet and the right to purchase the remaining 4,500 acre-feet of 5K water. For water quality purposes, South Adams plans to take the water during periods of high flow or may take water diverted into the

Burlington Ditch and the Companies will deliver the reusable 5K water to their stockholders. The timing of Denver's deliveries of the 5K water and South Adam's diversions of this water from the Burlington Ditch is also part of the recent water court application (Case No. 02CW105)

Barr Lake typically reaches its normal winter capacity around November or December. FRICO maintains this storage level throughout the winter and then tops off the reservoir to gage height of 34 feet during the runoff. Releases typically begin in May and continue throughout the irrigation season until September or October. The sequence of water rights calls affecting storage in Barr Lake in a typical year are as follows:

- Beginning around May 1st – Burlington 1885 water right is the call on the South Platte.
- Around June 1st – Free river conditions.
- Around mid June – Burlington's 11/20/1885 water right is the senior call for 1-2 weeks and is the bypass call (the "bypassed from") for 1-2 weeks.
- First week of July – The Burlington call is off.

Generally, a call placed on the river affects all water rights junior to and upstream of the calling priority. A bypass call occurs when a structure is able to divert a portion of its water right but must pass the rest to a downstream senior water right. The senior water right is satisfied without having to completely call out the upstream structure. In this case, all structures junior to the upstream structure and located upstream of the senior downstream user (the "bypassed to" right) are affected. As described above, around mid June, a portion of Burlington's 11/20/1885 water right is often bypassed to satisfy the downstream Jay Thomas Ditch water right.

Reservoir Accounts and Ditch Ownership:

Burlington Company: There are 3,999.992 shares in the Burlington Company.

- 1848.327 shares (46.2 percent) were historically delivered through the Little Burlington Division – Little Burlington Ditch and Brighton Lateral.
- The remaining 2,151.665 shares (53.8 percent) were delivered through the Barr Lake portion (the Oasis portion of the Burlington Company).

The cities of Thornton and Brighton together own a majority of shares in the Little Burlington Division (Thornton – 837.5 shares, 45.3 percent; Brighton – 146.61 shares, 7.9 percent). Some of these shares have been changed to municipal and other uses in Water Division 1 Water Court. The municipalities can take delivery of their pro-rata share of the changed water rights into their municipal systems after they are diverted through the Burlington Ditch. The return flow requirements of the changed Burlington Ditch shares are summarized in **Table 8** for the senior Duggan 27.4 cfs right and the 1885 right for use in the SPDSS Surface Water Planning Model.

Table 8
Return Flow Obligations – Changed Burlington Ditch Water Rights
Used Under Little Burlington Ditch

Source	Adjudication Date	Admin. No.	Decreed Amount	Return Flow as Portion of Diversion
Duggan Right	4/1/1864	5205.00000	3.133 cfs	Not used*
	4/1/1864	5205.00000	10.28 cfs	31 percent
	4/1/1864	5205.00000	7.987 cfs	31 percent
	4/1/1864	5205.00000	6.00 cfs	100 percent
		TOTAL	27.4 cfs	
South Platte River	11/20/1885	13108.00000	200 cfs out of 350 cfs	31 percent

Source: Thornton's 87CW107 decree. Same approach adopted in Brighton's pending 00CW202 case.
* 3.133 cfs portion of Duggan right changed by South Adams County Water and Sanitation District (SACWSD) and used by SACWSD as direct credit in the South Platte River.

FRICO: FRICO is a mutual ditch company. There are 2,759.127 shares in the Barr Division, with 79.7 percent used by FRICO-Barr irrigators. FRICO also owns 1,257.67 shares of Burlington Company stock (31.4 percent), which is used within the FRICO–Barr Division.

FRICO typically allocates "charge" water, expressed as percentages, to its shareholders in May with an allocation of 100 percent corresponding to 10 acre-feet per share delivered at the shareholder's headgate. The allocation is based on the volume of storage water and typical evaporation and canal losses. Shareholders can call for allocation at any time as long as there is sufficient water to produce reasonable heads in the ditches. FRICO may make supplemental allocations throughout the irrigation season and typically delivers some "non-charge" water that is not counted against shareholders' allocation. This direct flow water is available when Barr Lake is full or nearly full.

Historical allocations made to the FRICO–Barr shareholders averaged 4.5 acre-feet per acre while allocations made to the Burlington Company shareholders averaged 4.0 acre-feet per acre over the 1969 to 2000 time period. These allocations represent "charge" water only.

Henrylyn: Henrylyn owns 123 shares of Burlington-Barr Lake stock (3.1 percent of total, which is part of 31.4 percent owned by FRICO) and 560 shares of FRICO–Barr Lake stock (20.3 percent). The Barr Lake water is delivered to Henrylyn stockholders through the Neres Canal and Box Elder Lateral.

Henrylyn allocates water to landowners similarly to FRICO, with an allocation of 100 percent corresponding to a delivery of 1 acre-foot per share at the landowner's headgate. Historical allocations to landowners under Box Elder averaged 0.53 acre-feet per acre while landowners under the Horse Creek and Prospect Reservoirs were allocated 0.37 acre-feet per acre over the 1969 to 2000. These allocations represent both "charge" and "non-charge" water.

General Operational Targets: Under the 1921 and 1999 Agreements, FRICO has managed the system allowing exchanges between Barr Lake and the Henrylyn reservoirs. Effectively, Horse Creek and Prospect Reservoirs are filled in part with the more senior Barr Lake storage right and Barr Lake is filled in part under the more junior Horse Creek and Prospect storage rights.

2) Henrylyn System

Henrylyn operates its system with FRICO during the non-irrigation season to maximize storage first in Horse Creek Reservoir, next Prospect Reservoir, and then Lord Reservoir, which is used mostly for regulation. Olds Reservoir is used as a recharge reservoir and Henrylyn can also move water from Prospect to Olds Reservoir to augment Lost Creek.

During the irrigation season, Henrylyn System irrigation demands are first met from direct flow from the South Platte River. Releases from Horse Creek and Prospect Reservoirs are made to meet the remaining irrigation demands.

Where to find more information

- The Water District 2 Meeting Notes prepared for SPDSS Task 3 – Identify Key Diversion Structures contain additional information on ditch and reservoir operations within this water district.
- The FRICO–Milton Division SPDSS Operating Memorandum contains additional information on Beebe Canal and the Gilmore Ditch.
- The Irrigated Acreage Assessment GIS Coverage prepared for SPDSS displays the boundary of the FRICO service area. GIS coverage is available on the CDSS website (cdss.state.co.us).

REFERENCES

1. Water Rights Data. Colorado Division of Water Resources. http://water.state.co.us/

2. *Beebe Draw Diversion and Augmentation Program, Report No. 1, The Water Resources of Beebe Draw*. January 1985. Prepared by Hydro-Triad, LTD for the Farmers Reservoir and Irrigation Company.

3. *Draft Analysis of "5K" Water Operation and Water Rights Requested in Case No. 02CW105*. July 2004. Prepared by Helton & Williamsen, P.C. for the Farmers Reservoir and Irrigation Company, Burlington Ditch, Reservoir, and Canal Company, Henrylyn District.

4. Photos: Colorado State Parks. http://parks.state.co.us/default.asp?parkID=67&action=park