

WATER PERMIT NO. 2671-2

Name of Applicant: **Rapid Valley Sanitary District**

Address: **4611 Teak Dr, Rapid City SD 57703** Phone: **605 393-1050**

Amount of Water Claimed: **99 AF** Total Acres: **NA**

Source of Water Supply: **Murphy Ditch**

Water to be used for: **several uses** County: **Pennington**

Type of Waste Disposal System:

Location:

PRIORITY Date Received: **8-16-2011** Application/License Fee: **\$300**

Corrected Application Received: Period of Annual Use: **April 1 – October 31**

Remarks: **transfer Gravatt to Rapid Valley Sanitary District**

Diversion Point:

Land to be Irrigated:

Depth of Well:

Well Driller:

Remarks:

Type of Map: **aerial**

Prepared by: **Ted Schultz, PE**

Reviewed and the Number Assigned on: **8-16-2011**

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____

FORM 2: Application for uses other than irrigation
(type or print)

Mail to: Water Rights Program Joe Foss Building 523 E. Capitol Pierre, SD 57501-3181 (605) 773-3352	No. <u>2671-2</u> (office use only)	Hydrologic Unit <u>10130110</u>
	Basin <u>Upper Cheyenne</u>	
	Newspaper <u>Rapid City Journal</u>	

RECEIVED

AUG 16 2011

WATER RIGHTS
PROGRAM

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use(s) of water:

- | | | | |
|---|---|--|--|
| ☒ Municipal | ☐ Suburban Housing | ☐ Recreational | ☐ Institutional |
| ☐ Rural Water System | ☐ Commercial | ☐ Fish & Wildlife | ☐ Geothermal Heat |
| ☐ Domestic (over 18 gpm) | ☐ Industrial | ☐ Other _____ | |

Type of Application:
(check one)

- ☐ New ☒ Vested Right (Use predates Mar. 2, 1955) ☐ Future Use Reservation
☐ Place to Beneficial Use Water Reserved by Future Use Permit No. _____
☒ Amendment/Correction to Permit No. 1727-2

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.)

Transfer of Olson shares to Rapid Valley Sanitary District at an alternate point of diversion located at the District water treatment plant. Change use from irrigation to suburban housing/municipal.

- Name of Applicant Rapid Valley Sanitary District - Water Service Phone 605-393-1050
(check one) ☒ Owner ☐ Tenant/lessee
Mailing Address 4611 Teak Drive, Rapid City State SD 57703
(Street, RR, or Box and City) (Zip Code)
- Amount of water claimed 0.60 *CFS or 19 **GPM ***AF
(*Cubic Feet per Second) (**Gallons per Minute) (***)Acre Feet - storage capacity of dam/dugout or annual use if applicable
- Source of water supply Murphy Ditch - Rapid Valley Water Company, Inc.
- Location of point of diversion (example - 3 wells in SW 1/4 NE 1/4 section 12-T104N-R53W) County Pennington
See Figure 1, Page 3. Raw water diversion point located in NE 1/4 NW 1/4 of Section 15, T1N, R8E, BHM, Pennington County.
- County or counties where water will be used Pennington
- Annual period during which water is to be used April through October
- Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)
Refer to attached report prepared by Leonard Rice Engineers dated June 2011.

STATE OF SOUTH DAKOTA)

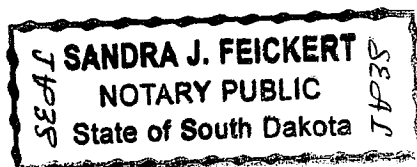
County of Pennington)

Attachments: Attach Form 2A if diversion is from a well or dugout, or if storage of water is proposed. Attach map and any other technical information. (see instructions)

I, Jim Jester, the applicant, certify that I have read this application, have examined the attached map and that the matters stated are true and that I intend, and am able to complete the necessary construction.

Applicant's signature Jim Jester

Subscribed and sworn to before me this 15th day of August 20 11



Sandra J. Feickert
Notary Public signature

My Commission Expires 12-08-2015

SOUTH DAKOTA
WATER PERMIT NO. 2671-2

Date of first receipt of application August 16, 2011.

The Water Management Board approved Water Permit No. 2671-2 on November 30, 2011 for Rapid Valley Sanitary District – Water Service, c/o Jim Jester, 4611 Teak Drive, Rapid City SD 57703 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 2671-2 transfers a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch. The transfer is for Rapid Creek water historically used to irrigate 45.6 acres of Gravatt property. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.60 cubic feet of water per second (cfs) with an annual volume limitation of 98.5 acre feet of water.

Historically, the 0.60 cfs has been used to irrigate 45.6 acres located in portions of the E 1/2 SW 1/4 and Section 19 and NE 1/4 NW 1/4 Section 30; all in T1N-R9E. The existing diversion point on Rapid Creek for Murphy Ditch is located in the NE 1/4 SW 1/4 Section 8-T1N-R8E. This permit changes the diversion point for 0.60 cfs to a permanent diversion point for use by the Sanitary District to be located in the NE 1/4 NW 1/4 Section 15-T1N-R8E. This permit does not authorize any new water appropriation from Rapid Creek.

2. The water appropriated shall be used for the purpose of municipal, industrial, commercial, common distribution system, rural water system, suburban housing and domestic use and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: April 1 – October 31 (as set forth in qualifications No. 1).
4. The date from which applicant may claim right is April 6, 1878 (established by the Murphy Ditch vested water right for natural flow).
5. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATIONS

1. Permit No. 2671-2 is limited to a diversion rate of 0.60 cfs for a total annual volume of 98.5 acre feet of water. The Rapid Valley Sanitary District shall measure diversions at the District's water treatment plant. The total monthly diversion shall not exceed the amount listed in the following table.

Monthly Volume Limitation

Month	acre feet
April	3.8
May	12.3
June	14.2
July	18.8
August	24.4
September	17.9
October	7.1
TOTAL	98.5

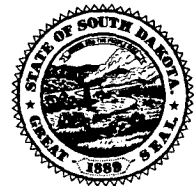
(continued)

2. The Rapid Valley Sanitary District shall report to the Chief Engineer annually the amount of water withdrawn each month at the District's water treatment plant.
3. Permit No. 2671-2 authorizes diversion of only natural flow water by the Rapid Valley Sanitary District and does not include any right to stored irrigation water available under contract from Pactola Reservoir and Deerfield Reservoir.
4. The Water Management Board retains jurisdiction of Permit No. 2671-2 in the event that additional information shows that changes need to be made in the monthly or total annual volumes authorized by Permit No. 2671-2.
5. Diversion under Permit No. 2671-2 may not interfere with existing water rights in effect prior to approval of Permit No. 2671-2 or any domestic rights.
6. The amount of water with an April 6, 1878 priority date, which may be appropriated under Vested Water Right No. 1727-2 is reduced by 0.60 cfs.
7. The approval of Permit No. 2671-2 retires from future irrigation the 45.6 acres known as the Gravatt property located in portions of the E ½ SW ¼ Section 19 and NE ¼ NW ¼ Section 30, T1N, R9E which has been historically irrigated from Murphy Ditch.
8. The permit holder, Rapid Valley Sanitary District, shall permanently render inoperable the structural means of diverting water to the land which is no longer subject to Vested Water Right No. 1727-2 pursuant to South Dakota Codified Law 46-5-34.1. This work shall be completed prior to the permit holder's diversion of the transferred water to beneficial use on the parcel of land approved under the transfer. The permit holder must notify the Chief Engineer to schedule an inspection. This transfer is subject to the Chief Engineer's approval that the works are rendered inoperable. This qualification does not grant access to property owned by third parties for making structural changes. The permit is responsible for ensuring that access is obtained from such third parties and that such third parties are also notified that inspections will occur.

WATER MANAGEMENT BOARD

By: Garland Erbele
Garland Erbele, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

DEC 14 2011
date





1560 Concourse Drive
Rapid City, SD 57703
Phone (605) 341-7800
Fax (605) 341-7864
www.cetecengineering.com

Letter of Transmittal

DATE: 08-15-2011	JOB NO: 08118.00
ATTENTION: Eric Gronlund and Mark Rath	
RE: Rapid Valley Sanitary District	
Water Rights Transfer	

TO: S.D. Dept. of Environment & Natural Resources
Water Rights
Joe Foss Building
523 E. Capitol
Pierre, SD 57501-3182

RECEIVED

AUG 16 2011

WATER RIGHTS
PROGRAM

WE ARE ☒ SENDING
☐ HAND DELIVERING

☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change Order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			Form 2. (Transfer of Rypkema shares.)
1			Form 2. (Transfer of Gravatt shares).
1			Form 2. (Transfer of Olson shares).
3	June 2011		Engineering Report.
1	08-15-2011		\$900.00 Permit Fee – Check #3597.

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Reviewed ☐ Revise and resubmit
☐ For your use ☐ Rejected ☐ Resubmit _____ copies for approval
☐ As requested ☐ Make corrections noted ☐ Return _____ corrected prints
☐ For review and comment ☐ Other _____

REMARKS:

Please review and process the attached Water Rights Transfers on the Murphy Ditch to Rapid Valley Sanitary District.

Please contact me with any questions.

COPY TO: Jim Jester, Rapid Valley Sanitary District – Water Service
Aaron Tieman, SDDENR – Rapid City
File

SIGNED:


Ted Schultz, P.E.



LeonardRice
ENGINEERS, INC.

RECEIVED
AUG 16 2011
WATER RIGHTS
PROGRAM

ENGINEERING REPORT

TRANSFER OF WATER RIGHTS

1878 MURPHY DITCH VESTED WATER RIGHT

Prepared For

RAPID VALLEY SANITARY DISTRICT

In Association With

CETEC ENGINEERING, INC.

JUNE 2011

Project No. 1161RV-04

2000 Clay Street, Suite 300 | Denver, Colorado 80211
303-455-9589 | www.LREwater.com



Engineering Report: Transfer of Water Rights

1878 Murphy Ditch Vested Water Right

A circular professional engineer seal for Miranda Larsen. The outer ring contains the text "COLORADO LICENSED" at the top and "PROFESSIONAL ENGINEER" at the bottom, separated by dots. Inside the ring, the name "MIRANDA LARSEN" is written in an arc. In the center, the license number "02727" is displayed above the expiration date "6/27/2011". A handwritten signature, "Miranda Larsen", is written across the seal.

Edward J. Armbruster, P.E.
Miranda C. Larsen-Funk, P.E.
Billy Mihelich, E.I.T.
Anita Rodlin


Theodore F. Schultz, P.E.
CETEC Engineering, Inc.

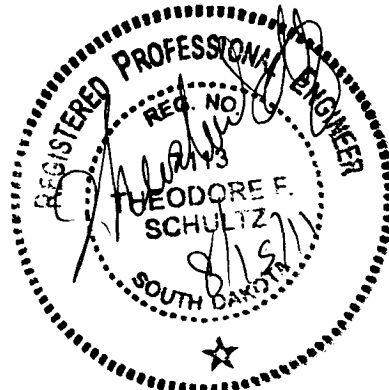


Table of Contents

<i>Executive Summary</i>	<i>1</i>
<i>1. Introduction.....</i>	<i>2</i>
<i>2. Background</i>	<i>2</i>
2.1. Rapid Valley Sanitary District	2
2.2. Murphy Ditch.....	2
2.3. Prior Transfers of the 1878 Murphy Ditch Vested Water Right.....	4
2.4. Untransferred Portion of the 1878 Murphy Ditch Vested Water Right	4
<i>3. Methodology for Analyses.....</i>	<i>5</i>
3.1. Crop Irrigation Requirement.....	5
3.2. Required Headgate Delivery.....	7
3.3. Pro Rata Delivery	7
3.4. Transferable Yield	7
<i>4. Results of Analyses.....</i>	<i>8</i>
4.1. Crop Irrigation Requirement.....	8
4.2. Required Headgate Delivery.....	9
4.3. Pro Rata Delivery	9
4.4. Transferable Yield	9
<i>5. Future Use of Murphy Ditch Water Right.....</i>	<i>10</i>
5.1. Use by RVSD	10
5.2. Summary	11
<i>6. References</i>	<i>13</i>

List of Figures

Figure 1. Rapid Valley Sanitary District General Location Map	3
Figure 2: Permitted 1878 Murphy Ditch Parcels.....	6

List of Tables

Table 1 - 1878 Murphy Ditch Vested Water Right Stockholders.....	5
Table 2 - Average Crop Irrigation Requirement for Alfalfa (1950 to 2004)	8
Table 3 - Average Crop Irrigation Requirement for Pasture Grass (1950 to 2004)	8
Table 4 - Average Required Headgate Delivery (1950 to 2004).....	9
Table 5 - Subject Right Average Diversions and Deliveries (1946 to 1980)	9
Table 6 - 1878 Murphy Ditch Vested Water Right Annual Transferable Yield.....	10
Table 7 - Average RVSD Monthly Water Use Pattern	11
Table 8 - Volumetric Limit on Diversions (ac-ft).....	12

Appendices

APPENDIX A - Water License No. 1727-2 Rapid Valley Water Company

APPENDIX B - Selection of Study Period

APPENDIX C - Calculation of Average Historical Murphy Ditch Diversions

APPENDIX D - Farm Specific Calculations of Transferable Yield

APPENDIX E - Detailed Results of Potential Consumptive Use Computations

EXECUTIVE SUMMARY

The Rapid Valley Sanitary District ("the District" or RVSD) provides drinking water to residents and businesses in rural portions of Pennington County east of Rapid City, South Dakota. A portion of the District's potable water supplies comes from previous transfers of shares purchased in the Rapid Valley Water Company ("the Company"). The District is contemplating purchasing additional shares of the Company. Rapid Valley Water Company diverts water from Rapid Creek via the Murphy Ditch under a vested 1878 water right ("subject right"). To date, RVSD has secured contracts for approximately 9 percent of the subject right.

This Engineering Report summarizes an evaluation of the transferable yield of the 1878 water right in the Murphy Ditch ("subject right"). As a result of prior transfers irrigation has ceased on approximately 817 acres of the original 1,148 acres identified in Permit No. 1727-2. Approximately 331 acres continue to be irrigated using the subject right. The transferrable yield from the 1878 Murphy Ditch water right associated with the "untransferred" 331 acres are the subject of this report. An analysis was conducted to quantify the transferable yield of the untransferred portion of the subject right. Historical diversions and deliveries through the Murphy Ditch over the period 1946 through 1980 were estimated to average 2.6 ac-ft per acre per year. The irrigated lands associated required, on average, a total of 3.7 ac-ft per acre of delivery to fully meet the crop irrigation requirements each year. The transferable amount was estimated by taking the lesser of the historical deliveries and the required deliveries on a monthly basis.

If irrigation of the untransferred portion of the subject right is discontinued, an average of up to 703 ac-ft per year (4.3 c.f.s.) could be diverted at an alternate point of diversion located at the District water treatment plant (194 ac-ft or 1.19 c.f.s. for those shares under contract). This report contains several terms and conditions on the future use of the subject right by the District to protect other water rights owners on Rapid Creek.

1. INTRODUCTION

This Engineering Report summarizes an evaluation of the transferable yield of the untransferred portion of lands historically irrigated by the 1878 Murphy Ditch water right. The report documents the historical operation of the Murphy Ditch as it relates to delivery of irrigation water to these lands and quantifies the future transferable yield based on historical water supply requirements and water availability.

The District is currently negotiating with multiple stockholders to acquire additional interest in the 1878 Murphy Ditch water right. To date they have secured contracts with three water right owners. The District will use the portion of the subject right acquired, following a transfer proceeding with the South Dakota Department of Environment and Natural Resources (SDDENR), to supply a portion of its existing and future demand for potable water. Following the transfer, the District would divert water under the subject right at a treatment facility located approximately 3.5 river miles below the Ditch headgate on Rapid Creek.

2. BACKGROUND

2.1. RAPID VALLEY SANITARY DISTRICT

The RVSD is located on the eastern edge of Rapid City in central Pennington County (**Figure 1**). The District was formed in the early 1960s to serve a growing population east of Rapid City in the plains area known as Rapid Valley and is the oldest organized rural water system in South Dakota.

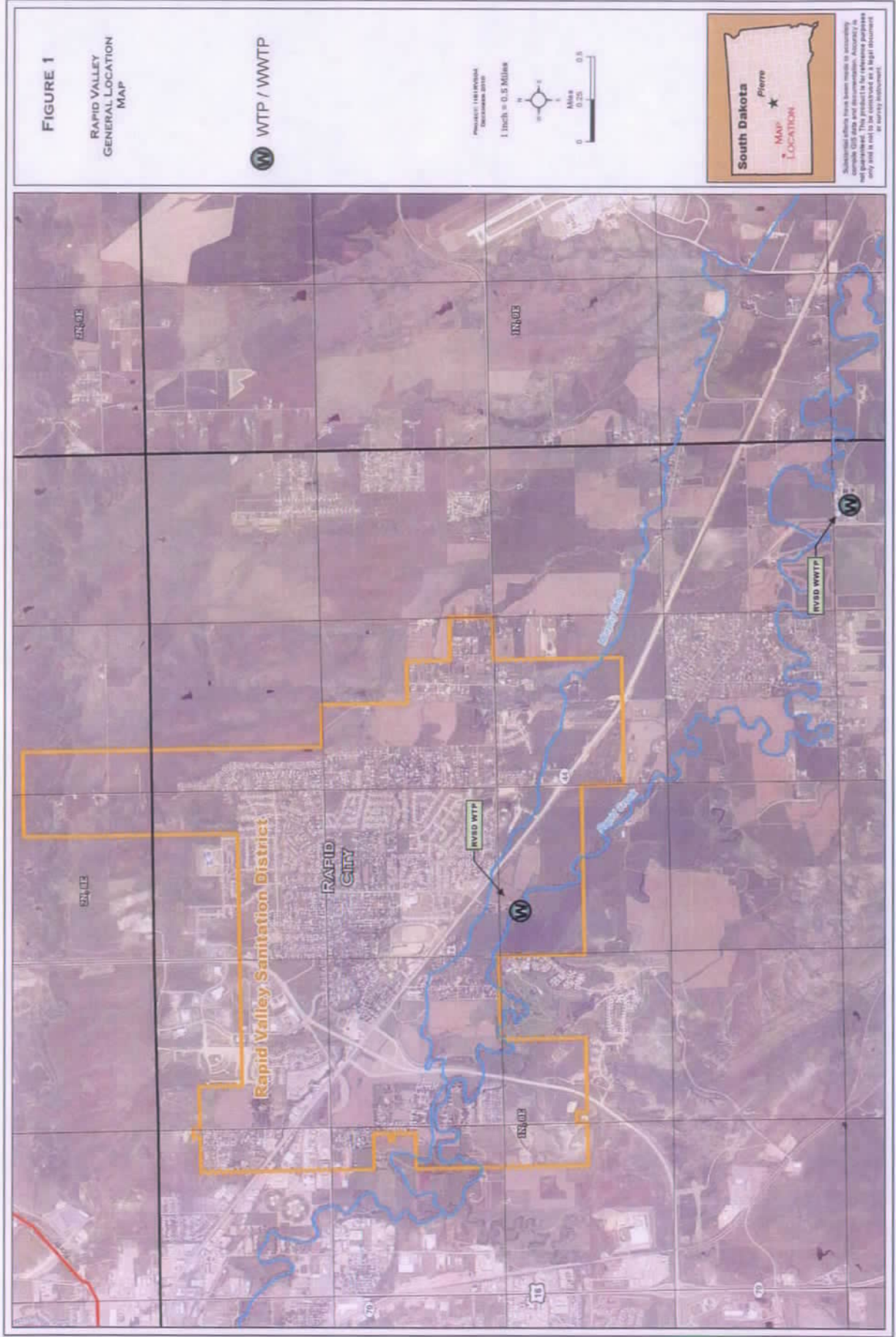
The Rapid Valley area has seen steady growth and has grown from approximately 1,800 customers in 1988 to 3,400 customers in 2009. The late 1990s housing boom in Rapid Valley increased customers at a rate of 140 per year; this growth has slowed in more recent years to an estimated 100 new customers per year. The area has been a popular location for new residential construction, and additional residential growth is expected in the undeveloped District area. The current customer base of 10,000 people is composed mainly of residential customers with commercial properties in the highway service areas.

The current District boundary includes approximately 3,850 acres with a 2009 service area of 1,700 acres or 44 percent of the possible system area. The recent development has been constructed at higher densities (3.0-3.5 dwelling units per acre) and typically uses more water during peak periods as compared to development during the 1960s, 1970s and 1980s. The continued growth has created challenges for the RVSD water system and storage facilities. The District has had difficulty providing adequate supply and water storage during peak water usage periods and continued growth. Drought conditions will further strain the water system and potentially cause water shortages.

2.2. MURPHY DITCH

The Murphy Ditch (also known as the Rapid Valley Ditch or Rapid Valley Water Company) diverts water from the north side of Rapid Creek at a point located in the NE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 8, Township 1 North, Range 8 East of the Black Hills P.M., in Pennington County. The headgate of the Ditch is located approximately two miles south and east of Rapid City, and approximately three-quarters of a mile downstream of the U.S. Geological Survey stream flow gage ID 06418900 (Rapid Creek below Sewage Treatment Plant near Rapid City). The Ditch extends from its headgate approximately 8 miles to the south and east. Irrigation water from the ditch is supplied to lands on both sides of Rapid Creek. Diversions from Rapid Creek can be measured at a rated weir located down-ditch from the headgate and above the first owner turnout.

The Murphy Ditch diverts water under two original water rights. Under Vested Water Right (Permit No. 1727-2 (April 6, 1878 priority date) the Murphy Ditch has the right to divert 17.0 c.f.s (**Appendix A**). This is the second most senior water right on Rapid Creek; the Leedy Ditch, located upstream within Rapid City, has the most senior right for 1.0 c.f.s, and a priority date of April 1, 1877. The Murphy Ditch's junior priority, under Permit No., 1727-2 (April 26, 1893 priority date) allows for diversion of an additional 3.0 c.f.s.



At times, the Murphy Ditch may also carry water diverted under several other permits, including Little Giant (Permit No. 653-2 for 2.4 c.f.s), Blanche Sedivy (Permit No. 1684-2 for 0.21 c.f.s), Warren Lamb Lumber (Permit No. 1461-2 for 1.25 c.f.s), Marty Rypkema (Permit No. 1784-2 for 0.71 c.f.s) and Jerry and Donna Olson (Permit No. 1788-2 for 0.50 c.f.s). These permits are for water in addition to the 17.0 c.f.s and 3.0 c.f.s rights of the Murphy Ditch.

At the time that the Murphy Ditch vested water right permit was confirmed in early 1991, specific lands were identified on which use of each of the Murphy Ditch vested water rights could occur. Note that some of these lands were corrected by Permit Nos. 2239-2, 2240-2, 2241-2, and 2242-2 later that same year. The permit issued for the subject right (17.0 c.f.s) identifies 1,148 irrigated acres. The interest that each stockholder owns in the subject right is equal to the number of permitted irrigated acres owned of those identified in the aforementioned permits.

The Murphy Ditch consists of an earthen channel over its entire course, and individual farmers are provided water via numerous turnouts. The Ditch is operated on an informal rotational basis whereby owners in the Ditch receive water in turn, based on their pro-rata interest. At times more than one owner may be provided water depending on the divertible flow rate at Rapid Creek. The ditch periodically receives inflow down-ditch of the diversion point on the river as natural drainage and/or return flows from lands lying to the north and west (further discussed below). Lands irrigated by the Hawthorne Ditch lie immediately above the Murphy Ditch and may contribute to these inflows.

2.3. PRIOR TRANSFERS OF THE 1878 MURPHY DITCH VESTED WATER RIGHT

There have been several transfers involving the subject water right since the early 1990s. Between 1991 and 2003, Rapid City transferred a total of 4.14 c.f.s for use in the City's municipal system. RVSD has transferred a total of 6.71 c.f.s for use in their municipal system (5.05 c.f.s in 2006 and 1.66 c.f.s in 2009). As part of several of the Rapid City transfers, a portion of the subject right was abandoned. We are not aware of any additional transfers to date.

2.4. UNTRANSFERRED PORTION OF THE 1878 MURPHY DITCH VESTED WATER RIGHT

We have compared information regarding the current stockholders in the Rapid Valley Water Company to the lands identified when the permit for the 1878 Murphy Ditch vested water right was confirmed, aerial photography, the Pennington County assessor's database, and our understanding of prior transfers. Mr. Mark Rath of the SDDENR was also consulted from time to time. From this information we have estimated the number of permitted acres each of the stockholders owns and with which Murphy Ditch vested water right priority we believe they are associated. **Table 1** and **Figure 2** provide our current understanding of owners of interest in the subject right. Those lands identified in **Table 1** as "irrigated" or "potentially irrigated" are the subject of this report. As shown in **Table 1** approximately 331 acres (29 percent) irrigated by the subject right remain untransferred and are available for use by RVSD following purchase and a transfer proceeding.

To date, out of the untransferred portion of the 1878 Murphy Ditch Vested Water Right, RVSD has secured contracts with stockholders Gravatt, Olsen, and Rypkema. This represents irrigation of approximately 90.6 acres or 7.9 percent of the 1878 Murphy Ditch Vested Water Right. These contracts along with prior transfers by RVSD of the 1878 Murphy Ditch Vested Water Right (489 acres, 42.6 percent) will result in ownership by RVSD of approximately 50.5 percent. As previously indicated, RVSD may continue to acquire additional interest from the remaining stockholders.

Table 1
1878 Murphy Ditch Vested Water Right Stockholders

Stockholder	Irrigated Acreage	Percent Ownership	Land/Water Right Status
Ahrlin	68.4	4.4%	Irrigated
Anderson	2	0.2%	Irrigated
Buckholz	5	0.4%	Irrigated
Gravatt ^[2]	45.6	5.5%	Irrigated
Lytle	45	3.9%	Irrigated
Olson ^[2]	9	0.8%	Irrigated
RVSD	489	42.6%	Transferred
Rapid City	322.3	28.1%	Transferred
Rapid Valley Fire	5	0.4%	Potentially Irrigated
Rypkema ^[2]	36	3.1%	Irrigated
Vessley	5	0.4%	Irrigated
Whiting	1	0.1%	Irrigated
Wileman	5	0.4%	Irrigated
Williams	104	9.1%	Irrigated
Abandoned	5.7	0.5%	Abandoned in Transfer
Total	1,148	100.0%	
Total Untransferred	331	28.8%	
Total Under Contract	90.6	7.9%	

Note:

[1] Based on documentation from confirmation of 1878 Murphy Ditch Vested Water Right permit.

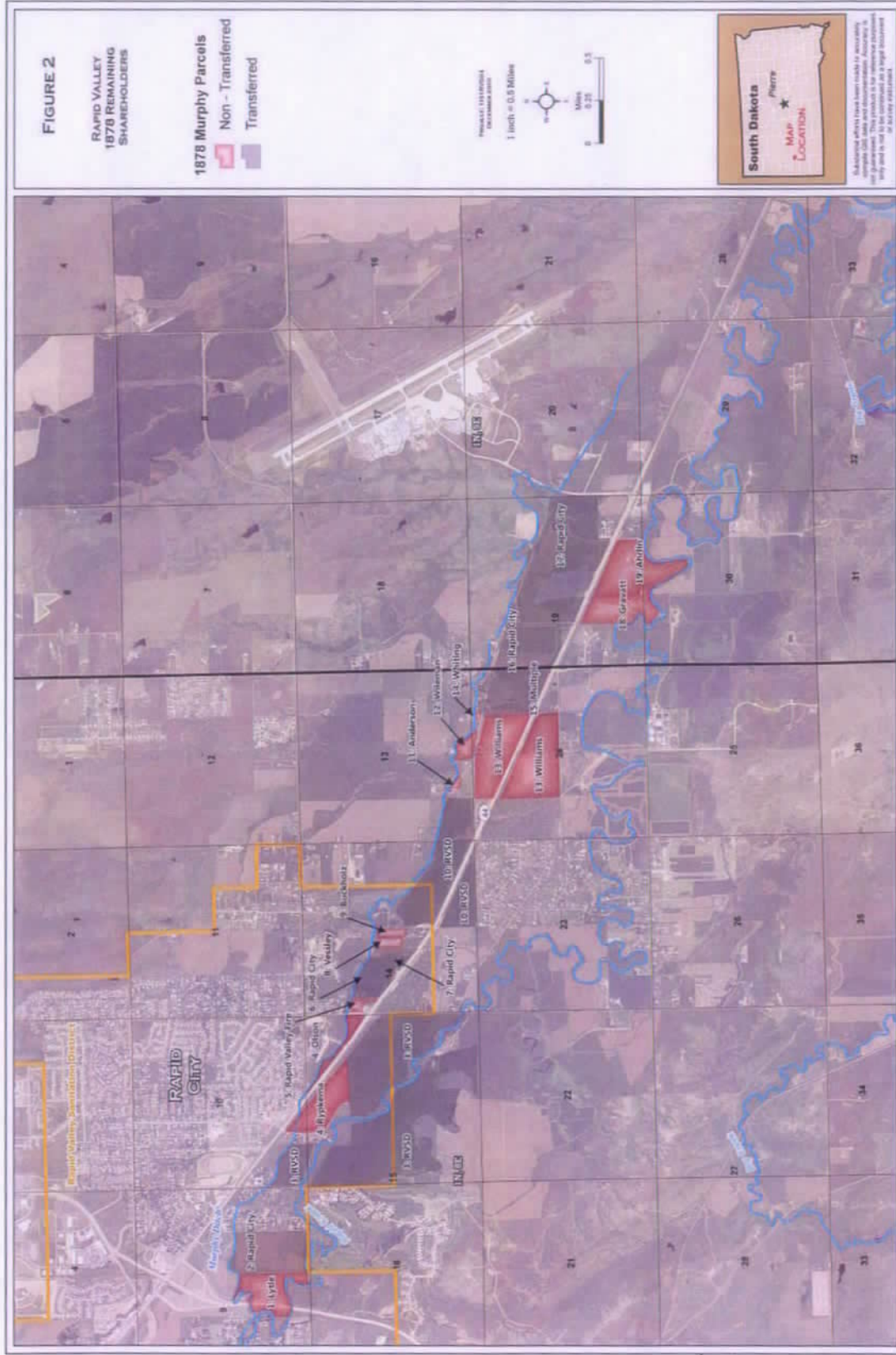
[2] Under contract as of the date of this report.

3. METHODOLOGY FOR ANALYSES

We have completed two prior transfers of the subject right with the assistance of the SDDENR on the Harney Peak Ranch and the Higgins Ranch. Based on this prior work, it is our understanding that the transferable yield of the subject right is calculated using a monthly comparison of the required ranch headgate delivery to meet the crop irrigation requirement and the pro rata portion of the available delivery from the ditch. The following describes the analyses used to determine transferable yield.

3.1. CROP IRRIGATION REQUIREMENT

An analysis was performed to determine the historical crop irrigation requirement under the Murphy Ditch over the period January 1950 through December 2004 (additional information regarding the study period used is provided in **Appendix B**). This analysis was performed on a monthly time-step for each year of the study period, requiring input data on monthly historical diversions, crop acreage and location of irrigated land, climate conditions, and soils.



The Modified Blaney-Criddle method was used to calculate the potential consumptive use of water by crops irrigated by the subject right (Soil Conservation Service, 1970). Modified Blaney-Criddle is a widely accepted technique and has been used extensively throughout the United States, including South Dakota and the Rapid Creek area. Historical climate data from the Rapid City weather station (NOAA Station 6937, Rapid City 4NW) were used in the Modified Blaney-Criddle analysis. In applying the Modified Blaney-Criddle method to develop the potential consumptive use for each crop, the crop growth stage coefficients (kc) were increased by 9.5 percent to reflect effects of elevation and aridity (Hill, et al., 1983; Burman, et al., 1982; Pochop, et al., 1984). Crop irrigation requirement was determined by subtracting from potential consumptive use the amount of precipitation effectively used by the crop.

3.2. REQUIRED HEADGATE DELIVERY

Required headgate delivery to meet crop irrigation requirement is equal to the crop irrigation requirement divided by the maximum farm efficiency. The maximum farm efficiency is dependent on farm-specific water application techniques, slope, soil types, water conveyance and control systems, tailwater collection systems, crop distributions, and irrigation management. Generally for flood irrigation, the starting point for farm efficiency is 50 percent. Efficiency can be increased or decreased from 50 percent based on farm-specific practices. For this analysis, we have assumed that untransferred farms under the Murphy Ditch have a maximum farm efficiency of 50 percent. We would not expect this number to change unless water users provided significant evidence to support increased or decreased efficiency.

3.3. PRO RATA DELIVERY

Pro rata deliveries are equal to the subject right diversions (less ditch loss) multiplied by a particular stockholders interest in the subject right.

Irrigation water has historically been supplied to the untransferred irrigated lands via the Murphy Ditch from Rapid Creek. We have assumed that no additional water supplies were used for irrigation of these lands. Monthly diversion records were obtained for the Murphy Ditch from previous engineering reports that addressed water right transfers from other properties and from several documents developed by the U.S. Bureau of Reclamation in relation to operation of Pactola Reservoir. The portion of these records that we believe to be an accurate representation of Murphy Ditch diversions generally cover the period from 1946 through about 1980, although there are several years during this period when data are not available. Detailed description of the estimation of diversion records is presented in **Appendix C**.

Previous engineering reports have estimated that approximately 11 percent of diversions through the Murphy Ditch are lost to seepage prior to delivery at farm headgates, i.e., 89 percent conveyance efficiency (Wright Water Engineers, 1990). A ditch loss of 11 percent has been used in the analyses for each of the prior transfers. For these reasons, we have assumed a ditch loss of 11 percent.

3.4. TRANSFERABLE YIELD

As previously described, it is our understanding that transferable yield is calculated using a monthly comparison of the required ranch headgate delivery to meet the crop irrigation requirement and the pro rata portion of the available delivery. Transferrable yield is the lesser of these two values. The following equations were used to determine transferable yield.

Transferable Yield

= Minimum of (Required Headgate Delivery & Pro Rata Delivery), on a monthly basis

$$\text{Required Headgate Delivery} = \frac{\text{Crop Irrigation Requirement}}{\text{Maximum Farm Efficiency}}$$

$$\text{Pro Rata Delivery} = \text{Ditch Diversions} \times \text{Conveyance Efficiency} \times \frac{\text{Permitted Acres Owned}}{\text{Total of Permitted Acres}}$$

The transferable yield calculation was performed for each of the stockholders listed in **Table 1** who own an untransferred interest in the subject right. For purposes of this analysis, we have assumed that the subject right was historically the only irrigation water supply for the remaining stockholders.

Crop irrigation requirement was calculated using a specific cropping pattern determined for each farm. A cropping pattern of 50 percent alfalfa/hay and 50 percent pasture grass was used when information was not available from the irrigator. The number of irrigated acres was assumed to be the same as the permitted acres. Detailed assumptions of farm specific calculations are presented in **Appendix D**.

4. RESULTS OF ANALYSES

4.1. CROP IRRIGATION REQUIREMENT

As shown in **Table 2** the unit crop irrigation requirements for alfalfa and pasture grass are 2.0 ac-ft per irrigated acre and 1.7 ac-ft per acre, respectively. Detailed results of calculations of potential consumptive use, effective precipitation, and irrigation water requirement are provided in **Appendix E** of this Report.

Table 2
Average Crop Irrigation Requirement for Alfalfa (1950 to 2004)
(ac-ft/acre)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Potential Consumptive Use	0.0	0.3	0.6	0.7	0.6	0.3	0.1	2.7
Effective Precipitation	0.0	0.1	0.2	0.2	0.1	0.1	0.0	0.7
Crop Irrigation Requirement	0.0	0.2	0.4	0.6	0.5	0.3	0.1	2.0

Notes:

[1] Climate station 6937 (Rapid City AP)

[2] SCS TR21 cropping coefficients with an elevation adjustment were used.

Table 3
Average Crop Irrigation Requirement for Pasture Grass (1950 to 2004)
(ac-ft/acre)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Potential Consumptive Use	0.1	0.3	0.5	0.6	0.5	0.3	0.1	2.4
Effective Precipitation	0.0	0.1	0.2	0.1	0.1	0.1	0.0	0.7
Crop Irrigation Requirement	0.1	0.2	0.3	0.5	0.4	0.2	0.1	1.7

Notes:

[1] Climate station 6937 (Rapid City AP)

[2] SCS TR21 cropping coefficients with an elevation adjustment were used.

4.2. REQUIRED HEADGATE DELIVERY

The required headgate delivery was calculated based on the crop irrigation requirement and the estimated maximum farm efficiency. As shown in **Table 4**, the annual required headgate delivery averaged 4.1 ac-ft per acre and 3.4 ac-ft per acre for alfalfa and pasture grass, respectively.

Table 4
Average Required Headgate Delivery (1950 to 2004)
(ac-ft/acre)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Alfalfa Hay	0.1	0.4	0.8	1.2	1.0	0.5	0.1	4.1
Pasture Grass	0.1	0.3	0.6	0.9	0.9	0.5	0.2	3.4

4.3. PRO RATA DELIVERY

Average historical diversions through the Murphy Ditch are presented in **Table 5**. Historical diversions averaged approximately 2,951 ac-ft per year from 1946 through 1980. Historical deliveries, after subtracting an estimated 11 percent to account for conveyance loss, averaged approximately 2.3 ac-ft per acre (**Table 5**).

Table 5
Subject Right
Average Diversions and Deliveries (1946 to 1980)

Water Supply	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Diversion (ac-ft)	140	348	403	533	690	506	331	2,951
Diversion (ac-ft/acre)	0.1	0.3	0.4	0.5	0.6	0.4	0.3	2.6
Delivery (ac-ft)	125	310	359	474	614	450	295	2,626
Delivery (ac-ft/acre)	0.1	0.3	0.3	0.4	0.5	0.4	0.3	2.3

4.4. TRANSFERABLE YIELD

Our estimates of historical diversions through the Murphy Ditch, deliveries to shareholders and irrigation needs on individual farms were used to determine that amount of water that could be transferred, i.e., the transferrable yield from the untransferred portion of the water right. As shown in **Table 6**, transferrable yield averaged approximately 703 ac-ft (4.3 c.f.s.) over the study period. Detailed results of farm specific calculations are presented in **Appendix D**.

The contracts secured, to date by RVSD, represent a transferable yield of approximately 194 ac-ft or 1.19 c.f.s. of the 1878 Murphy Ditch Vested Water Right. As previously indicated, RVSD may continue to acquire additional interest from the remaining stockholders.

Table 6
1878 Murphy Ditch Vested Water Right
Annual Transferable Yield
(in terms of Ranch Headgate Delivery)

Stockholder	Volume (ac-ft)	Rate (c.f.s.)
Ahrlin	148	0.90
Anderson	4	0.03
Buckholz	11	0.07
Gravatt ^[3]	99	0.60
Lytle	97	0.59
Olson ^[3]	19	0.12
Rapid Valley Fire	11	0.07
Rypkema ^[3]	76	0.47
Vessley	11	0.07
Whiting	2	0.01
Wileman	11	0.07
Williams	225	1.37
Total (untransferred)	703	4.30
Total (under contract)	194	1.19

Note:

[1] Volume calculated on a monthly basis as the lesser of historical deliveries or deliveries required to fully satisfy irrigation requirements.

[2] Rate equal to pro rata ownership (acreage permitted out of 1,148 total Murphy Ditch acres.

[3] Under contract as of the date of this report.

5. FUTURE USE OF MURPHY DITCH WATER RIGHT

5.1. USE BY RVSD

The shares under contract as of the date of this report and any additional acquisitions of the Rapid Valley Water Company by RVSD will be transferred from the Murphy Ditch to an alternate point of diversion at the District water treatment facility (**Figure 1**). As a result of this transfer, the District's acquired interest in the Murphy Ditch would no longer be diverted for irrigation purposes at the historical place of use. Water use by the District may include municipal, industrial, commercial, common distribution system, rural water system, suburban housing and domestic use.

Water use by the District follows seasonal patterns typical of municipal systems (**Table 7**). Water use during the summer months is typically higher than other months of the year because of increased landscape irrigation. We have estimated that 5 percent of indoor use is consumptively used, i.e., 95 percent of water use returns to Rapid Creek via waste water treatment systems. We estimated that 80 percent of outdoor water use (lawn and other irrigation) is consumed, i.e., 20 percent of outdoor water use returns to Rapid Creek via subsurface drainage pathways.

Table 7 also shows the depletion and return percentages associated with total water use by the District. These percentages have been calculated by considering 1) the percentage of indoor and outdoor use for each month, and 2) a 5 percent and 80 percent consumptive factor for indoor and outdoor uses, respectively. We estimate that water uses by the District are on average 26 percent consumptive. The remaining 74 percent of water use by the District returns to Rapid Creek via waste water treatment facilities or subsurface drainage.

Consumptive water uses by the District are highest during the summer months due to outdoor irrigation. As a percentage of water availability, the consumptive percentage is highest in the month of August (48 percent of water deliveries); this coincides with the highest period of outdoor uses. Note that during all months, consumptive percentages for water use by the District are lower than the consumption rates that historically occurred when the Murphy Ditch rights were used for agricultural irrigation (approximately 50 percent).

Table 7
Average RVSD Monthly Water Use Pattern

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total	6.0%	6.0%	6.0%	6.0%	7.0%	10.0%	12.0%	14.0%	12.0%	9.0%	6.0%	6.0%	100.0%
Indoor	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	72.0%
Outdoor	0.0%	0.0%	0.0%	0.0%	1.0%	4.0%	6.0%	8.0%	6.0%	3.0%	0.0%	0.0%	28.0%
Depletion %	5%	5%	5%	5%	16%	35%	43%	48%	43%	30%	5%	5%	26%
Return %	95%	95%	95%	95%	84%	65%	58%	52%	58%	70%	95%	95%	74%

5.2. SUMMARY

- The untransferred portion of the 1878 Murphy Ditch vested water right includes approximately 331 of the originally permitted acres.
- To date RVSD has secured contracts for approximately 90.6 acres of the untransferred portion of the 1878 Murphy Ditch vested water right (Gravatt, Olsen, Rypkema).
- RVSD may continue to acquire additional interest in the untransferred portion of the 1878 Murphy Ditch vested water right.
- The untransferred portion was historically associated with irrigation of permitted lands as described in **Table 1** and shown in **Figure 2**.
- A transfer of the Murphy Ditch water right to RVSD should be administered with a priority date based on the Murphy Ditch vested water right for natural flow (April 6, 1878).
- The majority of water that was historically delivered by the subject right occurred from April through October. Diversion of the water transferred by RVSD should be limited to April through October.
- Following a transfer to RVSD, diversions by the District should be limited to monthly and annual diversion amounts shown in (**Table 8**)
- The future maximum rate of diversion of the transferred water should not exceed the District's prorata interest in the subject right (**Table 6**). This will protect remaining shareholders in the ditch and other water right owners on Rapid Creek.
- The existing point of diversion for Murphy Ditch on Rapid Creek is in the NE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 8, Township 1 North, Range 8 East of the Black Hills P.M., in Pennington County. In the future, RVSD may divert the transferred water at a point in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 15, Township 1 North, Range 8 East of the Black Hills P.M., in Pennington County.
- Water transferred to RVSD will be for municipal, industrial, commercial, common distribution system, rural water system, suburban housing and domestic use purposes and will not exceed the amount of water needed for the District's beneficial use.
- The water used by the District that is consumed will be less depletive than occurred historically under agricultural uses.
- Lands historically irrigated should no longer be irrigated with water from the Murphy Ditch. This will prevent an expansion of the use of the subject right over historical conditions and will protect other vested water right owners on Rapid Creek.
- RVSD should annually report to the SDNER the amount of water withdrawn each month.

Table 8
Volumetric Limit on Diversions (ac-ft)

Stockholder	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Ahrlin	6	18	21	28	37	27	11	148
Anderson	0	1	1	1	1	1	0	4
Buckholz	0	1	2	2	3	2	1	11
Gravatt	4	12	14	19	24	18	7	99
Lytle	4	12	14	19	24	18	7	97
Olson	1	2	3	4	5	4	1	19
Rapid Valley Fire	0	1	2	2	3	2	1	11
Rypkema	2	10	11	15	19	14	5	76
Vessley	0	1	2	2	3	2	1	11
Whiting	0	0	0	0	1	0	0	2
Wileman	0	1	2	2	3	2	1	11
Williams	9	28	32	43	56	41	16	225
Total	26	88	102	135	174	128	50	703

6. REFERENCES

- Alley, W.M. 1984. The Palmer Drought Severity Index: Limitations and Assumptions. *Journal of Climate and Applied Meteorology*, 23: 1100-1109.
- Anderson, M.T., D.G. Driscoll and J.E. Williamson, 1998. Ground-Water and Surface-Water Interactions along Rapid Creek near Rapid City, South Dakota. U.S. Geological Survey, Water Resources Investigations Report 98-4214.
- Brown and Caldwell, 2003. Technical Report for M.P. Carley Property Water Rights Transfer.
- Burman, et al. 1982. Statistical and Numerical Representation of Irrigation Water Requirements. *Trans. ASAE*, Volume 25.
- Colorado State University, 1998. Irrigation – Tailwater Recovery for Surface Irrigation. Technical Bulletin 4.709. Colorado State University Cooperative Extension.
- Glover, R.E., 1960. Groundwater Movement. Engineering Monograph No. 31. U.S. Bureau of Reclamation.
- Glover, R.E., 1960. Study of Groundwater Movement. Technical Memorandum 657. U.S. Bureau of Reclamation.
- Hill, et al. 1983. Comparison of Equations Used for Estimating Agricultural Crop Evapotranspiration with Field Research. U.S. Bureau of Reclamation.
- Hortness, J.E. and D.G. Driscoll. 1998. Streamflow Losses in the Black Hills of Western South Dakota. U.S. Geological Survey Water Resources Investigations Report 98-4116.
- Jensen, M.E., R.D. Burman, and R.G. Allen (ed). 1990. Evapotranspiration and Irrigation Water Requirements. American Society of Civil Engineers, Eng. Pract. Manual No. 70. 332 p.
- Leonard Rice Engineers, Inc. and Cetec Engineering, Inc. 2005. Engineering Report: Transfer of Lamb Property Water Rights – 1878 Murphy Ditch Priority.
- Leonard Rice Engineers, Inc. and Cetec Engineering, Inc. 2009. Engineering Report: Transfer of Higgins Property Water Rights – 1878 Murphy Ditch Priority.
- National Drought Mitigation Center. 1996. Drought Indices. University of Nebraska. Lincoln, NE. <http://enso.unl.edu/ndmc/enigma/indices/htm>
- NOAA – Climate Data, Rapid City (No. 6937)
- Palmer, W.C. 1965. Meteorological Drought. Research Paper No. 45, U.S. Department of Commerce Weather Bureau, Washington, D.C.
- Pochop, et al. 1984. Elevation – A Bias Error in SCS Blaney-Criddle ET Estimates. *Trans. ASCE*.
- Personal Communication, Mr. Mark Rath, South Dakota Department of Environment and Natural Resources.
- Personal Communication, Mr. Steve Murphy, Murphy Ditch Superintendent (Ditch Rider).
- Personal Communication, Mr. Duane Scott, Rapid Creek Water Conservancy District, Rapid Creek Water Master.

Personal Communication, Mr. Kevin Hamm, Rapid Creek Water Conservancy District, Rapid Creek Water Master.

Personal Communication, Mr. Curt Anderson, U.S. Bureau of Reclamation, Pactola Reservoir.

Soil Conservation Service. 1967. Irrigation Water Requirements Technical Release No. 21, April 1967, revised September 1970.

U.S. Department of Agriculture. 1988. Colorado Irrigation Guide. Soil Conservation Service. December, 1988.

U.S. Bureau of Reclamation, 1990. Rapid Valley Water Management Study. Belle Fourche Projects Office. Great Plains Region, Newell, South Dakota.

Wright Water Engineers, Inc. 1990. Engineering Report for Transfer of Tyler Property Share of Validated 1878 Murphy Ditch Company.

Wright Water Engineers, Inc. 1992. Engineering Report for Transfer of Strommer Property Portion of Southside Ditch Water Rights

APPENDIX A

Water License No. 1727-2 Rapid Valley Water Company

PERMITS TRANSFERRING WATER AND ACREAGE

WATER RIGHT NO.1727-2, RAPID VALLEY WATER CO. INC. (MURPHY DITCH)

PRIORITY DATE: APRIL 6, 1878
LICENSED FOR: 17.0 CFS 1,148 AC

APRIL 26, 1893
3.0 CFS 189 AC

	REDUCED BY:	REMAINING:	PERMIT APPROVED
2142-2 CITY OF RAPID CITY (TYLER PROPERTY)	0.64 CFS 49 AC	16.36 CFS 1,099 AC	5-1-91
2142-2 AMENDED	0.62 CFS 49 AC	16.38 CFS 1,099 AC	
2199-2 CITY OF RAPID CITY (PELLE PROPERTY)	0.05 CFS 4 AC	16.33 CFS 1,095 AC	5-7-92
2201-2 CITY OF RAPID CITY (LONG PROPERTY)	0.13 CFS 10 AC	16.20 CFS 1,085 AC	5-7-92
2316-2 CITY OF RAPID CITY (MORRIS PROPERTY)	0.81 CFS 64 AC	15.39 CFS 1,021 AC	5-1-96
2399-2 CITY OF RAPID CITY (WILEMAN PROPERTY)	0.35 CFS 27.3 AC	15.04 CFS 993.7 AC	5-7-98
2469-2 CITY OF RAPID CITY (MURPHY PROPERTY)	0.34 CFS 27 AC	14.70 CFS 966.7 AC	12-5-01
2512-2 CITY OF RAPID CITY (CARLEY PROPERTY)	1.84 CFS 145 AC	12.86 CFS 821.7 AC	12-3-03
2586-2 Rapid Valley Sanitary Dist. (Harney Peak Ranch - David Lamb property)	5.05 CFS 368 AC	7.81 CFS 453.7 AC	8-23-06
2641-2 Rapid Valley Sanitary (Higgins Ranch)	1.66 CFS 121 AC	6.15 CFS 332 AC	

PRIORITY DATE:
LICENSED FOR:

APRIL 26, 1893
3.0 CFS 189 AC

2526-2 DONALD & VIRGENA JUNDT (STROMER PROPERTY)	0.71 CFS 50 AC	2.29 CFS 139 AC	3-2-05
---	----------------	-----------------	--------

STATE OF SOUTH DAKOTA

VESTED RIGHT WATER LICENSE NO. 1727-2 FOR IRRIGATION

(1) Rapid Valley Water Company, Inc., of RR #2 Box 223, Rapid City, SD 57701 made Application No. 1727-2, January 7, 1980 for validation of a vested right claim to appropriate 20.0 cubic feet of water per second (cfs) from Rapid Creek, Pennington County, South Dakota for irrigation purposes.

Vested Water Right No. 1727-2 was validated December 5, 1990 with priority dates of **January 1, 1878 (for 17.0 cfs) and January 1, 1893 (for 3.0 cfs). Construction of the described water supply system and the application of water to beneficial use has been completed and complies with applicable provisions of South Dakota State Law.

**Vested Water Right No. 1727-2 was validated with priority dates of January 1, 1878 and January 1, 1893, however the affidavit of water use submitted with the vested right claim shows the actual priority dates to be April 6, 1878 and April 26, 1893. This vested right water license will reflect the priority dates specified on the affidavit.

(2) The applicant is entitled to divert 20.0 cubic feet of water per second for beneficial use. The location of the diversion point is in the SW 1/4 Section 8, T1N, R8E.

The location of the irrigated acreage is:
1878 PRIORITY DATE

Land Parcel Number	Legal Description	Acreage
1	NE1/4 SW1/4	S9-T1N-R8E 20
	SE1/4 SW1/4	S9-T1N-R8E 25
2	NW1/4 SE1/4	S9-T1N-R8E 29
	SW1/4 SE1/4	S9-T1N-R8E 35

Page 2
Vested Water Right License No. 1727-2

3	SW1/4 SW1/4	S10-T1N-R8E	25
	NW1/4 NW1/4	S15-T1N-R8E	31
	SW1/4 NW1/4	S15-T1N-R8E	38
	NW1/4 SW1/4	S15-T1N-R8E	30
	SE1/4 NW1/4	S15-T1N-R8E	32
	NE1/4 SW1/4	S15-T1N-R8E	31
	SW1/4 NE1/4	S15-T1N-R8E	38
	NW1/4 SE1/4	S15-T1N-R8E	29
	SE1/4 NE1/4	S15-T1N-R8E	25
	NE1/4 SE1/4	S15-T1N-R8E	38
	SW1/4 SW1/4	S15-T1N-R8E	1
	SE1/4 SW1/4	S15-T1N-R8E	11
	SW1/4 SE1/4	S15-T1N-R8E	24
	SE1/4 SE1/4	S15-T1N-R8E	15
5	SW1/4 NW1/4	S14-T1N-R8E	5
6	SW1/4 NW1/4	S14-T1N-R8E	32
7	SE1/4 NW1/4	S14-T1N-R8E	6
	NE1/4 SW1/4	S14-T1N-R8E	4
8	SE1/4 NW1/4	S14-T1N-R8E	3
	NE1/4 SW1/4	S14-T1N-R8E	2
9	SE1/4 NW1/4	S14-T1N-R8E	3
	NE1/4 SW1/4	S14-T1N-R8E	2
10	NW1/4 SE1/4	S14-T1N-R8E	28
	SW1/4 SE1/4	S14-T1N-R8E	31
	SE1/4 SE1/4	S14-T1N-R8E	32
	NE1/4 SE1/4	S14-T1N-R8E	3
	SW1/4 SW1/4	S13-T1N-R8E	27
11	SE1/4 SW1/4	S13-T1N-R8E	2
12	SW1/4 SE1/4	S13-T1N-R8E	5
13	104 OF THE TOTAL 142 ACRES		
	NE1/4 NW1/4	S24-T1N-R8E -	36
	SE1/4 NW1/4	S24-T1N-R8E -	40
	NW1/4 NE1/4	S24-T1N-R8E -	32
	SW1/4 NE1/4	S24-T1N-R8E -	34
			104
14	NW1/4 NE1/4	S24-T1N-R8E	1

Page 3
Vested Water Right License No. 1727-2

15	28 ACRES OF THE TOTAL 56 ACRES		
	NE1/4 NE1/4	S24-T1N-R8E - 31	
	SE1/4 NE1/4	S24-T1N-R8E - 25	
			28
16	NW1/4 NW1/4	S19-T1N-R9E	10
	SW1/4 NW1/4	S19-T1N-R9E	39
17	NE1/4 NW1/4	S19-T1N-R9E	2
	SE1/4 NW1/4	S19-T1N-R9E	32
	NE1/4 SW1/4	S19-T1N-R9E	10
	SW1/4 NE1/4	S19-T1N-R9E	25
	NW1/4 SE1/4	S19-T1N-R9E	24
	SW1/4 SE1/4	S19-T1N-R9E	2
	SE1/4 NE1/4	S19-T1N-R9E	11
	NE1/4 SE1/4	S19-T1N-R9E	39
18	NE1/4 SW1/4	S19-T1N-R9E	12
	SE1/4 SW1/4	S19-T1N-R9E	39
	NE1/4 NW1/4	S30-T1N-R9E	12
19	SW1/4 SE1/4	S19-T1N-R9E	31
	NW1/4 NE1/4	S30-T1N-R9E	20

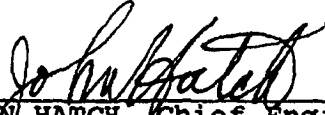
	Total		1103
1893 PRIORITY DATE			
20	SE1/4 SE1/4	S19-T1N-R9E	14
	NE1/4 NE1/4	S30-T1N-R9E	12
21	NW1/4 SW1/4	S20-T1N-R9E	25
	SW1/4 SW1/4	S20-T1N-R9E	34
	NE1/4 SW1/4	S20-T1N-R9E	7
	SE1/4 SW1/4	S20-T1N-R9E	39
	NW1/4 NW1/4	S29-T1N-R9E	2
	NE1/4 NW1/4	S29-T1N-R9E	18
22	SW1/4 SE1/4	S20-T1N-R9E	18
	NW1/4 NE1/4	S29-T1N-R9E	20

	Total		189

Page 4

Vested Water Right License No. 1727-2

(3) Pursuant to Section 46-5-30.1, Rapid Valley Water Company, Inc of RR #2 Box 223, Rapid City, SD 57701 the holder and/or owner of Vested Water Right No. 1727-2 is issued a license to appropriate 20.0 cubic feet of water per second from Rapid Creek with priority dates of April 6, 1878 (for 17.0 cfs) and April 26, 1893 (for 3.0 cfs) from locations specified in (2) of this license. The water is to be used for irrigation purposes. This license is subject to any limitations, conditions or qualifications listed in Vested Water Right No. 1727-2 and subject to South Dakota Water Law.



JOHN HATCH, Chief Engineer
Water Rights Division
Department of Water and Natural
Resources

FEB 20 1991

DATE

APPENDIX B
Selection of Study Period

The study period of 1950 through 2004 was selected as part of our Harney Peak Analysis based on examination of historical climate and streamflow data and with the objective of representing conditions over a range of climatic and hydrologic conditions. To stay consistent with the Harney Peak analysis, we have again used the 1950 through 2004 study period.

The principal climate parameters influencing water supply (and demand for irrigation water) are precipitation and temperature. An index that combines these parameters is the Palmer Drought Severity Index (PDSI) (Palmer, 1965; Alley, 1984). The National Climatic Data Center (NCDC) has developed an archive of monthly PDSI values from 1895 to the present for the Rapid Creek basin in South Dakota. The PDSI indicates the severity of a wet or dry spell, and generally ranges from -10.0 (very dry) to +10.0 (very wet). Monthly PDSI values for the Rapid Creek basin since 1950 are shown in Figure B-1.

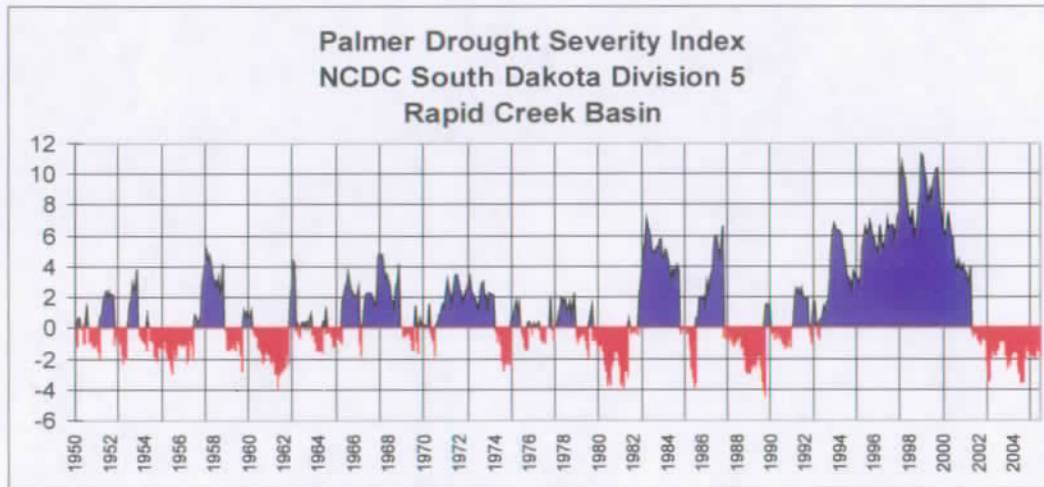


Figure B-1. Monthly PDSI Values for the Rapid Creek basin in South Dakota.

Based on our review of local climate and streamflow information, we believe the period extending from 1950 through 2004 is appropriate for evaluating water rights on Rapid Creek and represents sufficient natural variation in climatic and hydrologic conditions

APPENDIX C

Calculation of Average Historical Murphy Ditch Diversions

Engineering Report
Transfer of Water Rights 1878 Murphy Ditch Vested Water Right

The amount of water diverted by ditches from Rapid Creek has periodically been recorded over time by the State, the Conservancy District, the Bureau of Reclamation, and possibly others. The purpose of measuring diversion amounts has been twofold: to assist the State in administration of natural flows in Rapid Creek according to the prior appropriation system, and to assist the State, Conservancy District, and Bureau of Reclamation in management and operation of Pactola Reservoir and storage water releases that provide supplemental water supplies to Conservancy District members.

Available streamflow records were examined for gages located on Rapid Creek above Pactola Reservoir, SD (U.S.G.S. ID 06410500), below Pactola Dam, SD (U.S.G.S. ID 06411500), above Canyon Lake near Rapid City, SD (U.S.G.S. ID 06412500), at Rapid City, SD (U.S.G.S. ID 06414000), and below Sewage Treatment Plant Pipeline near Rapid City (U.S.G.S. ID 06418900). Records for these gages are generally available back through 1955 or earlier. All of these gages are influenced by upstream reservoir and/or irrigation operations, although the gage above Pactola Reservoir is fairly indicative of natural hydrologic conditions. Streamflow records from all of the gages generally agree with indications of wet or dry periods as suggested by the PDSI.

Strict water rights administration of natural flows on Rapid Creek according to the prior appropriation system has not historically occurred. This has largely been due to the high level of historical cooperation among ditches and to some degree, the ability for many water right owners to receive contracted storage water. As opposed to many circumstances in an over-appropriated stream system, water users on Rapid Creek have historically been willing to share in times of shortages. Contracted storage releases have further eased the situation in times of reduced natural flow levels.

The intra- and inter-ditch cooperation has allowed considerable flexibility in use of limited supplies from Rapid Creek for irrigation. This resulted in a reduced need for measurement of diversion amounts. It is our opinion that this is reflected in the diversion records by a lack of information for several past years. It is our opinion that historical records must be carefully viewed as an approximation of the actual supply realized from the water rights.

The Rapid Valley Water Conservancy District was formed in 1948 and has historically operated under a contract with the U.S. Bureau of Reclamation for deliveries of water from Pactola and Deerfield Reservoirs to its member ditches. Pactola and Deerfield Reservoirs are part of the Rapid Valley Unit of the Pick Sloan Project. Combined, these reservoirs provide supplemental irrigation water to over 8,900 acres of farm land in the Conservancy District as well as municipal and industrial water to Rapid City.

The Conservancy District has, as members, all of the downstream ditches on Rapid Creek with the exception of the lands served by the senior priority in the Murphy Ditch (at the time of formation of the Conservancy District, owners in the Murphy Ditch elected not to become members because of their senior status and sufficient natural flows in Rapid Creek to meet their needs). Storage deliveries to member ditches of the Conservancy District are considered supplemental irrigation water supplies to the ditches own direct flow water rights. Supplemental water provided by the Conservancy District is not considered as part of the historical water supply that may be transferred to an alternate point of diversion.

Records of historical monthly diversions by the Murphy Ditch are presented in Table B-1. As shown, historical diversions for the Murphy Ditch averaged approximately 2,951 ac-ft per year from 1946 through 1980 (prior to any transfers out of the ditch).

Engineering Report
Transfer of Water Rights 1878 Murphy Ditch Vested Water Right

Table C-1
Historical Diversion Records for Murphy Ditch (acre-feet)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1946					994	614	404	2012
1947		421	547	517	730	1560	687	4462
1948	6	513	522	348	999	826	654	3868
1949		185	480	425	1130	876	220	3316
1950		34	1020	1150	798	673	300	3975
1951	314	902	470	297	803	84	51	2921
1952	101	998	393	555	1140	660	1	3848
1953			236	888	1030	1100		3254
1954			477	960	904	770		3111
1955								
1956		322	858	720	450	376		2726
1957		126	0	206	716	334		1382
1958		686	648	438	542	558		2872
1959		620	450	614	778	436		2898
1960								
1961								
1962								
1963		298	288	768	718	240		2312
1964		378	135	516	814	360		2203
1965		171	250	510	796	630		2357
1966		282	588	686	214	120		1890
1967		40	0	147	304	120		611
1968		210	96	242	606	130		1284
1969								
1970			229	294	307	93		923
1971		180	230	294	306	116		1126
1972		176	60	52	600	215		1103
1973		96	310	552	510	240		1708
1974		744	900	960	904	752		4260
1975		366	98	520	968	960		2912
1976		328	392	440	620	608		2388
1977		196	514	592	668	342		2312
1978		30	180	440	460	632		1742
1979		328	708	498	368	460		2362
1980		430	600	820	520	300		2670
Avg	140	348	403	533	690	506	331	2951

Notes:

1946-1950: "USDI Definite Plan Report - Rapid Valley Unit" Bureau of Reclamation

1951-1952: "WRIR 97-4288 - Streamflow Characteristics for Black Hills of South Dakota" Lisa Miller and Daniel Driscoll, USGS, 1993, Sec.B

1953-1980: "Status of Water Use on Rapid Creek" John Hamak, DWNr, SD, December, 1980, App. IV

No data available

APPENDIX D

Farm Specific Calculations of Transferable Yield

Murphy Ditch Remaining Transferable Yield

Owner

Ahrlin

Water Rights Owned

Vested Water Right Priority

1878 Permit

1893 Permit

No. of Acres

68.4

0

% Ownership

6.0%

0

Irrigation Practices

Efficiency 50%

Alfalfa Hay 50%

Pasture Grass 50%

Estimated Transferable Yield (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Crop Irrigation Water Requirement	2.8	12.1	22.6	35.6	32.1	17.2	5.3	127.7
Required Ranch Headgate Delivery to Meet Crop Irrigation Water Requirement	5.6	24.2	45.2	71.1	64.2	34.5	10.6	255.5
Ranch Headgate Delivery (Prorata Portion of Available Diversions)	7.4	18.5	21.4	28.3	36.6	26.8	17.6	156.5
Transferable Yield (in terms of Ranch Headgate Delivery)	5.6	18.5	21.4	28.3	36.6	26.8	10.6	147.8

Note:

The above is estimated based on readily available data.

Murphy Ditch Remaining Transferable Yield

Owner

Anderson

Water Rights Owned

Vested Water Right Priority

1878 Permit

1893 Permit

No. of Acres

2

0

% Ownership

0.2%

0

Irrigation Practices

Efficiency 50%

Alfalfa Hay 50%

Pasture Grass 50%

Estimated Transferable Yield (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Crop Irrigation Water Requirement	0.1	0.4	0.7	1.0	0.9	0.5	0.2	3.7
Required Ranch Headgate Delivery to Meet Crop Irrigation Water Requirement	0.2	0.7	1.3	2.1	1.9	1.0	0.3	7.5
Ranch Headgate Delivery (Prorata Portion of Available Diversions)	0.2	0.5	0.6	0.8	1.1	0.8	0.5	4.6
Transferable Yield (in terms of Ranch Headgate Delivery)	0.2	0.5	0.6	0.8	1.1	0.8	0.3	4.3

Note:

The above is estimated based on readily available data.

Murphy Ditch Remaining Transferable Yield

Owner

Buckholz

Water Rights Owned

Vested Water Right Priority

1878 Permit

1893 Permit

No. of Acres

5

0

% Ownership

0.4%

0

Irrigation Practices

Efficiency 50%

Alfalfa Hay 50%

Pasture Grass 50%

Estimated Transferable Yield (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Crop Irrigation Water Requirement	0.2	0.9	1.7	2.6	2.3	1.3	0.4	9.3
Required Ranch Headgate Delivery to Meet Crop Irrigation Water Requirement	0.4	1.8	3.3	5.2	4.7	2.5	0.8	18.7
Ranch Headgate Delivery (Prorata Portion of Available Diversions)	0.5	1.3	1.6	2.1	2.7	2.0	1.3	11.4
Transferable Yield (in terms of Ranch Headgate Delivery)	0.4	1.3	1.6	2.1	2.7	2.0	0.8	10.8

Note:

The above is estimated based on readily available data.

Murphy Ditch Remaining Transferable Yield

Owner

Gravatt

Water Rights Owned

Vested Water Right Priority

1878 Permit

1893 Permit

No. of Acres

45.6

0

% Ownership

4.0%

0

Irrigation Practices

Efficiency

50%

Alfalfa Hay

50%

Pasture Grass

50%

Estimated Transferable Yield (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Crop Irrigation Water Requirement	1.9	8.1	15.1	23.7	21.4	11.5	3.5	85.2
Required Ranch Headgate Delivery to Meet Crop Irrigation Water Requirement	3.8	16.1	30.1	47.4	42.8	23.0	7.1	170.3
Ranch Headgate Delivery (Prorata Portion of Available Diversions)	4.9	12.3	14.2	18.8	24.4	17.9	11.7	104.3
Transferable Yield (in terms of Ranch Headgate Delivery)	3.8	12.3	14.2	18.8	24.4	17.9	7.1	98.5

Note:

The above is estimated based on readily available data.

Murphy Ditch Remaining Transferable Yield

Owner

Lytle

Water Rights Owned

Vested Water Right Priority

1878 Permit

1893 Permit

No. of Acres

45

0

% Ownership

3.9%

0

Irrigation Practices

Efficiency 50%

Alfalfa Hay 50%

Pasture Grass 50%

Estimated Transferable Yield (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Crop Irrigation Water Requirement	1.9	7.9	14.9	23.4	21.1	11.3	3.5	84.0
Required Ranch Headgate Delivery to Meet Crop Irrigation Water Requirement	3.7	15.9	29.7	46.8	42.2	22.7	7.0	168.1
Ranch Headgate Delivery (Prorata Portion of Available Diversions)	4.9	12.1	14.1	18.6	24.1	17.7	11.5	103.0
Transferable Yield (in terms of Ranch Headgate Delivery)	3.7	12.1	14.1	18.6	24.1	17.7	7.0	97.2

Note:

The above is estimated based on readily available data.

Murphy Ditch Remaining Transferable Yield

Owner

Olson

Water Rights Owned

Vested Water Right Priority

1878 Permit

1893 Permit

No. of Acres

9

0

% Ownership

0.8%

0

Irrigation Practices

Efficiency 50%

Alfalfa Hay 100%

Pasture Grass 0%

Estimated Transferable Yield (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Crop Irrigation Water Requirement	0.3	1.8	3.4	5.2	4.6	2.4	0.6	18.4
Required Ranch Headgate Delivery to Meet Crop Irrigation Water Requirement	0.5	3.6	6.8	10.4	9.2	4.9	1.3	36.7
Ranch Headgate Delivery (Prorata Portion of Available Diversions)	1.0	2.4	2.8	3.7	4.8	3.5	2.3	20.6
Transferable Yield (in terms of Ranch Headgate Delivery)	0.5	2.4	2.8	3.7	4.8	3.5	1.3	19.1

Note:

The above is estimated based on readily available data.

Murphy Ditch Remaining Transferable Yield

Owner

Rypkema

Water Rights Owned

Vested Water Right Priority

1878 Permit

1893 Permit

No. of Acres

36

0

% Ownership

3.1%

0

Irrigation Practices

Efficiency 50%

Alfalfa Hay 100%

Pasture Grass 0%

Estimated Transferable Yield (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Crop Irrigation Water Requirement	1.1	7.2	13.6	20.7	18.5	9.8	2.6	73.4
Required Ranch Headgate Delivery to Meet Crop Irrigation Water Requirement	2.1	14.4	27.2	41.5	36.9	19.6	5.1	146.8
Ranch Headgate Delivery (Prorata Portion of Available Diversions)	3.9	9.7	11.2	14.9	19.3	14.1	9.2	82.4
Transferable Yield (in terms of Ranch Headgate Delivery)	2.1	9.7	11.2	14.9	19.3	14.1	5.1	76.5

Note:

The above is estimated based on readily available data.

Murphy Ditch Remaining Transferable Yield

Owner

Vessley

Water Rights Owned

Vested Water Right Priority

1878 Permit

1893 Permit

No. of Acres

5

0

% Ownership

0.4%

0

Irrigation Practices

Efficiency 50%

Alfalfa Hay 50%

Pasture Grass 50%

Estimated Transferable Yield (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Crop Irrigation Water Requirement	0.2	0.9	1.7	2.6	2.3	1.3	0.4	9.3
Required Ranch Headgate Delivery to Meet Crop Irrigation Water Requirement	0.4	1.8	3.3	5.2	4.7	2.5	0.8	18.7
Ranch Headgate Delivery (Prorata Portion of Available Diversions)	0.5	1.3	1.6	2.1	2.7	2.0	1.3	11.4
Transferable Yield (in terms of Ranch Headgate Delivery)	0.4	1.3	1.6	2.1	2.7	2.0	0.8	10.8

Note:

The above is estimated based on readily available data.

Murphy Ditch Remaining Transferable Yield

Owner

Whiting

Water Rights Owned

Vested Water Right Priority

1878 Permit

1893 Permit

No. of Acres

1

0

% Ownership

0.1%

0

Irrigation Practices

Efficiency 50%

Alfalfa Hay 100%

Pasture Grass 0%

Estimated Transferable Yield (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Crop Irrigation Water Requirement	0.0	0.2	0.4	0.6	0.5	0.3	0.1	2.0
Required Ranch Headgate Delivery to Meet Crop Irrigation Water Requirement	0.1	0.4	0.8	1.2	1.0	0.5	0.1	4.1
Ranch Headgate Delivery (Prorata Portion of Available Diversions)	0.1	0.3	0.3	0.4	0.5	0.4	0.3	2.3
Transferable Yield (in terms of Ranch Headgate Delivery)	0.1	0.3	0.3	0.4	0.5	0.4	0.1	2.1

Note:

The above is estimated based on readily available data.

Murphy Ditch Remaining Transferable Yield

Owner

Wileman

Water Rights Owned

Vested Water Right Priority

1878 Permit

1893 Permit

No. of Acres

5

0

% Ownership

0.4%

0

Irrigation Practices

Efficiency

50%

Alfalfa Hay

100%

Pasture Grass

0%

Estimated Transferable Yield (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Crop Irrigation Water Requirement	0.1	1.0	1.9	2.9	2.6	1.4	0.4	10.2
Required Ranch Headgate Delivery to Meet Crop Irrigation Water Requirement	0.3	2.0	3.8	5.8	5.1	2.7	0.7	20.4
Ranch Headgate Delivery (Prorata Portion of Available Diversions)	0.5	1.3	1.6	2.1	2.7	2.0	1.3	11.4
Transferable Yield (in terms of Ranch Headgate Delivery)	0.3	1.3	1.6	2.1	2.7	2.0	0.7	10.6

Note:

The above is estimated based on readily available data.

Murphy Ditch Remaining Transferable Yield

Owner

Williams

Water Rights Owned

Vested Water Right Priority

1878 Permit

1893 Permit

No. of Acres

104

0

% Ownership

9.1%

0

Irrigation Practices

Efficiency

50%

Alfalfa Hay

50%

Pasture Grass

50%

Estimated Transferable Yield (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Crop Irrigation Water Requirement	4.3	18.4	34.4	54.1	48.8	26.2	8.1	194.2
Required Ranch Headgate Delivery to Meet Crop Irrigation Water Requirement	8.6	36.7	68.7	108.1	97.6	52.4	16.2	388.4
Ranch Headgate Delivery (Prorata Portion of Available Diversions)	11.3	28.1	32.5	43.0	55.6	40.8	26.7	237.9
Transferable Yield (in terms of Ranch Headgate Delivery)	8.6	28.1	32.5	43.0	55.6	40.8	16.2	224.7

Note:

The above is estimated based on readily available data.

APPENDIX E

Detailed Results of Potential Consumptive Use Computations

Engineering Report
Transfer of Water Rights 1878 Murphy Ditch Vested Water Right

Table E-1
Average Monthly Temperature (degrees F)

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
1950	9.0	29.8	25.0	38.0	50.4	63.9	66.9	67.7	58.4	53.7	32.0	28.5	43.6
1951	20.7	27.7	33.8	40.6	56.3	65.0	71.0	69.5	55.8	46.6	33.1	17.4	44.8
1952	22.5	26.8	25.8	50.2	56.2	69.0	71.6	72.4	67.1	50.2	34.3	30.0	48.0
1953	31.3	25.7	36.7	38.3	52.5	66.8	72.4	72.5	63.1	55.8	41.7	30.4	48.9
1954	20.1	41.2	27.7	45.9	54.2	63.7	77.7	72.5	63.2	46.7	42.6	32.3	49.0
1955	23.9	19.3	28.6	49.8	59.2	62.2	76.9	76.2	62.2	51.8	24.7	21.8	46.4
1956	23.0	24.1	34.1	39.1	56.7	72.8	72.0	69.5	63.0	53.4	33.1	29.8	47.6
1957	10.7	27.6	33.7	41.0	54.0	62.3	75.3	71.6	59.2	47.4	35.4	34.9	46.1
1958	31.9	21.9	30.6	44.0	61.8	62.3	67.1	74.7	63.8	52.3	37.2	27.0	47.9
1959	20.6	21.7	37.9	43.3	53.7	70.1	73.8	75.7	58.8	44.5	27.9	34.2	46.8
1960	23.9	19.1	28.0	47.5	56.9	65.6	76.8	72.4	63.6	51.8	36.9	25.0	47.3
1961	27.3	33.2	39.4	41.8	55.7	71.3	73.1	77.2	55.6	49.8	34.9	23.0	48.5
1962	19.3	24.1	28.6	49.1	58.3	65.3	69.2	71.1	60.2	52.9	40.6	30.1	47.4
1963	12.3	30.2	39.7	44.5	57.0	68.1	74.4	73.7	66.5	59.4	39.6	22.7	49.0
1964	28.4	28.0	29.9	46.3	58.5	64.9	76.7	69.4	59.0	51.6	33.7	18.9	47.1
1965	25.4	25.6	21.2	47.0	54.7	64.5	72.1	70.7	49.7	54.7	38.2	33.3	46.4
1966	14.1	19.3	35.0	38.6	56.0	65.3	76.6	65.9	61.3	48.6	34.6	26.7	45.2
1967	27.9	27.5	35.2	44.0	49.8	60.0	70.6	70.6	63.4	50.1	34.6	22.5	46.3
1968	23.4	27.4	40.4	42.6	50.8	63.0	69.1	67.0	59.8	51.0	35.5	18.5	45.7
1969	15.9	25.4	27.8	49.6	57.4	59.8	71.0	73.7	64.8	40.6	38.7	28.2	46.1
1970	17.8	30.8	27.4	39.2	55.6	65.5	72.7	73.8	59.1	44.1	34.2	21.8	45.2
1971	17.5	22.6	32.6	46.0	53.6	66.3	68.0	73.8	57.4	46.1	34.5	23.3	45.1
1972	17.5	24.0	36.5	43.6	55.1	64.6	65.6	69.1	59.4	43.8	31.0	18.6	44.1
1973	26.7	28.8	37.4	42.8	53.7	64.7	70.7	74.2	57.1	51.3	32.3	25.3	47.1
1974	21.9	32.4	37.6	47.1	53.8	66.6	77.3	67.6	57.6	51.7	36.4	28.9	48.3
1975	23.7	17.6	27.6	40.5	54.0	62.2	74.7	70.3	58.5	49.2	33.8	29.4	45.1
1976	23.8	34.6	34.4	46.9	55.3	64.3	72.7	72.6	63.3	45.4	31.7	26.8	47.7
1977	12.7	34.5	36.4	49.5	60.2	69.0	73.4	66.0	61.0	48.8	33.3	21.8	47.2
1978	11.0	15.3	35.4	45.2	55.0	65.0	71.1	69.7	66.2	50.5	29.2	17.0	44.2
1979	7.4	16.7	35.4	44.4	53.6	65.3	70.4	68.5	66.3	50.8	33.0	33.1	45.4
1980	21.0	27.0	31.5	48.9	57.4	67.0	74.9	68.5	61.6	48.8	39.2	30.2	48.0
1981	32.6	29.3	40.0	51.5	54.9	64.9	71.9	70.0	63.5	47.7	40.4	25.8	49.4
1982	12.1	24.2	33.0	42.1	53.3	59.6	70.7	70.2	58.7	47.2	32.7	28.6	44.4
1983	32.1	37.3	36.4	40.7	52.0	63.1	73.7	78.0	60.8	49.4	34.9	8.1	47.2
1984	28.0	36.1	34.2	43.8	53.6	62.8	72.2	74.8	57.2	47.2	37.4	21.4	47.4
1985	21.6	23.8	35.9	52.0	61.8	62.1	74.6	69.0	55.5	47.3	16.0	21.0	45.0
1986	29.8	21.5	43.0	44.2	54.9	67.6	70.8	69.6	54.9	48.7	30.6	30.5	47.2
1987	31.0	32.4	32.6	51.4	59.4	67.1	75.4	68.1	61.4	47.1	40.3	28.9	49.6
1988	21.6	26.9	35.5	47.1	59.9	75.6	76.0	72.5	60.4	49.6	36.3	28.4	49.2
1989	28.7	14.4	31.1	45.8	55.3	64.0	77.0	73.1	61.0	48.8	36.4	19.4	46.2
1990	32.3	28.9	36.4	45.0	53.2	66.6	71.7	73.7	65.9	48.2	40.4	17.7	48.3
1991	18.3	35.9	38.4	46.3	56.6	67.2	72.9	74.0	61.1	46.4	30.0	32.7	48.3
1992	33.6	36.3	40.8	47.1	57.4	62.6	64.3	65.8	62.6	49.2	32.4	19.0	47.6
1993	16.0	15.1	37.6	43.5	56.1	60.3	65.1	68.6	56.6	48.2	32.4	31.4	44.3
1994	22.4	19.8	40.5	46.0	60.2	68.5	70.7	73.3	65.4	49.7	35.5	30.3	48.5
1995	29.2	31.8	33.2	40.3	51.8	62.8	70.6	73.6	60.0	46.5	33.7	25.4	46.6
1996	14.9	27.3	26.2	43.3	50.5	65.5	70.8	73.2	59.8	47.7	24.3	17.9	43.4
1997	18.1	28.8	36.7	38.7	52.8	66.3	70.9	68.7	62.5	48.6	33.2	30.3	46.3
1998	24.3	34.9	27.9	46.2	56.2	58.7	72.7	72.3	67.0	47.8	36.4	26.8	47.6
1999	25.6	36.6	36.3	42.6	53.0	62.6	71.3	71.4	55.6	49.9	41.7	33.3	48.3
2000	26.2	33.2	38.6	43.0	56.0	62.1	73.6	74.4	63.4	49.8	27.0	16.7	47.0
2001	29.7	16.9	34.3	46.0	56.2	64.1	74.8	74.4	62.5	47.8	39.4	28.9	47.9
2002	27.3	31.1	23.1	45.4	53.1	71.0	79.5	72.6	63.0	40.2	37.0	31.0	47.9
2003	26.2	22.6	35.8	48.8	56.0	63.2	78.2	77.6	60.4	52.8	28.8	29.4	48.3
2004	22.1	27.8	40.6	49.0	57.5	63.3	73.6	68.6	63.1	50.2	37.2	31.3	48.7
Average	22.5	27.0	33.8	44.8	55.4	65.0	72.5	71.5	60.9	49.1	34.4	25.9	46.9

Notes: Rapid City Weather Station (No. 6937)

Engineering Report
Transfer of Water Rights 1878 Murphy Ditch Vested Water Right

Table E-2
Total Monthly Precipitation (inches)

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
1950	0.3	0.1	2.7	1.6	2.4	0.9	1.6	2.7	2.8	0.4	0.4	0.0	15.9
1951	0.1	0.1	1.0	0.5	1.9	3.0	1.6	2.9	1.5	0.9	0.2	0.5	14.2
1952	0.0	0.7	0.8	0.3	3.8	3.0	1.5	0.7	0.2	0.0	0.2	0.1	11.2
1953	0.8	2.5	0.7	2.8	1.7	4.1	1.3	0.9	0.4	0.2	0.8	0.2	16.2
1954	0.2	0.3	2.3	0.3	2.7	3.2	1.2	2.1	0.2	1.9	0.6	0.3	15.3
1955	0.5	0.9	0.6	1.6	1.7	2.1	2.1	1.7	3.1	0.3	0.4	0.7	15.5
1956	0.5	0.5	0.8	1.7	2.1	1.3	2.3	3.2	0.3	0.1	1.5	0.4	14.5
1957	0.4	0.3	0.7	2.1	7.1	3.4	2.0	1.0	0.7	1.3	0.4	0.0	19.3
1958	0.4	0.8	1.1	3.0	1.0	3.9	4.5	0.3	0.0	0.2	0.4	0.4	16.1
1959	0.4	0.6	0.6	1.9	3.3	2.8	0.7	0.4	2.4	0.2	1.2	0.3	14.6
1960	0.2	0.9	0.8	1.2	2.2	2.2	0.7	1.2	0.7	0.0	0.4	0.8	11.2
1961	0.1	0.2	0.8	1.5	1.3	0.8	2.1	0.4	1.0	0.9	0.4	0.5	10.0
1962	0.5	1.0	1.3	0.7	6.9	4.0	4.5	1.0	0.7	1.6	0.1	0.2	22.5
1963	1.0	0.9	1.6	3.8	1.2	5.5	2.0	1.3	1.2	0.8	0.1	0.3	19.8
1964	0.4	0.8	0.6	1.2	2.5	4.7	0.8	1.9	0.7	0.5	0.3	0.8	15.2
1965	0.6	0.2	0.5	1.5	7.0	3.6	0.6	1.5	1.5	0.6	0.2	0.1	17.7
1966	0.2	1.0	1.8	2.5	0.3	1.3	3.9	3.2	2.8	1.5	1.0	0.8	20.4
1967	0.5	0.6	0.8	5.2	3.2	6.8	1.1	1.0	2.1	0.3	0.3	0.9	22.6
1968	0.4	0.4	0.2	1.8	1.7	7.0	2.4	2.5	0.9	0.1	0.5	0.6	18.5
1969	0.1	0.7	0.7	1.6	2.2	2.0	6.1	0.3	0.4	0.9	0.4	0.6	15.9
1970	0.7	0.5	1.5	4.6	2.4	2.2	1.0	0.7	1.6	1.2	0.8	0.6	17.9
1971	1.2	1.0	1.3	2.9	3.7	1.9	1.5	0.5	2.3	2.0	0.8	0.2	19.2
1972	0.2	0.4	0.5	2.8	3.3	4.1	1.7	2.5	0.2	0.8	0.4	0.3	17.2
1973	0.1	0.3	2.7	2.7	2.4	0.6	1.5	0.7	1.4	1.4	0.7	0.5	15.1
1974	0.2	0.3	0.3	1.6	1.3	1.1	0.7	1.4	0.9	1.2	0.1	0.1	9.1
1975	1.1	0.4	2.5	1.4	1.2	5.6	1.6	0.9	0.0	0.7	0.6	1.7	17.5
1976	0.3	0.5	0.3	2.7	2.7	4.8	1.1	1.3	0.3	0.2	0.6	0.4	15.2
1977	0.8	0.3	2.6	1.6	2.5	1.8	3.0	1.8	2.9	1.1	0.8	0.4	19.4
1978	0.2	0.8	0.4	2.2	3.1	2.0	4.1	1.4	0.2	0.3	0.6	0.3	15.6
1979	0.5	0.3	0.5	0.3	1.2	3.6	4.1	2.3	0.1	0.9	0.2	0.1	14.0
1980	0.2	0.5	0.9	1.1	1.6	4.8	1.8	2.4	0.5	2.3	0.6	0.7	17.2
1981	0.1	0.1	0.1	0.3	2.8	1.9	4.5	1.7	0.2	1.8	0.2	0.4	14.1
1982	0.4	0.4	1.4	0.7	6.5	2.9	1.8	4.8	2.7	3.8	0.3	0.4	26.0
1983	0.3	0.2	0.8	1.0	2.2	3.0	1.9	2.4	0.3	1.7	1.1	0.5	15.5
1984	0.1	0.2	0.7	3.1	1.6	4.7	1.6	1.0	0.7	0.7	0.5	0.4	15.2
1985	0.5	0.1	1.6	0.3	1.2	1.6	1.0	1.9	1.6	1.0	2.2	0.8	13.6
1986	0.5	0.9	0.9	4.7	1.4	4.6	0.9	1.3	3.1	1.6	1.4	0.0	21.4
1987	0.0	1.7	1.1	0.0	3.4	1.4	0.8	2.4	0.7	0.3	0.3	0.3	12.4
1988	0.2	0.3	0.5	0.6	3.3	1.1	0.4	2.0	0.6	0.8	0.8	0.5	10.9
1989	0.0	0.3	1.0	1.5	1.4	1.0	0.8	1.7	3.1	1.5	0.4	0.8	13.6
1990	0.2	0.4	1.2	0.8	4.9	1.4	1.9	1.9	2.4	0.6	0.4	0.3	16.5
1991	0.3	0.8	0.6	3.0	4.4	3.3	2.0	0.6	0.6	1.0	0.7	0.0	17.3
1992	0.3	0.2	1.9	0.7	2.5	2.2	3.3	0.5	0.4	0.7	0.4	0.6	13.5
1993	0.7	0.6	0.8	3.1	2.2	3.4	4.3	1.2	1.5	0.9	0.7	0.5	19.8
1994	0.5	0.7	0.4	1.2	1.5	0.7	0.6	0.9	0.3	2.8	0.7	0.4	10.5
1995	0.1	0.6	0.8	2.6	4.0	4.5	2.9	0.5	0.9	2.4	0.4	0.1	19.7
1996	0.9	0.1	1.1	1.6	8.2	1.2	0.5	1.9	1.6	1.1	0.1	1.3	19.4
1997	0.7	0.3	0.2	4.8	5.4	3.4	3.7	3.9	0.8	0.5	0.2	0.1	23.8
1998	0.2	1.2	1.3	0.3	2.3	5.6	1.3	1.4	1.5	5.6	1.1	0.1	21.9
1999	0.2	0.0	1.3	2.5	3.7	5.2	3.7	0.5	0.9	0.1	0.4	0.2	18.7
2000	0.2	0.2	1.4	4.0	2.4	1.6	2.1	0.7	0.5	1.5	0.5	0.1	15.0
2001	0.2	0.2	0.4	2.2	1.7	3.6	2.5	1.6	0.9	1.0	0.1	0.0	14.3
2002	0.3	0.4	1.4	1.6	2.1	0.8	1.1	1.9	2.7	1.0	0.3	0.4	14.0
2003	0.7	0.7	1.6	2.3	2.3	2.8	1.0	1.0	1.5	0.8	0.9	0.5	16.1
2004	0.5	0.8	1.1	0.8	2.1	1.4	2.5	1.4	2.9	1.6	0.5	0.3	15.7
Average	0.4	0.5	1.0	1.9	2.8	2.9	2.0	1.5	1.2	1.1	0.6	0.4	16.4

Notes: Rapid City Weather Station (No. 6937)

Engineering Report
Transfer of Water Rights 1878 Murphy Ditch Vested Water Right

Table E-3
Effective Precipitation (Ac-ft/Acre)

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
1950	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.6
1951	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.7
1952	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.6
1953	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.5
1954	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.2	0.0	0.1	0.0	0.0	0.7
1955	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.8
1956	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.6
1957	0.0	0.0	0.0	0.0	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.8
1958	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.7
1959	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.6
1960	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.5
1961	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.4
1962	0.0	0.0	0.0	0.0	0.4	0.3	0.3	0.1	0.0	0.0	0.0	0.0	1.1
1963	0.0	0.0	0.0	0.0	0.1	0.4	0.2	0.1	0.1	0.0	0.0	0.0	0.8
1964	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.7
1965	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.8
1966	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.2	0.0	0.0	0.0	0.8
1967	0.0	0.0	0.0	0.0	0.1	0.4	0.1	0.1	0.1	0.0	0.0	0.0	0.8
1968	0.0	0.0	0.0	0.0	0.1	0.4	0.2	0.2	0.1	0.0	0.0	0.0	0.9
1969	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.8
1970	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.5
1971	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.7
1972	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.2	0.0	0.0	0.0	0.0	0.8
1973	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.5
1974	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.4
1975	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.6
1976	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.7
1977	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.9
1978	0.0	0.0	0.0	0.0	0.2	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.7
1979	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.8
1980	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.2	0.0	0.1	0.0	0.0	0.8
1981	0.0	0.0	0.0	0.0	0.2	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.8
1982	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.3	0.2	0.1	0.0	0.0	1.1
1983	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.7
1984	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.6
1985	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.5
1986	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.1	0.2	0.0	0.0	0.0	0.8
1987	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.6
1988	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.5
1989	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.6
1990	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.8
1991	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.8
1992	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.6
1993	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.8
1994	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.4
1995	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.0	0.1	0.1	0.0	0.0	0.8
1996	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.6
1997	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.3	0.0	0.0	0.0	0.0	1.0
1998	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.9
1999	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.0	0.1	0.0	0.0	0.0	0.8
2000	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.5
2001	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.8
2002	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.6
2003	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.6
2004	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.7
Average	0.00	0.00	0.00	0.01	0.14	0.19	0.15	0.11	0.07	0.03	0.00	0.00	0.7

Notes: Rapid City Weather Station (No. 6937)

Engineering Report
Transfer of Water Rights 1878 Murphy Ditch Vested Water Right

Table E-4
Potential Consumptive Use – Alfalfa
(Ac-ft/Acre)

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
1950	0.0	0.0	0.0	0.0	0.2	0.5	0.6	0.5	0.3	0.1	0.0	0.0	2.3
1951	0.0	0.0	0.0	0.0	0.4	0.6	0.7	0.6	0.3	0.1	0.0	0.0	2.6
1952	0.0	0.0	0.0	0.1	0.4	0.7	0.7	0.6	0.4	0.1	0.0	0.0	3.0
1953	0.0	0.0	0.0	0.0	0.3	0.6	0.7	0.6	0.4	0.1	0.0	0.0	2.7
1954	0.0	0.0	0.0	0.0	0.3	0.5	0.8	0.6	0.4	0.1	0.0	0.0	2.8
1955	0.0	0.0	0.0	0.1	0.4	0.5	0.8	0.7	0.4	0.1	0.0	0.0	3.1
1956	0.0	0.0	0.0	0.0	0.4	0.7	0.7	0.6	0.4	0.1	0.0	0.0	2.9
1957	0.0	0.0	0.0	0.0	0.3	0.5	0.8	0.6	0.3	0.1	0.0	0.0	2.6
1958	0.0	0.0	0.0	0.1	0.5	0.5	0.6	0.7	0.4	0.1	0.0	0.0	2.8
1959	0.0	0.0	0.0	0.0	0.3	0.7	0.8	0.7	0.3	0.1	0.0	0.0	2.8
1960	0.0	0.0	0.0	0.1	0.4	0.6	0.8	0.6	0.4	0.1	0.0	0.0	3.0
1961	0.0	0.0	0.0	0.0	0.4	0.7	0.7	0.7	0.3	0.1	0.0	0.0	2.9
1962	0.0	0.0	0.0	0.1	0.4	0.6	0.6	0.6	0.3	0.1	0.0	0.0	2.8
1963	0.0	0.0	0.0	0.0	0.4	0.6	0.8	0.7	0.4	0.1	0.0	0.0	3.0
1964	0.0	0.0	0.0	0.1	0.4	0.6	0.8	0.6	0.3	0.1	0.0	0.0	2.9
1965	0.0	0.0	0.0	0.0	0.4	0.6	0.7	0.6	0.2	0.1	0.0	0.0	2.6
1966	0.0	0.0	0.0	0.0	0.3	0.6	0.8	0.5	0.3	0.1	0.0	0.0	2.7
1967	0.0	0.0	0.0	0.0	0.2	0.5	0.7	0.6	0.4	0.1	0.0	0.0	2.4
1968	0.0	0.0	0.0	0.0	0.2	0.5	0.6	0.5	0.3	0.1	0.0	0.0	2.3
1969	0.0	0.0	0.0	0.1	0.4	0.5	0.7	0.7	0.4	0.1	0.0	0.0	2.8
1970	0.0	0.0	0.0	0.0	0.3	0.6	0.7	0.7	0.3	0.1	0.0	0.0	2.7
1971	0.0	0.0	0.0	0.0	0.3	0.6	0.6	0.7	0.3	0.1	0.0	0.0	2.6
1972	0.0	0.0	0.0	0.0	0.4	0.6	0.6	0.6	0.3	0.1	0.0	0.0	2.5
1973	0.0	0.0	0.0	0.0	0.3	0.6	0.7	0.7	0.3	0.1	0.0	0.0	2.6
1974	0.0	0.0	0.0	0.0	0.3	0.6	0.8	0.5	0.3	0.1	0.0	0.0	2.7
1975	0.0	0.0	0.0	0.0	0.3	0.5	0.8	0.6	0.3	0.1	0.0	0.0	2.6
1976	0.0	0.0	0.0	0.0	0.4	0.5	0.7	0.6	0.4	0.1	0.0	0.0	2.8
1977	0.0	0.0	0.0	0.1	0.4	0.7	0.7	0.5	0.3	0.1	0.0	0.0	2.9
1978	0.0	0.0	0.0	0.0	0.4	0.6	0.7	0.6	0.4	0.1	0.0	0.0	2.7
1979	0.0	0.0	0.0	0.0	0.3	0.6	0.7	0.6	0.4	0.1	0.0	0.0	2.6
1980	0.0	0.0	0.0	0.1	0.4	0.6	0.8	0.6	0.3	0.1	0.0	0.0	2.9
1981	0.0	0.0	0.0	0.2	0.4	0.6	0.7	0.6	0.4	0.1	0.0	0.0	2.9
1982	0.0	0.0	0.0	0.0	0.3	0.5	0.7	0.6	0.3	0.1	0.0	0.0	2.4
1983	0.0	0.0	0.0	0.0	0.2	0.5	0.8	0.8	0.3	0.1	0.0	0.0	2.7
1984	0.0	0.0	0.0	0.0	0.3	0.5	0.7	0.7	0.3	0.1	0.0	0.0	2.6
1985	0.0	0.0	0.0	0.2	0.5	0.5	0.8	0.6	0.3	0.1	0.0	0.0	2.9
1986	0.0	0.0	0.0	0.0	0.4	0.6	0.7	0.6	0.3	0.1	0.0	0.0	2.6
1987	0.0	0.0	0.0	0.2	0.4	0.6	0.8	0.6	0.3	0.1	0.0	0.0	3.0
1988	0.0	0.0	0.0	0.1	0.4	0.8	0.8	0.6	0.3	0.1	0.0	0.0	3.2
1989	0.0	0.0	0.0	0.0	0.4	0.5	0.8	0.7	0.3	0.1	0.0	0.0	2.8
1990	0.0	0.0	0.0	0.0	0.3	0.6	0.7	0.7	0.4	0.1	0.0	0.0	2.8
1991	0.0	0.0	0.0	0.0	0.4	0.6	0.7	0.7	0.3	0.1	0.0	0.0	2.9
1992	0.0	0.0	0.0	0.1	0.4	0.5	0.5	0.5	0.4	0.1	0.0	0.0	2.5
1993	0.0	0.0	0.0	0.0	0.4	0.5	0.6	0.6	0.3	0.1	0.0	0.0	2.3
1994	0.0	0.0	0.0	0.1	0.4	0.6	0.7	0.7	0.4	0.1	0.0	0.0	3.0
1995	0.0	0.0	0.0	0.0	0.2	0.5	0.7	0.7	0.3	0.1	0.0	0.0	2.5
1996	0.0	0.0	0.0	0.0	0.2	0.6	0.7	0.7	0.3	0.1	0.0	0.0	2.5
1997	0.0	0.0	0.0	0.0	0.3	0.6	0.7	0.6	0.4	0.1	0.0	0.0	2.6
1998	0.0	0.0	0.0	0.0	0.4	0.4	0.7	0.6	0.4	0.1	0.0	0.0	2.7
1999	0.0	0.0	0.0	0.0	0.3	0.5	0.7	0.6	0.3	0.1	0.0	0.0	2.5
2000	0.0	0.0	0.0	0.0	0.4	0.5	0.7	0.7	0.4	0.1	0.0	0.0	2.8
2001	0.0	0.0	0.0	0.0	0.4	0.5	0.8	0.7	0.4	0.1	0.0	0.0	2.9
2002	0.0	0.0	0.0	0.0	0.3	0.7	0.9	0.6	0.4	0.1	0.0	0.0	3.0
2003	0.0	0.0	0.0	0.1	0.4	0.5	0.9	0.7	0.3	0.1	0.0	0.0	3.1
2004	0.0	0.0	0.0	0.1	0.4	0.5	0.8	0.6	0.4	0.1	0.0	0.0	2.8
Average	0.00	0.00	0.00	0.04	0.34	0.57	0.73	0.62	0.34	0.10	0.00	0.00	2.7

Notes: Rapid City Weather Station (No. 6937)

Engineering Report
Transfer of Water Rights 1878 Murphy Ditch Vested Water Right

Table E-5
Potential Consumptive Use – Pasture Grass
(Ac-ft/Acre)

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
1950	0.0	0.0	0.0	0.0	0.2	0.4	0.5	0.5	0.3	0.2	0.0	0.0	2.1
1951	0.0	0.0	0.0	0.0	0.3	0.5	0.6	0.5	0.2	0.1	0.0	0.0	2.2
1952	0.0	0.0	0.0	0.2	0.3	0.5	0.6	0.5	0.4	0.1	0.0	0.0	2.6
1953	0.0	0.0	0.0	0.0	0.3	0.5	0.6	0.5	0.3	0.2	0.0	0.0	2.5
1954	0.0	0.0	0.0	0.1	0.3	0.4	0.7	0.5	0.3	0.1	0.0	0.0	2.5
1955	0.0	0.0	0.0	0.2	0.4	0.4	0.7	0.6	0.3	0.1	0.0	0.0	2.7
1956	0.0	0.0	0.0	0.0	0.3	0.6	0.6	0.5	0.3	0.2	0.0	0.0	2.5
1957	0.0	0.0	0.0	0.0	0.3	0.4	0.7	0.5	0.3	0.1	0.0	0.0	2.3
1958	0.0	0.0	0.0	0.1	0.4	0.4	0.5	0.6	0.3	0.2	0.0	0.0	2.5
1959	0.0	0.0	0.0	0.1	0.3	0.5	0.6	0.6	0.3	0.1	0.0	0.0	2.5
1960	0.0	0.0	0.0	0.1	0.3	0.5	0.7	0.5	0.3	0.2	0.0	0.0	2.6
1961	0.0	0.0	0.0	0.1	0.3	0.6	0.6	0.6	0.2	0.1	0.0	0.0	2.5
1962	0.0	0.0	0.0	0.2	0.3	0.5	0.5	0.5	0.3	0.2	0.0	0.0	2.5
1963	0.0	0.0	0.0	0.1	0.3	0.5	0.6	0.6	0.4	0.2	0.0	0.0	2.8
1964	0.0	0.0	0.0	0.1	0.3	0.5	0.7	0.5	0.3	0.1	0.0	0.0	2.5
1965	0.0	0.0	0.0	0.1	0.3	0.4	0.6	0.5	0.2	0.2	0.0	0.0	2.3
1966	0.0	0.0	0.0	0.0	0.3	0.5	0.7	0.4	0.3	0.1	0.0	0.0	2.3
1967	0.0	0.0	0.0	0.1	0.2	0.4	0.6	0.5	0.3	0.1	0.0	0.0	2.2
1968	0.0	0.0	0.0	0.0	0.2	0.4	0.5	0.5	0.3	0.1	0.0	0.0	2.1
1969	0.0	0.0	0.0	0.2	0.3	0.4	0.6	0.6	0.3	0.1	0.0	0.0	2.4
1970	0.0	0.0	0.0	0.0	0.3	0.5	0.6	0.6	0.3	0.1	0.0	0.0	2.3
1971	0.0	0.0	0.0	0.1	0.3	0.5	0.5	0.6	0.3	0.1	0.0	0.0	2.3
1972	0.0	0.0	0.0	0.1	0.3	0.5	0.5	0.5	0.3	0.1	0.0	0.0	2.1
1973	0.0	0.0	0.0	0.1	0.3	0.5	0.6	0.6	0.3	0.1	0.0	0.0	2.3
1974	0.0	0.0	0.0	0.1	0.3	0.5	0.7	0.5	0.3	0.2	0.0	0.0	2.5
1975	0.0	0.0	0.0	0.0	0.3	0.4	0.6	0.5	0.3	0.1	0.0	0.0	2.3
1976	0.0	0.0	0.0	0.1	0.3	0.4	0.6	0.5	0.3	0.1	0.0	0.0	2.4
1977	0.0	0.0	0.0	0.2	0.4	0.5	0.6	0.4	0.3	0.1	0.0	0.0	2.5
1978	0.0	0.0	0.0	0.1	0.3	0.5	0.6	0.5	0.4	0.1	0.0	0.0	2.4
1979	0.0	0.0	0.0	0.1	0.3	0.5	0.6	0.5	0.4	0.1	0.0	0.0	2.4
1980	0.0	0.0	0.0	0.1	0.3	0.5	0.6	0.5	0.3	0.1	0.0	0.0	2.5
1981	0.0	0.0	0.0	0.2	0.3	0.5	0.6	0.5	0.3	0.1	0.0	0.0	2.5
1982	0.0	0.0	0.0	0.0	0.3	0.4	0.6	0.5	0.3	0.1	0.0	0.0	2.1
1983	0.0	0.0	0.0	0.0	0.3	0.4	0.6	0.6	0.3	0.1	0.0	0.0	2.4
1984	0.0	0.0	0.0	0.1	0.3	0.4	0.6	0.6	0.3	0.1	0.0	0.0	2.3
1985	0.0	0.0	0.0	0.2	0.4	0.4	0.6	0.5	0.2	0.1	0.0	0.0	2.5
1986	0.0	0.0	0.0	0.1	0.3	0.5	0.6	0.5	0.2	0.1	0.0	0.0	2.3
1987	0.0	0.0	0.0	0.2	0.4	0.5	0.7	0.5	0.3	0.1	0.0	0.0	2.6
1988	0.0	0.0	0.0	0.1	0.4	0.7	0.7	0.5	0.3	0.1	0.0	0.0	2.8
1989	0.0	0.0	0.0	0.1	0.3	0.4	0.7	0.6	0.3	0.1	0.0	0.0	2.5
1990	0.0	0.0	0.0	0.1	0.3	0.5	0.6	0.6	0.4	0.1	0.0	0.0	2.5
1991	0.0	0.0	0.0	0.1	0.3	0.5	0.6	0.6	0.3	0.1	0.0	0.0	2.5
1992	0.0	0.0	0.0	0.2	0.3	0.4	0.5	0.4	0.3	0.1	0.0	0.0	2.2
1993	0.0	0.0	0.0	0.1	0.3	0.4	0.5	0.5	0.3	0.1	0.0	0.0	2.1
1994	0.0	0.0	0.0	0.1	0.4	0.5	0.6	0.6	0.4	0.1	0.0	0.0	2.6
1995	0.0	0.0	0.0	0.0	0.3	0.4	0.6	0.6	0.3	0.1	0.0	0.0	2.2
1996	0.0	0.0	0.0	0.0	0.2	0.5	0.6	0.6	0.3	0.1	0.0	0.0	2.3
1997	0.0	0.0	0.0	0.0	0.3	0.5	0.6	0.5	0.3	0.1	0.0	0.0	2.2
1998	0.0	0.0	0.0	0.1	0.3	0.4	0.6	0.5	0.4	0.1	0.0	0.0	2.4
1999	0.0	0.0	0.0	0.1	0.3	0.4	0.6	0.5	0.2	0.2	0.0	0.0	2.2
2000	0.0	0.0	0.0	0.1	0.3	0.4	0.6	0.6	0.3	0.1	0.0	0.0	2.4
2001	0.0	0.0	0.0	0.1	0.3	0.4	0.6	0.6	0.3	0.1	0.0	0.0	2.5
2002	0.0	0.0	0.0	0.1	0.3	0.6	0.7	0.5	0.3	0.0	0.0	0.0	2.6
2003	0.0	0.0	0.0	0.2	0.3	0.4	0.7	0.6	0.3	0.1	0.0	0.0	2.7
2004	0.0	0.0	0.0	0.2	0.3	0.4	0.6	0.5	0.3	0.1	0.0	0.0	2.5
Average	0.0	0.0	0.0	0.1	0.3	0.5	0.6	0.5	0.3	0.1	0.0	0.0	2.4

Notes: Rapid City Weather Station (No. 6937)

Engineering Report
Transfer of Water Rights 1878 Murphy Ditch Vested Water Right

Table E-6
Crop Irrigation Requirement – Alfalfa
(Ac-ft/Acre)

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
1950	0.0	0.0	0.0	0.0	0.1	0.5	0.5	0.4	0.2	0.1	0.0	0.0	1.7
1951	0.0	0.0	0.0	0.0	0.2	0.4	0.6	0.4	0.2	0.1	0.0	0.0	1.8
1952	0.0	0.0	0.0	0.1	0.2	0.4	0.6	0.6	0.4	0.1	0.0	0.0	2.4
1953	0.0	0.0	0.0	0.0	0.2	0.3	0.6	0.6	0.4	0.1	0.0	0.0	2.2
1954	0.0	0.0	0.0	0.0	0.2	0.3	0.7	0.5	0.4	0.0	0.0	0.0	2.2
1955	0.0	0.0	0.0	0.1	0.3	0.4	0.7	0.6	0.2	0.1	0.0	0.0	2.3
1956	0.0	0.0	0.0	0.0	0.2	0.6	0.5	0.4	0.4	0.1	0.0	0.0	2.3
1957	0.0	0.0	0.0	0.0	0.0	0.3	0.6	0.5	0.3	0.1	0.0	0.0	1.8
1958	0.0	0.0	0.0	0.0	0.4	0.3	0.3	0.7	0.4	0.1	0.0	0.0	2.2
1959	0.0	0.0	0.0	0.0	0.1	0.5	0.7	0.7	0.2	0.1	0.0	0.0	2.3
1960	0.0	0.0	0.0	0.1	0.3	0.4	0.8	0.5	0.3	0.1	0.0	0.0	2.5
1961	0.0	0.0	0.0	0.0	0.3	0.6	0.6	0.7	0.2	0.1	0.0	0.0	2.5
1962	0.0	0.0	0.0	0.1	0.0	0.3	0.3	0.5	0.3	0.1	0.0	0.0	1.7
1963	0.0	0.0	0.0	0.0	0.3	0.3	0.6	0.6	0.3	0.1	0.0	0.0	2.2
1964	0.0	0.0	0.0	0.0	0.3	0.3	0.8	0.4	0.3	0.1	0.0	0.0	2.1
1965	0.0	0.0	0.0	0.0	0.0	0.3	0.7	0.5	0.1	0.1	0.0	0.0	1.7
1966	0.0	0.0	0.0	0.0	0.3	0.5	0.5	0.3	0.2	0.1	0.0	0.0	1.9
1967	0.0	0.0	0.0	0.0	0.1	0.1	0.6	0.5	0.2	0.1	0.0	0.0	1.6
1968	0.0	0.0	0.0	0.0	0.1	0.1	0.5	0.4	0.3	0.1	0.0	0.0	1.5
1969	0.0	0.0	0.0	0.1	0.3	0.3	0.3	0.6	0.4	0.1	0.0	0.0	2.0
1970	0.0	0.0	0.0	0.0	0.2	0.4	0.6	0.6	0.2	0.0	0.0	0.0	2.2
1971	0.0	0.0	0.0	0.0	0.1	0.5	0.5	0.6	0.2	0.0	0.0	0.0	1.9
1972	0.0	0.0	0.0	0.0	0.2	0.3	0.5	0.4	0.3	0.1	0.0	0.0	1.7
1973	0.0	0.0	0.0	0.0	0.2	0.5	0.6	0.6	0.2	0.1	0.0	0.0	2.2
1974	0.0	0.0	0.0	0.0	0.3	0.5	0.8	0.4	0.2	0.1	0.0	0.0	2.3
1975	0.0	0.0	0.0	0.0	0.2	0.2	0.6	0.5	0.3	0.1	0.0	0.0	2.0
1976	0.0	0.0	0.0	0.0	0.2	0.3	0.6	0.5	0.4	0.1	0.0	0.0	2.1
1977	0.0	0.0	0.0	0.1	0.3	0.5	0.5	0.4	0.2	0.1	0.0	0.0	2.1
1978	0.0	0.0	0.0	0.0	0.2	0.4	0.4	0.5	0.4	0.1	0.0	0.0	2.0
1979	0.0	0.0	0.0	0.0	0.2	0.3	0.4	0.4	0.4	0.1	0.0	0.0	1.9
1980	0.0	0.0	0.0	0.1	0.3	0.3	0.6	0.4	0.3	0.0	0.0	0.0	2.1
1981	0.0	0.0	0.0	0.2	0.2	0.4	0.4	0.5	0.4	0.0	0.0	0.0	2.1
1982	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.3	0.2	0.0	0.0	0.0	1.3
1983	0.0	0.0	0.0	0.0	0.2	0.3	0.6	0.6	0.3	0.1	0.0	0.0	2.0
1984	0.0	0.0	0.0	0.0	0.2	0.2	0.6	0.6	0.2	0.1	0.0	0.0	2.0
1985	0.0	0.0	0.0	0.2	0.4	0.4	0.7	0.4	0.2	0.1	0.0	0.0	2.3
1986	0.0	0.0	0.0	0.0	0.3	0.3	0.6	0.5	0.1	0.0	0.0	0.0	1.8
1987	0.0	0.0	0.0	0.2	0.2	0.5	0.7	0.4	0.3	0.1	0.0	0.0	2.4
1988	0.0	0.0	0.0	0.1	0.2	0.7	0.8	0.5	0.3	0.1	0.0	0.0	2.7
1989	0.0	0.0	0.0	0.0	0.3	0.5	0.8	0.5	0.2	0.1	0.0	0.0	2.3
1990	0.0	0.0	0.0	0.0	0.1	0.5	0.6	0.5	0.3	0.1	0.0	0.0	2.0
1991	0.0	0.0	0.0	0.0	0.1	0.4	0.6	0.6	0.3	0.1	0.0	0.0	2.1
1992	0.0	0.0	0.0	0.1	0.2	0.4	0.3	0.5	0.3	0.1	0.0	0.0	1.9
1993	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.5	0.2	0.1	0.0	0.0	1.5
1994	0.0	0.0	0.0	0.0	0.3	0.6	0.6	0.6	0.4	0.0	0.0	0.0	2.6
1995	0.0	0.0	0.0	0.0	0.1	0.2	0.5	0.6	0.3	0.0	0.0	0.0	1.7
1996	0.0	0.0	0.0	0.0	0.0	0.5	0.6	0.5	0.2	0.1	0.0	0.0	1.9
1997	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.3	0.3	0.1	0.0	0.0	1.6
1998	0.0	0.0	0.0	0.0	0.2	0.1	0.6	0.5	0.3	0.0	0.0	0.0	1.9
1999	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.6	0.2	0.1	0.0	0.0	1.6
2000	0.0	0.0	0.0	0.0	0.2	0.4	0.6	0.6	0.3	0.1	0.0	0.0	2.2
2001	0.0	0.0	0.0	0.0	0.3	0.3	0.6	0.6	0.3	0.1	0.0	0.0	2.1
2002	0.0	0.0	0.0	0.0	0.2	0.6	0.8	0.5	0.2	0.0	0.0	0.0	2.4
2003	0.0	0.0	0.0	0.0	0.2	0.3	0.8	0.7	0.2	0.1	0.0	0.0	2.4
2004	0.0	0.0	0.0	0.1	0.3	0.4	0.6	0.5	0.2	0.1	0.0	0.0	2.1
Average	0.00	0.00	0.00	0.03	0.20	0.38	0.58	0.51	0.27	0.07	0.00	0.00	2.0

Notes: Rapid City Weather Station (No. 6937)



LeonardRice
ENGINEERS, INC.

Leonard Rice Engineers, Inc. provides consulting services related to planning, management, and development of water at the highest level of technical excellence that is professional, ethical, and profitable.

Our company is devoted to serving our clients, developing staff, effectively using technology, communicating effectively, continuously improving, and contributing to our community.

We foster a challenging, stimulating, and fulfilling work experience.

Engineering Report
Transfer of Water Rights 1878 Murphy Ditch Vested Water Right

Table E-7
Crop Irrigation Requirement – Pasture Grass
(Ac-ft/Acre)

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
1950	0.0	0.0	0.0	0.0	0.1	0.4	0.4	0.3	0.1	0.1	0.0	0.0	1.4
1951	0.0	0.0	0.0	0.0	0.2	0.3	0.5	0.3	0.2	0.1	0.0	0.0	1.5
1952	0.0	0.0	0.0	0.1	0.1	0.3	0.5	0.5	0.4	0.1	0.0	0.0	2.1
1953	0.0	0.0	0.0	0.0	0.2	0.2	0.5	0.5	0.3	0.2	0.0	0.0	1.9
1954	0.0	0.0	0.0	0.1	0.1	0.2	0.6	0.4	0.3	0.0	0.0	0.0	1.8
1955	0.0	0.0	0.0	0.1	0.2	0.3	0.5	0.5	0.1	0.1	0.0	0.0	1.9
1956	0.0	0.0	0.0	0.0	0.2	0.5	0.4	0.3	0.3	0.2	0.0	0.0	1.9
1957	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.5	0.2	0.1	0.0	0.0	1.5
1958	0.0	0.0	0.0	0.0	0.3	0.2	0.2	0.6	0.3	0.2	0.0	0.0	1.8
1959	0.0	0.0	0.0	0.0	0.1	0.4	0.6	0.6	0.1	0.1	0.0	0.0	1.8
1960	0.0	0.0	0.0	0.1	0.2	0.3	0.6	0.5	0.3	0.2	0.0	0.0	2.1
1961	0.0	0.0	0.0	0.0	0.2	0.5	0.5	0.6	0.2	0.1	0.0	0.0	2.1
1962	0.0	0.0	0.0	0.1	0.0	0.2	0.3	0.4	0.3	0.1	0.0	0.0	1.4
1963	0.0	0.0	0.0	0.0	0.2	0.2	0.5	0.5	0.3	0.2	0.0	0.0	1.9
1964	0.0	0.0	0.0	0.1	0.2	0.2	0.6	0.4	0.2	0.1	0.0	0.0	1.8
1965	0.0	0.0	0.0	0.1	0.0	0.2	0.6	0.4	0.1	0.2	0.0	0.0	1.5
1966	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.2	0.1	0.1	0.0	0.0	1.5
1967	0.0	0.0	0.0	0.0	0.1	0.0	0.5	0.4	0.2	0.1	0.0	0.0	1.3
1968	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.3	0.2	0.1	0.0	0.0	1.3
1969	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.5	0.3	0.0	0.0	0.0	1.6
1970	0.0	0.0	0.0	0.0	0.2	0.3	0.5	0.5	0.2	0.0	0.0	0.0	1.8
1971	0.0	0.0	0.0	0.0	0.1	0.4	0.4	0.5	0.1	0.0	0.0	0.0	1.6
1972	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.3	0.3	0.0	0.0	0.0	1.3
1973	0.0	0.0	0.0	0.0	0.1	0.4	0.5	0.5	0.2	0.1	0.0	0.0	1.8
1974	0.0	0.0	0.0	0.1	0.2	0.4	0.6	0.4	0.2	0.1	0.0	0.0	2.0
1975	0.0	0.0	0.0	0.0	0.2	0.1	0.5	0.4	0.3	0.1	0.0	0.0	1.7
1976	0.0	0.0	0.0	0.0	0.1	0.2	0.5	0.5	0.3	0.1	0.0	0.0	1.7
1977	0.0	0.0	0.0	0.1	0.2	0.4	0.4	0.3	0.1	0.1	0.0	0.0	1.7
1978	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.4	0.4	0.1	0.0	0.0	1.7
1979	0.0	0.0	0.0	0.1	0.2	0.2	0.3	0.3	0.4	0.1	0.0	0.0	1.6
1980	0.0	0.0	0.0	0.1	0.2	0.2	0.5	0.3	0.3	0.0	0.0	0.0	1.7
1981	0.0	0.0	0.0	0.2	0.1	0.3	0.3	0.4	0.3	0.0	0.0	0.0	1.7
1982	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.2	0.1	0.0	0.0	0.0	1.0
1983	0.0	0.0	0.0	0.0	0.1	0.2	0.5	0.5	0.3	0.1	0.0	0.0	1.7
1984	0.0	0.0	0.0	0.0	0.2	0.2	0.5	0.5	0.2	0.1	0.0	0.0	1.6
1985	0.0	0.0	0.0	0.2	0.3	0.3	0.6	0.4	0.1	0.1	0.0	0.0	1.9
1986	0.0	0.0	0.0	0.0	0.2	0.2	0.5	0.4	0.1	0.0	0.0	0.0	1.5
1987	0.0	0.0	0.0	0.2	0.2	0.4	0.6	0.3	0.3	0.1	0.0	0.0	2.0
1988	0.0	0.0	0.0	0.1	0.2	0.6	0.6	0.4	0.3	0.1	0.0	0.0	2.3
1989	0.0	0.0	0.0	0.1	0.2	0.4	0.6	0.4	0.1	0.1	0.0	0.0	1.9
1990	0.0	0.0	0.0	0.1	0.0	0.4	0.4	0.4	0.2	0.1	0.0	0.0	1.7
1991	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.5	0.3	0.1	0.0	0.0	1.7
1992	0.0	0.0	0.0	0.1	0.2	0.3	0.3	0.4	0.3	0.1	0.0	0.0	1.6
1993	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.4	0.2	0.1	0.0	0.0	1.2
1994	0.0	0.0	0.0	0.1	0.3	0.5	0.5	0.5	0.3	0.0	0.0	0.0	2.2
1995	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.5	0.2	0.0	0.0	0.0	1.4
1996	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.4	0.2	0.1	0.0	0.0	1.6
1997	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.2	0.3	0.1	0.0	0.0	1.2
1998	0.0	0.0	0.0	0.1	0.2	0.1	0.5	0.4	0.3	0.0	0.0	0.0	1.6
1999	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.5	0.2	0.2	0.0	0.0	1.4
2000	0.0	0.0	0.0	0.0	0.2	0.3	0.5	0.5	0.3	0.1	0.0	0.0	1.8
2001	0.0	0.0	0.0	0.0	0.2	0.2	0.5	0.5	0.3	0.1	0.0	0.0	1.7
2002	0.0	0.0	0.0	0.0	0.1	0.5	0.7	0.4	0.2	0.0	0.0	0.0	2.0
2003	0.0	0.0	0.0	0.1	0.2	0.3	0.6	0.6	0.2	0.1	0.0	0.0	2.0
2004	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.4	0.2	0.1	0.0	0.0	1.7
Average	0.0	0.0	0.0	0.1	0.2	0.3	0.5	0.4	0.2	0.1	0.0	0.0	1.7

Notes: Rapid City Weather Station (No. 6937)

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date 8/16, 2011

RECEIVED OF CETEC Engineering 1560 Concourse Dr Rapid City SD 57703

The following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. <u>2671-2</u> to Appropriate Water, to construct and to put water to beneficial use	100	00
Fee for Application for Permit No. _____ to Appropriate Water for Future use		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>2671-2</u>	200	00
Fee for Filing Transfer Form _____		
Fee for _____		
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____		
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____		
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____		
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	300 00

No. **05012**

By

Robert E. Eide
Chief Engineer

Gronlund, Eric

From: Ted Schultz <TedS@cetecengineering.com>
Sent: Monday, August 22, 2011 7:27 PM
To: Gronlund, Eric
Subject: Fwd: RVSD applications

Eric, we verified this and can provide replacement pages.

Ted F. Schultz, P.E.
CETEC Engineering Services, Inc.
1560 Concourse Drive
Rapid City, SD 57703
605-341-7800
Cetecengineering.com

Begin forwarded message:

From: Miranda Larsen-Funk <miranda.larsen-funk@lrewater.com>
Date: August 22, 2011 4:33:58 PM MDT
To: Ted Schultz <TedS@cetecengineering.com>
Subject: Re: RVSD applications

Ted -

I have made a few changes:

Olson – N ½ NE ¼ and SE ¼ NE ¼ Section **15**, T1S, R8E.

Rypkema – SE ¼ SW ¼ Section 10 & NE ¼ NW ¼ and NW ¼ NE ¼ Section 15,
all in T1S, R8E.

Gravatt –E ½ SW ¼ Section 19 & NE 1/4 NW ¼ Section 30; all in T 1S, R9E

Struck from Gravatt: W ½ SE ¼ Section 19 and NW ¼ NE ¼ Section
30 (this area is Ahrlin on the mapping but the lines are not very clear)

Miranda Larsen-Funk, P.E.
Senior Project Engineer



2000 Clay St. Suite 300
Denver, CO 80211
PH: 303.455.9589



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 27, 2011

John Lott
Dept. of Game, Fish and Parks
523 E. Capitol Avenue
Pierre SD 57501

Dear John:

Enclosed is a copy of the report, recommendations and public notice for Water Permit Application Nos. 2670-2, 2671-2 and 2672-2 filed by Rapid Valley Sanitary District. The applications propose to transfer portions of stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 (Murphy Ditch) from irrigation use to use by the District. The public notice is scheduled to be published November 2 and 9, 2011 in the Rapid City Journal for a hearing to be held before the Water Management Board on November 30, 2011.

This information is being sent to you because of Game, Fish and Parks continuing interest in Rapid Creek water right issues. If you have any questions regarding DENR's review of the applications, please contact Mark Rath at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosures



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 31, 2011

John Lott
Dept. of Game, Fish and Parks
523 E. Capitol Avenue
Pierre SD 57501

Dear John:

The publication notice that was sent to you regarding Rapid Valley Sanitary District's water permit applications inadvertently references the wrong township for the historically irrigated acres. Attached is a corrected notice as it will be published.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosure



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 27, 2011

Jerry Hammerquist
Rapid Valley Conservancy District
PO Box 26
Caputa SD 57725

Dear Mr. Hammerquist:

Enclosed is a copy of the report, recommendations and public notice for Water Permit Application Nos. 2670-2, 2671-2 and 2672-2 filed by Rapid Valley Sanitary District. The applications propose to transfer portions of stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 (Murphy Ditch) from irrigation use to use by the District. The public notice is scheduled to be published November 2 and 9, 2011 in the Rapid City Journal for a hearing to be held before the Water Management Board on November 30, 2011.

This information is being sent because of your continuing interest in Rapid Creek water right issues. If you have any questions regarding DENR's review of the applications, please contact Mark Rath at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosures



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 31, 2011

Jerry Hammerquist
Rapid Valley Conservancy District
PO Box 26
Caputa SD 57725

Dear Mr. Hammerquist:

The publication notice that was sent to your regarding Rapid Valley Sanitary District's water permit applications inadvertently references the wrong township for the historically irrigated acres. Attached is a corrected notice as it will be published.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosure



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 27, 2011

Keith Ham
15567 Hammerquist Road
Caputa SD 57725

Dear Mr. Ham:

Enclosed is a copy of the report, recommendations and public notice for Water Permit Application Nos. 2670-2, 2671-2 and 2672-2 filed by Rapid Valley Sanitary District. The applications propose to transfer portions of stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 (Murphy Ditch) from irrigation use to use by the District. The public notice is scheduled to be published November 2 and 9, 2011 in the Rapid City Journal for a hearing to be held before the Water Management Board on November 30, 2011.

This information is being sent because of your continuing interest in Rapid Creek water right issues. If you have any questions regarding DENR's review of the applications, please contact Mark Rath at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosures



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 31, 2011

Keith Ham
15567 Hammerquist Road
Caputa SD 57725

Dear Mr. Ham:

The publication notice that was sent to you regarding Rapid Valley Sanitary District's water permit applications inadvertently references the wrong township for the historically irrigated acres. Attached is a corrected notice as it will be published.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosure



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 27, 2011

Kevin Ham
Rapid Valley Water Master
3724 Freedom Court
Rapid City SD 57701-7639

Dear Mr. Ham:

Enclosed is a copy of the report, recommendations and public notice for Water Permit Application Nos. 2670-2, 2671-2 and 2672-2 filed by Rapid Valley Sanitary District. The applications propose to transfer portions of stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 (Murphy Ditch) from irrigation use to use by the District. The public notice is scheduled to be published November 2 and 9, 2011 in the Rapid City Journal for a hearing to be held before the Water Management Board on November 30, 2011.

This information is being sent because of your continuing interest in Rapid Creek water right issues. If you have any questions regarding DENR's review of the applications, please contact Mark Rath at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosures



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 31, 2011

Kevin Ham
Rapid Valley Water Master
3724 Freedom Court
Rapid City SD 57701-7639

Dear Mr. Ham:

The publication notice that was sent to you regarding Rapid Valley Sanitary District's water permit applications inadvertently references the wrong township for the historically irrigated acres. Attached is a corrected notice as it will be published.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosure



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 27, 2011

Terry Wolsterstorff, Public Works Director
City of Rapid City
306 6th Street
Rapid City SD 57701

Dear Mr. Wolsterstorff:

Enclosed is a copy of the report, recommendations and public notice for Water Permit Application Nos. 2670-2, 2671-2 and 2672-2 filed by Rapid Valley Sanitary District. The applications propose to transfer portions of stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 (Murphy Ditch) from irrigation use to use by the District. The public notice is scheduled to be published November 2 and 9, 2011 in the Rapid City Journal for a hearing to be held before the Water Management Board on November 30, 2011.

This information is being sent to you because of Rapid City's continuing interest in Rapid Creek water right issues. If you have any questions regarding DENR's review of the applications, please contact Mark Rath at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosures



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 31, 2011

Terry Wolsterstorff, Public Works Director
City of Rapid City
306 6th Street
Rapid City SD 57701

Dear Mr. Wolsterstorff:

The publication notice that was sent to you regarding Rapid Valley Sanitary District's water permit applications inadvertently references the wrong township for the historically irrigated acres. Attached is a corrected notice as it will be published.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosure



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 27, 2011

Curt Anderson
Bureau of Reclamation
515 9th Street, Room 101
Rapid City SD 57701

Dear Mr. Anderson:

Enclosed is a copy of the report, recommendations and public notice for Water Permit Application Nos. 2670-2, 2671-2 and 2672-2 filed by Rapid Valley Sanitary District. The applications propose to transfer portions of stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 (Murphy Ditch) from irrigation use to use by the District. The public notice is scheduled to be published November 2 and 9, 2011 in the Rapid City Journal for a hearing to be held before the Water Management Board on November 30, 2011.

This information is being sent to you because of the Bureau of Reclamation continuing interest in Rapid Creek water right issues. If you have any questions regarding DENR's review of the applications, please contact Mark Rath at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosures



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 31, 2011

Curt Anderson
Bureau of Reclamation
515 9th Street, Room 101
Rapid City SD 57701

Dear Curt:

The publication notice that was sent to you regarding Rapid Valley Sanitary District's water permit applications inadvertently references the wrong township for the historically irrigated acres. Attached is a corrected notice as it will be published.

Sincerely,

Eric Gronlund
Water Rights Program, DENR
(605) 773-3352

enclosure



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 2671-2, Rapid Valley Sanitary District**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 2671-2, Rapid Valley Sanitary District, c/o Jim Jester, 4611 Teak Drive, Rapid City SD 57703.

The Chief Engineer is recommending APPROVAL of Application No. 2671-2 because 1) the proposed diversion can be developed without unlawful impairment of existing rights, 2) the proposed use is a beneficial use, and 3) it is in the public interest with the following qualifications:

1. Permit No. 2671-2 is limited to a diversion rate of 0.60 cfs for a total annual volume of 98.5 acre feet of water. The Rapid Valley Sanitary District shall measure diversions at the District's water treatment plant. The total monthly diversion shall not exceed the amount listed in the following table.

Monthly Volume Limitation

Month	acre feet
April	3.8
May	12.3
June	14.2
July	18.8
August	24.4
September	17.9
October	7.1
TOTAL	98.5

2. The Rapid Valley Sanitary District shall report to the Chief Engineer annually the amount of water withdrawn each month at the District's water treatment plant.
3. Permit No. 2671-2 authorizes diversion of only natural flow water by the Rapid Valley Sanitary District and does not include any right to stored irrigation water available under contract from Pactola Reservoir and Deerfield Reservoir.

4. The Water Management Board retains jurisdiction of Permit No. 2671-2 in the event that additional information shows that changes need to be made in the monthly or total annual volumes authorized by Permit No. 2671-2.
5. Diversion under Permit No. 2671-2 may not interfere with existing water rights in effect prior to approval of Permit No. 2671-2 or any domestic rights.
6. The amount of water with an April 6, 1878 priority date, which may be appropriated under Vested Water Right No. 1727-2 is reduced by 0.60 cfs.
7. The approval of Permit No. 2671-2 retires from future irrigation the 45.6 acres known as the Gravatt property located in portions of the E $\frac{1}{2}$ SW $\frac{1}{4}$ Section 19 and NE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 30, T1N, R9E which has been historically irrigated from Murphy Ditch.
8. The permit holder, Rapid Valley Sanitary District, shall permanently render inoperable the structural means of diverting water to the land which is no longer subject to Vested Water Right No. 1727-2 pursuant to South Dakota Codified Law 46-5-34.1. This work shall be completed prior to the permit holder's diversion of the transferred water to beneficial use on the parcel of land approved under the transfer. The permit holder must notify the Chief Engineer to schedule an inspection. This transfer is subject to the Chief Engineer's approval that the works are rendered inoperable. This qualification does not grant access to property owned by third parties for making structural changes. The permit is responsible for ensuring that access is obtained from such third parties and that such third parties are also notified that inspections will occur.

See report on application for additional information.

A handwritten signature in black ink, appearing to read "Garland Erbele". The signature is fluid and cursive, with the first name "Garland" and last name "Erbele" clearly distinguishable.

Garland Erbele, Chief Engineer
October 26, 2011

REPORT ON APPLICATION NOS. 2670-2, 2671-2 & 2672-2
For Rapid Valley Sanitary District
October 1, 2011

Water Permit Application No. 2670-2 proposes to transfer a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch. The transfer is for Rapid Creek water historically used for irrigation of 9 acres of **Olson property**. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.12 cubic feet of water per second (cfs) with an annual volume limitation of 19 acre feet of water.

Historically, the 0.12 cfs has been used to irrigate 9 acres located in portions of the N $\frac{1}{2}$ NE $\frac{1}{4}$ and SE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 15, T1N-R8E. The existing diversion point on Rapid Creek for Murphy Ditch is located in the NE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 8, T1N-R8E. This application if approved, changes the diversion point for 0.12 cfs to a permanent diversion point for use by the Sanitary District to be located in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 15, T1N-R8E. Additionally, if this application is approved, it will retain the April 6, 1878 priority date established by the Murphy Ditch vested water right for natural flow and does not authorize any new water appropriation from Rapid Creek.

Water Permit Application No. 2671-2 proposes to transfer a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch. The transfer is for Rapid Creek water historically used for irrigation of 45.6 acres of **Gravatt property**. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.60 cfs with an annual volume limitation of 98.5 acre feet of water.

Historically, the 0.60 cfs has been used to irrigate 45.6 acres located in portions of the E $\frac{1}{2}$ SW $\frac{1}{4}$ Section 19 and NE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 30; all in T1N-R9E. The existing diversion point on Rapid Creek for Murphy Ditch is located in the NE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 8, T1N-R8E. This application if approved, changes the diversion point for 0.60 cfs to a permanent diversion point for use by the Sanitary District to be located in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 15, T1N-R8E. Additionally, if this application is approved, it will retain the April 6, 1878 priority date established by the Murphy Ditch vested water right for natural flow and does not authorize any new water appropriation from Rapid Creek.

Water Permit Application No. 2672-2 proposes to transfer a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water right No. 1727-2 from Murphy Ditch. The transfer is for Rapid Creek water historically used for irrigation of 36 acres of **Rypkema property**. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.47 cfs with an annual volume limitation of 76.4 acre feet of water.

Historically, the 0.47 cfs has been used to irrigate 36 acres located in portions of the SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 10 and NE $\frac{1}{4}$ NW $\frac{1}{4}$ and NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 15; all in T1N-R8E. The existing diversion point on Rapid Creek for Murphy Ditch is located in the NE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 8, T1N-R8E. This application if approved, changes the diversion point for 0.47 cfs to a permanent diversion point for use by the Sanitary District to be located in the NE $\frac{1}{4}$

NW¼ Section 15, T1N-R8E. Additionally, if this application is approved, it will retain the April 6, 1878 priority date established by the Murphy Ditch vested water right for natural flow and does not authorize any new water appropriation from Rapid Creek.

The transferable diversion rate is based on the pro-rated share of Murphy Ditch water decreased by the 11 percent carriage loss that remains in the ditch. The carriage loss is the water lost to seepage within the irrigation ditch as the water travels from the creek diversion to the where the water is applied. The carriage loss remains in the ditch to ensure that the proposed transfer does not unlawfully impair or adversely affect the remaining/existing water rights.

REVIEW OF EXISTING WATER PERMITS/RIGHTS

There have been several transfers involving the April 6, 1878 Murphy Ditch water right since the early 1990's. Between 1991 and 2003, Rapid City transferred a total of 4.14 cfs for municipal use. Rapid Valley Sanitation District transferred 6.71 cfs for municipal use (5.05 cfs in 2006 and 1.66 cfs in 2009). Therefore, of the original 17.0 cfs permitted for the 1878 priority, approximately 6.14 cfs remain and continue to be diverted through the irrigation ditch.

There are 92 existing water rights/permits appropriating 256.5 cfs on Rapid Creek between Pactola Reservoir and the confluence with the Cheyenne River. A majority of these rights/permits are junior in priority to the 1878 Murphy Ditch right with three being senior which appropriate 3.37 cfs.

REVIEW OF PROPOSED TRANSFER

South Dakota Codified Law, SDCL 46-5-34.1 states that no transfer can occur unless the transfer can be made without detriment to existing rights, or to individual domestic use rights. SDCL 46-2A-12 allows a change in use "only if the change does not unlawfully impair existing rights and is for a beneficial use and in the public interest." Calculations using accepted scientific methods and available climatic and cropping data have been made to insure that the proposed change does not unlawfully impair or adversely affect existing water rights. The water available for transfer is only from the natural flow in Rapid Creek and does not include stored water or stored water releases from the Deerfield – Pactola Reservoirs. SDCL 46-5-34.1 also states "No land which has had an irrigation right transferred from it pursuant to this section may qualify for another irrigation right from any water source. The last sentence of SDCL 46-5-34.1 would prohibit granting any new water permit applications for irrigation of the lands involved in these transfers if those applications are filed after this transfer is approved.

The accepted methodology from the past water right transfers and utilized for this transfer is the Modified Blaney-Criddle method which calculated the potential consumptive use of water by crops planted on the acreages. Modified Blaney-Criddle is a widely accepted technique and has been used extensively throughout the United States, including South Dakota and the Rapid Creek area. This method utilizes historic climatic data, crop type and elevation to calculate the volume of water consumed by the crop on a monthly basis. This data is then compared to the amount of water that was available for the consumption by the crop based on historical ditch diversion records, transportation loss, irrigation efficiency

and the total acreage irrigated annually from the ditch. Analysis also relied upon data on streamflow, climate conditions (temperature and precipitation) and soils information that were compiled from the U.S. Geological Survey, the National Climatic Data Center and the Natural Resources Conservation Service respectively.

Historical diversions through the Murphy Ditch over the period 1946 through 1980 were estimated to average 2,951 ac-ft per year. The Olson acreage (9 acres) constituted 0.8% of the original Murphy Ditch irrigated acreage and subtracting 11% carriage loss, the historical water delivery to the Olson property was estimated to average 21 ac-ft per year. The same 9 acres irrigated on the property required a total of 36.7 ac-ft per year of delivery to fully meet the crop irrigation requirements. By comparing the historical deliveries to the required deliveries, the total amount available for transfer was estimated to be 19 ac-ft per year. Therefore, the portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.12 cfs with an annual volume limitation of 19 ac-ft of water.

The Gravatt acreage (45.6 acres) constituted 4.0% of the original Murphy Ditch irrigated acreage and subtracting 11% carriage loss, the historical water delivery to the Gravatt property was estimated to average 105 ac-ft per year. The same 45.6 acres irrigated on the property required a total of 170.3 ac-ft per year of delivery to fully meet the crop irrigation requirements. By comparing the historical deliveries to the required deliveries, the total amount available for transfer was estimated to be 98.5 ac-ft per year. Therefore, the portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.60 cfs with an annual volume limitation of 98.5 ac-ft of water.

The Rypkema acreage (36 acres) constituted 3.1% of the original Murphy Ditch irrigated acreage and subtracting 11% carriage loss, the historical water delivery to the Rypkema property was estimated to average 81.4 ac-ft per year. The same 36 acres irrigated on the property required a total of 146.8 ac-ft per year of delivery to fully meet the crop irrigation requirements. By comparing the historical deliveries to the required deliveries, the total amount available for transfer was estimated to be 76.4 ac-ft per year. Therefore, the portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.47 cfs with an annual volume limitation of 76.4 ac-ft of water.

Therefore, the total monthly diversion of all three applications combined shall not exceed the amount listed in the following table:

Month	Monthly Volume Limitation (ac-ft)			Total
	2670-2 Olson	2671-2 Gravatt	2672-2 Rypkema	
April	0.5	3.8	2.1	6.4
May	2.4	12.3	9.7	24.4
June	2.8	14.2	11.2	28.2
July	3.7	18.8	14.9	37.4
Aug	4.8	24.4	19.3	48.5
Sept	3.5	17.9	14.1	35.5
Oct	1.3	7.1	5.1	13.5
Total	19.0	98.5	76.4	193.9

Rapid Valley Sanitary District contracts with the City of Rapid City to treat the Sanitary District's effluent at the City's sewage treatment facility. This allows existing downstream water rights to divert this water based upon priority availability. If in the future the Rapid Valley Sanitary District, through the City of Rapid City, stops returning effluent to Rapid Creek, then the diversion proposed by this water permit will need to be recalculated to reflect that condition.

If all of these applications are approved, the authorized diversion rate and acres under Vested Water Right No. 1727-2 should decrease by 1.19 cfs and 90.6 acres respectively. Also the Water Management Board should monitor the operation and management of the proposed transfers to ensure protection of existing water rights.

An issue that has come up involving a few of the previous water right transfers is the unauthorized irrigation of the land involved in the transfer after the transfer was approved. Water Rights staff and the Rapid Valley Water Master have received complaints concerning this issue. These permits, if approved, should contain the following qualification in order to help rectify future problems:

The permit holder, Rapid Valley Sanitary District, shall permanently render inoperable the structural means of diverting water to the land which is no longer subject to Vested Water Right No. 1727-2 pursuant to South Dakota Codified Law 46-5-34.1. This work shall be completed prior to the permit holder's diversion of the transferred water to beneficial use on the parcel of land approved under the transfer. The permit holder must notify the Chief Engineer to schedule an inspection. This transfer is subject to the Chief Engineer's approval that the works are rendered inoperable. This qualification does not grant access to property owned by third parties for making structural changes. The permit holder is responsible for ensuring that access is obtained from such third parties and that such third parties are also notified that inspections will occur.

CONCLUSIONS

1. The water for Application Nos. 2670-2, 2671-2 and 2672-2 has been historically used to irrigate a total of 90.6 acres (9 acres, 45.6 acres and 36 acres).
2. The diversion rate for Application Nos. 2670-2, 2671-2 and 2672-2 to be transferred is 1.19 cfs (0.12 cfs, 0.60 cfs and 0.47 cfs) which is based on the pro-rated share of the total ditch diversion rate minus the 11% carriage loss.
3. The amount of water requested to be transferred for Application Nos. 2670-2, 2671-2 and 2672-2 has an annual volume limitation of 194 ac-ft (19.0 ac-ft, 98.5 ac-ft and 76.4 ac-ft).
4. The total monthly diversion shall not exceed the amount listed in the following table.

Month	Monthly Volume Limitation (ac-ft)			Total
	2670-2 Olson	2671-2 Gravatt	2672-2 Rypkema	
April	0.5	3.8	2.1	6.4
May	2.4	12.3	9.7	24.4
June	2.8	14.2	11.2	28.2
July	3.7	18.8	14.9	37.4
Aug	4.8	24.4	19.3	48.5
Sept	3.5	17.9	14.1	35.5
Oct	1.3	7.1	5.1	13.5
Total	19.0	98.5	76.4	193.9

5. If Application Nos. 2670-2, 2671-2 and 2672-2 are approved, the authorized diversion rate and acreage of Vested Water Right No. 1727-2 should be decreased by 1.19 cfs and 90.6 acres.
6. The Water Management Board should retain jurisdiction in order to monitor the management and operation of the proposed transfers.
7. If approved, the water permits should contain the following qualification:

The permit holder shall permanently render inoperable the structural means of diverting water to the land which is no longer subject to Vested Water Right No. 1727-2 pursuant to South Dakota Codified Law 46-5-34.1. This work shall be completed prior to the permit holder's diversion of the transferred water to beneficial use on the parcel of land approved under the transfer. The permit holder must notify the Chief Engineer to schedule an inspection. This transfer is subject to the Chief Engineer's approval that the works are rendered inoperable. This qualification does not grant access to property owned by third parties for making structural changes. The permit holder is responsible for ensuring that access is obtained from such third parties and that such third parties are also notified that inspections will occur.

8. These transfers only involve the transfer of natural flow water and do not include any rights to stored water available under contract with the Bureau of Reclamation from Pactola and/or Deerfield Reservoirs.
9. During certain dry periods in the past, natural flow water has not been available for Vested Water Right No. 1727-2, so approval of these applications does not guarantee that natural flow water will be available every year.

Aaron R. Tieman

Aaron R. Tieman
Natural Resources Engineer II

Approved by

Mark D. Rath

Mark D. Rath
Natural Resources Engineer III

BIBLIOGRAPHY

Leonard Rice Engineers, Inc., 2011. Engineering Report – Transfer of Water Rights – 1878
Murphy Ditch Vested Water Right.

Water Rights, 2011, Unpublished Water Rights Data, SD DENR, DES, Water Rights
Program, Pierre, SD, 57501.

NOTICE OF HEARING
on Water Permit Application
Nos. 2670-2, 2671-2 & 2672-2

Notice is given that the Rapid Valley Sanitary District, 4611 Teak Dr, Rapid City SD 57703 has filed the following applications for a water permit.

Application No. 2670-2 transfers a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch. The transfer is for Rapid Creek water historically used to irrigate 9 acres of Olson property. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.12 cubic feet of water per second (cfs) with an annual volume limitation of 19 acre feet of water.

Historically, the 0.12 cfs has been used to irrigate 9 acres located in portions of the N 1/2 NE 1/4 and SE 1/4 NE 1/4 Section 15-T1N-R8E. The existing diversion point on Rapid Creek for Murphy Ditch is located in the NE 1/4 SW 1/4 Section 8-T1N-R8E. This permit changes the diversion point for 0.12 cfs to a permanent diversion point for use by the Sanitary District to be located in the NE 1/4 NW 1/4 Section 15-T1N-R8E. This application does not authorize any new water appropriation from Rapid Creek. This application, if approved, will retain the April 6, 1878, priority date established by the Murphy Ditch vested water right for natural flow.

Application No. 2671-2 transfers a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch. The transfer is for Rapid Creek water historically used to irrigate 45.6 acres of Gravatt property. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.60 cubic feet of water per second (cfs) with an annual volume limitation of 98.5 acre feet of water.

Historically, the 0.60 cfs has been used to irrigate 45.6 acres located in portions of the E 1/2 SW 1/4 and Section 19 and NE 1/4 NW 1/4 Section 30; all in T1N-R9E. The existing diversion point on Rapid Creek for Murphy Ditch is located in the NE 1/4 SW 1/4 Section 8-T1N-R8E. This permit changes the diversion point for 0.60 cfs to a permanent diversion point for use by the Sanitary District to be located in the NE 1/4 NW 1/4 Section 15-T1N-R8E. This application does not authorize any new water appropriation from Rapid Creek. This application, if approved, will retain the April 6, 1878, priority date established by the Murphy Ditch vested water right for natural flow.

Application No. 2672-2 transfers a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch. The transfer is for Rapid Creek water historically used to irrigate 36 acres of Rykema property. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.47 cubic feet of water per second (cfs) with an annual volume limitation of 76.4 acre feet of water.

RECEIVED

NOV 18 2011

WATER RIGHTS PROGRAM

Affidavit of Publication

STATE OF SOUTH DAKOTA

County of Pennington

SS:

Carina Tyler being first duly sworn, upon his/her oath says: That he/she is now and was at all time hereinafter mentioned, an employee of the RAPID CITY JOURNAL, a corporation of Rapid City, South Dakota, the owner and publisher of the RAPID CITY JOURNAL, a legal and daily newspaper printed and published in Rapid City, in said County of Pennington, and has full and personal knowledge of all the facts herein stated as follows: that said newspaper is and at all of the times herein mentioned has been a legal and daily newspaper with a bonafide paid circulation of at least Two Hundred copies daily, and has been printed and published in the English language, at and within an office maintained by the owner and publisher thereof, at Rapid City, in said Pennington County, and has been admitted to the United States mail under the second class mailing privilege for at least one year prior to the publication herein mentioned; that the advertisement, a printed copy of which, taken from said Rapid City Journal, the paper in which the same was published, is attached to this sheet and made a part of this affidavit, was published in said paper once each week for two successive weeks, the first publication there of being on the Second day of Nov. 2011 that the fees charged for the publication there of are Two hundred nine, eight dollars and twelve cents.

Carina Tyler

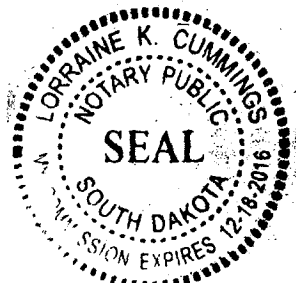
Subscribed and sworn to before me this 17th day of November, 2011.

Lorraine K. Cummings

Notary public

Dec. 18, 2016

My commission expires



Historically, the 0.47 cfs has been used to irrigate 36 acres located in portions of the SE 1/4 SW 1/4 Section 10 & NE 1/4 NW 1/4 and NW 1/4 NE 1/4 Section 15, all in T1N-R8E. The existing diversion point on Rapid Creek for Murphy Ditch is located in the NE 1/4 SW 1/4 Section 8-T1N-R8E. This permit changes the diversion point for 0.47 cfs to a permanent diversion point for use by the Sanitary District to be located in the NE 1/4 NW 1/4 Section 15-T1N-R8E. This application does not authorize any new water appropriation from Rapid Creek. This application, if approved, will retain the April 6, 1878, priority date established by the Murphy Ditch vested water right for natural flow.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application Nos. 2670-2, 2671-2 & 2672-2 because 1) existing rights will not be unlawfully impaired, 2) it is a beneficial use of water, and 3) it is in the public interest.

Any person interested in opposing or supporting these applications must file a written petition with BOTH the applicant and Chief Engineer. The applicant must also file a petition if opposed to the Chief Engineer's recommendations. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by November 21, 2011. The petition may be informal, but must include a statement describing the petitioner's interest in the applications, the petitioner's reasons for opposing or supporting the applications, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

The Water Management Board will consider these applications at 1:00 p.m. CST on November 30, 2011 at the Pierre Chamber of Commerce building located at 800 West Dakota Ave., Pierre SD. The Chief Engineer's recommendations are not final or binding upon the Board. The Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny these applications based on the facts presented at the public hearing. The November 30, 2011 hearing date will be automatically delayed for at least 20 days upon written request to the Chief Engineer from the applicant or any interested person opposing the applications. The request for an automatic delay must be filed by November 21, 2011.

Any hearing will be an adversary proceeding. Any person filing a petition and/or the applicant have the right to be represented by a lawyer and may present evidence or cross-examine witnesses according to SDCL 1-26. These and other due process rights will be forfeited if not exercised. Decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law. Contact Eric Grontund by November 21, 2011, at the above Water Rights Program address to request copies of information pertaining to these applications. Notice is given to individuals with disabilities that this hearing is being held in a physically accessible place. Please notify the Department of Environment and Natural Resources at least 48 hours before the hearing if you have a disability for which special arrangements must be made at the hearing. The telephone number for making arrangements is (605) 773-3352.

Since these applications do not involve a monetary controversy in excess of \$2,500.00 or termination of a property right in accordance with SDCL 1-26-18.3, the Chief Engineer has determined this contested case may not be referred to the Office of Hearing Examiners. If any party disagrees with this determination, the Chief Engineer shall be notified by November 21, 2011.

These applications are made pursuant to SDCL 46-1-1 thru 46-1-9, 46-1-12 thru 46-1-16; 46-2-3.1, 46-2-9, 46-2-11, 46-2-13, 46-2-17; 46-2A-1 thru 46-2A-10, 46-2A-12, 46-2A-14, 46-2A-15, 46-2A-20, 46-2A-21; 46-5-1 thru 46-5-11, 46-5-13 thru 46-5-15, 46-5-24, 46-5-25, 46-5-30.2, 46-5-30.4, 46-5-31; and Board Rules ARSD 74:02:01:01 thru 74:02:01:15.

Steven M. Pirner, Secretary, Department of Environment and Natural Resources.

(Published twice at the total approximate cost of \$298.12.)





DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

October 27, 2011

Rapid City Journal
PO Box 450
Rapid City SD 57701

ATTENTION: Legal Public Notice

Enclosed is a Notice on Application Nos. 2670-2, 2671-2 & 2672-2 to Appropriate Water to be published twice. Please publish the first notice on November 2, 2011 with the second publication 7 days later. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352.

The applicant must verify to you that the notice is to be published, before you make the first publication. **Please BILL the APPLICANT for the cost of publication.** The APPLICANT is Rapid Valley Sanitary District, c/o Jim Jester, 4611 Teak Dr., Rapid City SD 57703. (Ph # 605-393-1050).

Please send the Water Rights Program the first publication immediately. The publication is checked for accuracy so any corrections can be made in the second publication. You may use the form below or fax a copy of the first publication. Any fax should be sent to the attention of Karen Schlaak at (605) 773-4068. Publication errors can invalidate the public notice.

After the second publication, **please send us an affidavit or use the enclosed Proof of Publication form.** The applicant pays the cost of publication, but the Water Rights Program records require an affidavit or Proof of Publication. Delays in receiving the affidavit can be costly to the applicant.

Sincerely,

Eric Gronlund
Natural Resources Engineer
605 773-3352

enclosures

-----CUT HERE-----

Nos. 2670-2, 2671-2 & 2672-2

TO: Eric Gronlund
Water Rights Program
Joe Foss Building
Pierre SD 57501-3181

Date _____

We are in receipt of your letter of October 27, 2011 enclosing Notice to Appropriate Water by Application Nos. 2670-2, 2671-2 & 2672-2 which was first published in our issue of _____. ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.

Name

Newspaper



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.

October 27, 2011

Rapid Valley Sanitary District
Jim Jester
4611 Teak Dr
Rapid City SD 57703

Dear Mr. Jester:

Water Permit Application Nos. 2670-2, 2671-2 & 2672-2 for municipal use have been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Publisher of the Rapid City Journal printed at Rapid City SD (Ph # 605-394-8500). You will need to contact the newspaper and authorize publication of this notice. For your information, a copy of the notice, the recommendations of the Chief Engineer and reports on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice and to arrange for payment. Early contact with the paper can eliminate delays. Upon receiving authorization, the publisher has been instructed to publish your notice once each week for two consecutive weeks. The newspaper has also been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the application.

Sincerely,

Eric Gronlund
Natural Resources Engineer
(605) 773-3352
eric.gronlund@state.sd.us

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendations, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the applications.

Instruction to Newspaper - Publish first Notice on November 2, 2011 with the second publication 7 days later. The applicant is responsible for payment. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352 or email: Karen.schlaak@state.sd.us.

NOTICE OF HEARING on Water Permit Application Nos. 2670-2, 2671-2 & 2672-2

Notice is given that the Rapid Valley Sanitary District, 4611 Teak Dr, Rapid City SD 57703 has filed the following applications for a water permit.

Application No. 2670-2 transfers a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch. The transfer is for Rapid Creek water historically used to irrigate 9 acres of Olson property. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.12 cubic feet of water per second (cfs) with an annual volume limitation of 19 acre feet of water.

Historically, the 0.12 cfs has been used to irrigate 9 acres located in portions of the N 1/2 NE 1/4 and SE 1/4 NE 1/4 Section 15-T1N-R8E. The existing diversion point on Rapid Creek for Murphy Ditch is located in the NE 1/4 SW 1/4 Section 8-T1N-R8E. This permit changes the diversion point for 0.12 cfs to a permanent diversion point for use by the Sanitary District to be located in the NE 1/4 NW 1/4 Section 15-T1N-R8E. This application does not authorize any new water appropriation from Rapid Creek. This application, if approved, will retain the April 6, 1878, priority date established by the Murphy Ditch vested water right for natural flow.

Application No. 2671-2 transfers a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch. The transfer is for Rapid Creek water historically used to irrigate 45.6 acres of Gravatt property. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.60 cubic feet of water per second (cfs) with an annual volume limitation of 98.5 acre feet of water.

Historically, the 0.60 cfs has been used to irrigate 45.6 acres located in portions of the E 1/2 SW 1/4 and Section 19 and NE 1/4 NW 1/4 Section 30; all in T1N-R9E. The existing diversion point on Rapid Creek for Murphy Ditch is located in the NE 1/4 SW 1/4 Section 8-T1N-R8E. This permit changes the diversion point for 0.60 cfs to a permanent diversion point for use by the Sanitary District to be located in the NE 1/4 NW 1/4 Section 15-T1N-R8E. This application does not authorize any new water appropriation from Rapid Creek. This application, if approved, will retain the April 6, 1878, priority date established by the Murphy Ditch vested water right for natural flow.

Application No. 2672-2 transfers a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch. The transfer is for Rapid Creek water historically used to irrigate 36 acres of Rypkema property. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 0.47 cubic feet of water per second (cfs) with an annual volume limitation of 76.4 acre feet of water.

Historically, the 0.47 cfs has been used to irrigate 36 acres located in portions of the SE 1/4 SW 1/4 Section 10 & NE 1/4 NW 1/4 and NW 1/4 NE 1/4 Section 15, all in T1N-R8E. The existing diversion point on Rapid Creek for Murphy Ditch is located in the NE 1/4 SW 1/4 Section 8-T1N-R8E. This permit changes the diversion point for 0.47 cfs to a permanent diversion point for use by the Sanitary District to be located in the NE 1/4 NW 1/4 Section 15-T1N-R8E. This application does not authorize any new water appropriation from Rapid Creek. This application, if approved, will retain the April 6, 1878, priority date established by the Murphy Ditch vested water right for natural flow.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application Nos. 2670-2, 2671-2, & 2672-2 because 1) existing rights will not be unlawfully impaired, 2) it is a beneficial use of water, and 3) it is in the public interest.

Any person interested in opposing or supporting these applications must file a written petition with BOTH the applicant and Chief Engineer. The applicant must also file a petition if opposed to the Chief Engineer's recommendations. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by November 21, 2011. The petition may be informal, but must include a statement describing the petitioner's interest in the applications, the petitioner's reasons for opposing or supporting the applications, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

The Water Management Board will consider these applications at 1:00 p.m. CST on November 30, 2011 at the Pierre Chamber of Commerce building located at 800 West Dakota Ave., Pierre SD. The Chief Engineer's recommendations are not final or binding upon the Board. The Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny these applications based on the facts presented at the public hearing. The November 30, 2011 hearing date will be automatically delayed for at least 20 days upon written request to the Chief Engineer from the applicant or any interested person opposing the applications. The request for an automatic delay must be filed by November 21, 2011.

Any hearing will be an adversary proceeding. Any person filing a petition and/or the applicant have the right to be represented by a lawyer and may present evidence or cross-examine witnesses according to SDCL 1-26. These and other due process rights will be forfeited if not exercised. Decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law. Contact Eric Gronlund by November 21, 2011, at the above Water Rights Program address to request copies of information pertaining to these applications. Notice is given to individuals with disabilities that this hearing is being held in a physically accessible place. Please notify the Department of Environment and Natural Resources at least 48 hours before the hearing if you have a disability for which special arrangements must be made at the hearing. The telephone number for making arrangements is (605) 773-3352.

Since these applications do not involve a monetary controversy in excess of \$2,500.00 or termination of a property right in accordance with SDCL 1-26-18.3, the Chief Engineer has determined this contested case may not be referred to the Office of Hearing Examiners. If any party disagrees with this determination, the Chief Engineer shall be notified by November 21, 2011.

These applications are made pursuant to SDCL 46-1-1 thru 46-1-9, 46-1-12 thru 46-1-16; 46-2-3.1, 46-2-9, 46-2-11, 46-2-13, 46-2-17; 46-2A-1 thru 46-2A-10, 46-2A-12, 46-2A-14, 46-2A-15, 46-2A-20, 46-2A-21; 46-5-1 thru 46-5-11, 46-5-13 thru 46-5-15, 46-5-24, 46-5-25, 46-5-30.2, 46-5-30.4, 46-5-31; and Board Rules ARSD 74:02:01:01 thru 74:02:01:15. Steven M. Pirner, Secretary, Department of Environment and Natural Resources. Published twice at the total approximate cost of _____.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

DEC 16 2011

Rapid Valley Sanitary District – Water Service
Jim Jester
4611 Teak Dr
Rapid City SD 57703

Dear Mr. Jester:

Enclosed are Water Permit Nos. 2670-2, 2671-2 & 2672-2 authorizing construction of your water diversion systems and beneficial use of the water, not exceeding the limits as specified in the Water Permits.

Form 10's, *Notice of Completion of Works and Application of Water to Beneficial Use*, are enclosed. Please return the completed forms after you have finished the systems and have put the water to beneficial use. An investigation can then be scheduled so the water licenses may be issued, thus completing the acquisition of a water right.

An informational sheet ? *Common Water Right Questions?* is also enclosed. This sheet is intended to answer some of the questions associated with obtaining and keeping a water right.

Sincerely,

Garland Erbele, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures

Permit No. 2671-2
Upper Cheyenne River - Water District

Report of Examination of Works and/or Application of Water to Beneficial Use

TO: Chief Engineer, Water Rights Program, DENR, Foss Bldg., Pierre, SD 57501

I have on this day, 6/6/2012, conducted a thorough examination of the water use system constructed by **Rapid Valley Sanitary District, 4611 Teak Drive, Rapid City, SD 57703**, holder of Permit No. **2671-2**, bearing the priority date of **April 6, 1878**. Permit No. **2671-2** is authorized to appropriate a total of **0.60 cfs** with an annual volume limitation of **98.5 acre-feet** of **surface water from Rapid Creek** for **commercial, domestic, industrial, municipal, rural water system and suburban housing development purposes** in **Pennington County**.

Inspection contact and relationship to
permit holder, if applicable:

Rusty Schmidt,
District Manager

A. Works used to divert the water:

Infiltration gallery consisting of 2 intakes and 3 submersible pumps.

B. Works used to transport water to place of use:

Municipal distribution lines.

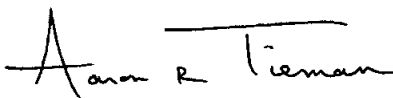
The system is in the following condition **good**. The point of diversion (well) is located specifically at **Lat/Lon – N44.050785/W-103.146189 which is the approximately 735 feet south and 1375 feet east of the NW corner of Section 15, T1N-R8E.** The works are capable of diverting **0.60 cfs** which is to be used for **commercial, domestic, industrial, municipal, rural water system and suburban housing development purposes.**

Water has been put to beneficial use to the maximum extent and the license should be issued for **0.60 cfs** with an annual volume limitation of **98.5 acre-feet**.

All structures, wells and lands on map **Y**

Exceptions to compliance are: **none**.

Comments: **Water Permit No. 2671-2 changes the diversion point location and transfers a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch. The transfer is for Rapid Creek water historically used to irrigate 45.6 acres at the Gravatt property owned by Jerry Gravatt. The portion of Rapid Creek natural flows to be transferred to Rapid Valley Sanitary District is 0.60 cfs with an annual volume limitation of 98.5 acre-feet of water.**



Aaron R. Tieman
Natural Resources Engineer II
DENR, Water Rights Program

Date report completed: **June 29, 2015**

FIELD INVESTIGATION REPORT FOR PERMIT NO. 2671-2

DATE OF INVESTIGATION:	June 6, 2012
NAME & ADDRESS OF PERMIT HOLDER	Rapid Valley Sanitary District 4611 Teak Drive Rapid City, SD 57703
INVESTIGATION CONTACT/ RELATIONSHIP TO PERMIT HOLDER, IF APPLICABLE	Rusty Schmidt (District Manager)
DIVERSION POINT LEGAL LOCATION	NE¼ NW¼ Section 15, T1N-R8E
WATER SUPPLY SOURCE	Surface water, Rapid Creek

Other permit(s) associated with the project: Vested Water Right No. 1727-2 (See comments below).

Water Treatment Plant:

Pump #1:

- 1) Make: Goulds
- 2) Model: VLT-CAFM
- 3) Capacity: 700 GPM

Motor:

- 1) Make: US Motors
- 2) Model: 20069462-100
- 3) Horsepower rating: 25 hp

Pump #2:

- 4) Make: Goulds
- 5) Model: VLT-CAFM
- 6) Capacity: 700 GPM

Motor:

- 4) Make: US Motors
- 5) Model: 20096462-100
- 6) Horsepower rating: 25 hp

Pump #3:

- 7) Make: Goulds
- 8) Model:
- 9) Capacity: 1100 GPM

Motor:

- 7) Make: US Motors
- 8) Model: DT93
- 9) Horsepower rating: 40 hp

DISTRIBUTION LINES OR CANALS:

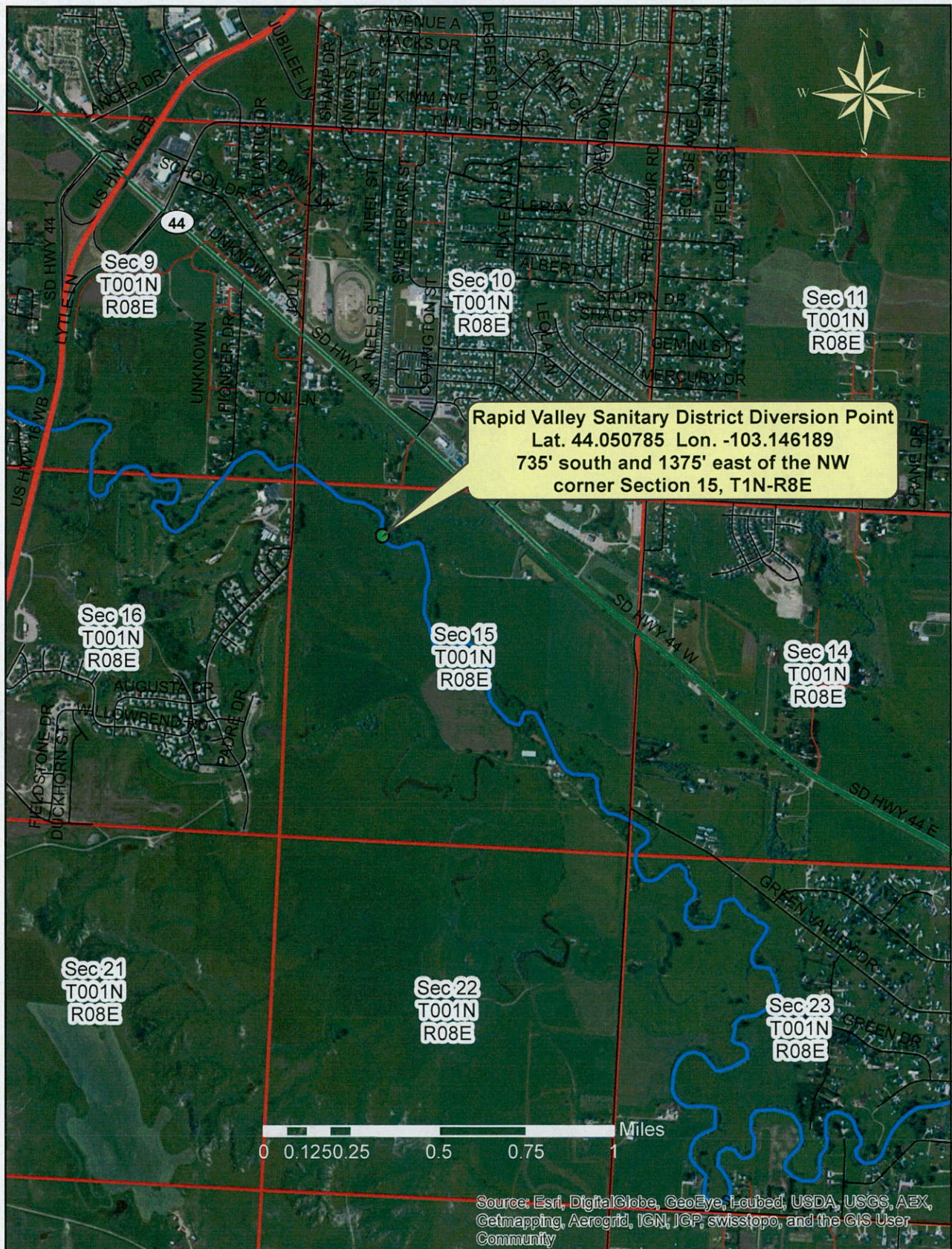
- 1) Type: Municipal distribution lines.

PERMIT QUALIFICATIONS:

- 1) Special qualifications to permit being abided by Yes
- 2) All structures, wells and lands on map Yes

COMMENTS: Water Permit No. 2671-2 changes the diversion point location and transfers a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch.

Water Right 2671-2
Rapid Valley Sanitary District
June 6, 2012



Aaron R. Tieman

Aaron Tieman
 Natural Resources Engineer II
 DENR Water Rights Program



TO: JEANNE GOODMAN, P.E., CHIEF ENGINEER
WATER RIGHTS PROGRAM

FROM: AARON TIEMAN, ENGINEER II
WATER RIGHTS PROGRAM

SUBJECT: INSPECTION OF IRRIGATION DIVERSION POINT ABANDONMENT FOR RAPID VALLEY
SANITARY DISTRICT, PENNINGTON COUNTY, SOUTH DAKOTA.

RAPID VALLEY SANITARY DISTRICT (RVSD) HAS OBTAINED THE FOLLOWING WATER RIGHTS FROM IRRIGATORS SERVED BY RAPID CREEK LOCATED IN THE RAPID VALLEY AREA:

2586-2	2671-2
2641-2	2672-2
2670-2	

A PERMIT CONDITION OF THESE WATER RIGHT TRANSFERS IS THAT THE HOLDER OF THE PERMIT SHALL PERMANENTLY RENDER INOPERABLE THE STRUCTURAL MEANS OF DIVERTING WATER TO LAND THAT IS NO LONGER SUBJECT TO THE WATER PERMIT. THE ABANDONMENT OF THE AFOREMENTIONED DIVERSION STRUCTURES WAS PERFORMED AND COMPLETED BY RVSD. ONCE COMPLETED, RVSD NOTIFIED THE WATER RIGHTS PROGRAM AND EACH SITE WAS INSPECTED AND DOCUMENTED TO VERIFY COMPLIANCE OF THE PERMIT CONDITION.

IT SHOULD BE NOTED THAT THE DIVERSION STRUCTURES ASSOCIATED WITH WATER PERMIT No. 2586-2 (TWO DIVERSION STRUCTURES) AND WATER PERMIT No. 2671-2 (ONE DIVERSION STRUCTURE) WERE LEFT IN PLACE DUE TO EXISTENCE OF DOWNSTREAM IRRIGATORS THAT ARE STILL ABLE TO RECEIVE WATER THAT UTILIZE THESE DIVERSION STRUCTURES.

AARON TIEMAN, ENGINEER WITH THE WATER RIGHTS PROGRAM, CONDUCTED THE SITE INSPECTIONS AND WAS ACCOMPANIED BY RUSTY SCHMIDT, MANAGER OF RVSD.

STATE OF SOUTH DAKOTA
WATER LICENSE NO. 2671-2

(1) The Rapid Valley Sanitary District, 4611 Teak Drive, Rapid City SD 57703 made Application No. 2671-2, August 16, 2011 for a water permit to transfer a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch. The transfer was for Rapid Creek water historically used to irrigate 45.6 acres of the Gravatt property. The portion of Rapid Creek natural flows transferred to the Sanitary District was 0.60 cubic feet of water per second (cfs) with an annual volume limitation of 98.5 acre feet.

Water Permit No. 2671-2, with a priority date of April 6, 1878, (established by the Murphy Ditch vested water right for natural flow) also changed the existing diversion point on Rapid Creek for Murphy ditch to a permanent diversion point for use by the Sanitary District. Permit No. 2671-2 did not authorize a new appropriation from Rapid Creek and is limited to 0.60 cfs for purposes of municipal, industrial, commercial, common distribution system, rural water system, suburban housing and domestic use in Pennington County.

(2) It is certified that the permit holder has complied with the provisions of South Dakota State Law and is entitled to divert 0.60 cubic feet of water per second for beneficial use with an annual volume limitation of 98.5 acre feet. The location of the diversion point is approximately 735 feet south & 1,375 feet east of the NW corner of Section 15, T1N, R8E (NE ¼ NW ¼).

(3) The permit holder has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use.

(4) Pursuant to South Dakota Water Law 46-5-30.1 Rapid Valley Sanitary District, 4611 Teak Drive, Rapid City SD 57703 the holder and/or owner of Water Right No. 2671-2 is issued a license to appropriate water, the right to use 0.60 cubic feet of water per second from Rapid Creek with a priority date of April 6, 1878 from the location specified in (2) of this license for municipal, industrial, commercial, common distribution system, rural water system, suburban housing and domestic use purposes.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Right No. 2671-2 and subject to the following qualifications:

- Permit No. 2671-2 is limited to a diversion rate of 0.60 cfs for a total annual volume of 98.5 acre feet of water. The Rapid Valley Sanitary District shall measure diversions at the District's water treatment plant. The total monthly diversion shall not exceed the amount listed in the following table.

Monthly Volume Limitation

Month	acre feet
April	3.8
May	12.3
June	14.2
July	18.8
August	24.4
September	17.9
October	7.1
TOTAL	98.5

(continued)

Water Permit No. 2671-2

Rapid Valley Sanitary District

- The Rapid Valley Sanitary District shall report to the Chief Engineer annually the amount of water withdrawn each month at the District's water treatment plant.
- Permit No. 2671-2 authorizes diversion of only natural flow water by the Rapid Valley Sanitary District and does not include any right to stored irrigation water available under contract from Pactola Reservoir and Deerfield Reservoir.
- The Water Management Board retains jurisdiction of Permit No. 2671-2 in the event that additional information shows that changes need to be made in the monthly or total annual volumes authorized by Permit No. 2671-2.
- Diversion under Permit No. 2671-2 may not interfere with existing water rights in effect prior to approval of Permit No. 2671-2 or any domestic rights.
- The amount of water with an April 6, 1878 priority date, which may be appropriated under Vested Water Right No. 1727-2, is reduced by 0.60 cfs.
- The approval of Permit No. 2671-2 retires from future irrigation the 45.6 acres known as the Gravatt property located in portions of the E ½ SW ¼ Section 19 and NE ¼ NW ¼ Section 30, T1N, R9E which has been historically irrigated from Murphy Ditch.
- The permit holder, Rapid Valley Sanitary District, shall permanently render inoperable the structural means of diverting water to the land which is no longer subject to Vested Water Right No. 1727-2 pursuant to South Dakota Codified Law 46-5-34.1. This work shall be completed prior to the permit holder's diversion of the transferred water to beneficial use on the parcel of land approved under the transfer. The permit holder must notify the Chief Engineer to schedule an inspection. This transfer is subject to the Chief Engineer's approval that the works are rendered inoperable. This qualification does not grant access to property owned by third parties for making structural changes. The permit is responsible for ensuring that access is obtained from such third parties and that such third parties are also notified that inspections will occur.



Jeanne Goodman, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

JUL 01 2016

date





DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

JUL 01 2016

Rusty Schmidt, District Manager
Rapid Valley Sanitary District
4611 Teak Drive
Rapid City SD 57703

RE: Water License Nos. 2586-2, 2641-2, 2670-2, 2671-2 & 2672-2

Dear Mr. Schmidt:

Enclosed are Water License Nos. 2586-2, 2641-2, 2670-2, 2671-2 & 2672-2. They are the final water right documents completing the process of obtaining Water Rights. Included with each license is a map prepared by the staff engineer who conducted the field investigation.

As long as you use the water beneficially, as stated in the Water Licenses, State Water Laws provide that you have a continuing right to use the water.

Sincerely,

Jeanne Goodman, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures