

WATER PERMIT NO. 2641-2

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

Address: **4611 Teak Drive, Rapid City SD 57703**

Phone: **605 393-1050**

Amount of Water Claimed: **269 AF**

Total Acres: **NA**

Source of Water Supply: **Murphy Ditch**

Water to be used for: **several use**

County: **Pennington**

Type of Waste Disposal System: **NA**

Location:

PRIORITY

Date Received: **8-17-09**

Application/License Fee: **\$300**

Corrected Application Received:

Period of Annual Use: **January 1 – December 31**

Remarks: **transfer Higgins Ranch shares 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, P.E.**

Reviewed and the Number Assigned on: **8-19-09**

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>2641-2</u> (office use only)	Hydrologic Unit <u>10120110</u>
	Basin <u>Upper Cheyenne</u>	
	Newspaper <u>Rapid City Journal PO Box 450</u>	
	<u>605-394-8300</u>	<u>57709</u>

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AUG 17 2009
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 Joan Mumford and Jaynell Higgins - Higgins Ranch 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 1.666 *CFS or 269 **GPM 269 ***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 4, Page 17. 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 August 6, 2009.

STATE OF SOUTH DAKOTA)

SS

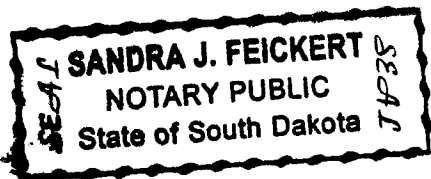
County of Pennington)

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 _____

Subscribed and sworn to before me this 14th day of August, 2009



Notary Public signature _____

My Commission Expires 12-08-2009

SOUTH DAKOTA
WATER PERMIT NO. 2641-2

Date of first receipt of application August 17, 2009.

The Water Management Board approved Water Permit No. 2641-2 on March 10, 2010 for Rapid Valley Sanitary District – Water Service, 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. 2641-2 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 121 acres at the Higgins Ranch owned by Joan Mumford and Jaynell Higgins. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 1.66 cubic feet of water per second (cfs) with an annual volume limitation of 269 acre feet of water.

Historically, the 1.66 cfs has been used to irrigate 121 acres located in portions of the SW 1/4 SW 1/4 Section 13 and the SE 1/4 NE 1/4 and the SE 1/4 Section 14; 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 1.66 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. This application, if approved, will retain the April 6, 1878, priority date established by the Murphy Ditch vested water right for natural flow.

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 qualification No. 1.
4. The date from which applicant may claim right is April 6, 1878 (established by 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. 2641-2 is limited to a diversion rate of 1.66 cfs for a total annual volume of 269 acre feet. The Rapid Valley Sanitary District shall measure diversion at the District's water treatment plant. The total monthly diversion shall not exceed the amount listed in the following table.

Monthly Volume Limitation

<i>Month</i>	<i>(ac-ft)</i>
April	9
May	34
June	39
July	52
August	68
September	49
October	18
TOTAL	269

(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. 2641-2 authorized 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. 2641-2 in the event that additional information shows that changes need to be made in the monthly or total annual volumes authorized by Permit No. 2641-2.
5. Diversion under Permit No. 2641-2 may not interfere with existing water rights in effect prior to approval of Permit No. 2641-2 or any domestic rights.
6. The amount of water with a April 6, 1878 priority date, which may be appropriated under Vested Water Right No. 1727-2 is reduced by 1.66 cfs.
7. The approval of Permit No. 2641-2 retires the 121 acres held by the Higgins Ranch which has been historically irrigated from using Murphy Ditch, located in the SW ¼ SW ¼ Section 13 and SE ¼ NE ¼ and SE ¼ Section 14: all in T1N, R8E from future irrigation.
8. The permit holder shall permanently render inoperable the structural means of diverting water to the land which is no longer subject to Water Permit 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.
9. 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, as determined by the South Dakota Water Management Board.

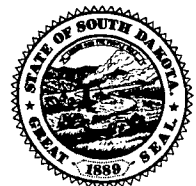
WATER MANAGEMENT BOARD

By: Garland Erbele

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

MAY 10 2010

date



RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date 8/17, 20 09

RECEIVED OF CETEC Engineering 1560 Concourse Dr Rapid City SD 57702

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

Fee for Application for Permit No. <u>2641-2</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>2641-2</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. 04197

By

Michael Erbe
Chief Engineer



Letter of Transmittal

DATE: 08-14-2009	JOB NO: 08118.00
ATTENTION: Mark Rath	
RE: Rapid Valley Sanitary District	
Water Rights.	

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

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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 - Application for Permit to Appropriate Water Within the State of South Dakota.
1	08-14-2009		\$300.00 Permit Fee - Check #2308.
1	08-06-2009		Engineering Report - Transfer of Higgins Property Water Rights.

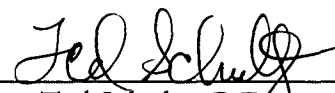
THESE ARE TRANSMITTED as checked below:

☒ 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:

COPY TO: Ed Armbruster, Leonard Rice Engineers, Inc.
Jim Jester, Rapid Valley Sanitary District - Water Service
Aaron Tieman, SDDENR - Rapid City
Brian Hagg, Whiting, Hagg & Hagg, LLP (3 copies)
File

SIGNED:


Ted Schultz, P.E.

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AUG 17 2009

WATER RIGHTS
PROGRAM

ENGINEERING REPORT

**TRANSFER OF HIGGINS PROPERTY WATER
RIGHTS**

1878 MURPHY DITCH PRIORITY

PREPARED FOR
RAPID VALLEY SANITARY DISTRICT

AUGUST 6, 2009

PREPARED BY:
LEONARD RICE ENGINEERS, INC.

IN ASSOCIATION WITH
CETEC ENGINEERING, INC.

PROJECT NO.: 1161RVS03



LEONARD RICE ENGINEERS, INC.

2009 AUG 17 10:00 AM FAX 408 455 4554
1161 RVS03 - 1878 MURPHY DITCH PRIORITY



LEONARD RICE ENGINEERS, INC. PROVIDES CONSULTING SERVICES RELATED TO PLANNING, PERMITTING, 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.

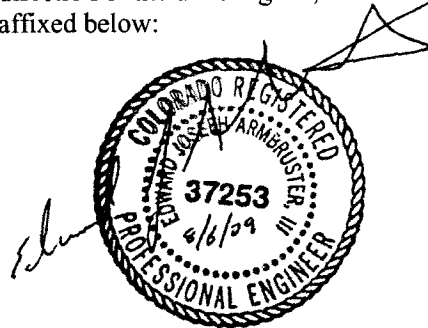
ENGINEERING REPORT TRANSFER OF HIGGINS PROPERTY WATER RIGHTS 1878 MURPHY DITCH PRIORITY

PREPARED FOR
RAPID VALLEY SANITARY DISTRICT

AUGUST 6, 2009

PROJECT NO.: 1161RVS03

The technical material in this report was prepared by or under the supervision and direction of the undersigned, whose seal as a Professional Engineer in Colorado is affixed below:



Edward J. Armbruster, P.E.
Principal



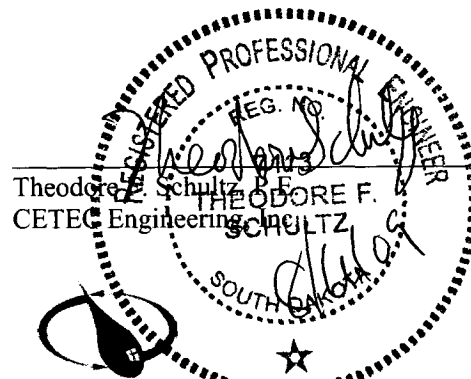
Miranda Larsen-Funk, P.E.
Project Engineer

The following members of the Leonard Rice Engineers, Inc. staff contributed to the preparation of this report:

Principal in Charge
Project Engineer

Edward J. Armbruster, P.E.
Miranda C. Larsen-Funk, P.E.

The technical material in this report was reviewed and approved by the undersigned, whose seal as a Professional Engineer in South Dakota is affixed below:



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

LEONARD RICE ENGINEERS, INC.

2000 CLAY STREET, SUITE 300 DENVER, COLORADO 80211-5119
(303) 455-9589 FAX (303) 455-0115

ENGINEERING REPORT
TRANSFER OF HIGGINS PROPERTY WATER RIGHTS
1878 MURPHY DITCH PRIORITY

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ENGINEERING REPORT

TRANSFER OF HIGGINS PROPERTY WATER RIGHTS

1878 MURPHY DITCH PRIORITY

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EXECUTIVE SUMMARY

This Engineering Report summarizes an evaluation of the historical use of water diverted from Rapid Creek under the 1878 Murphy Ditch agricultural water right on the Higgins Ranch. Approximately 11 percent of the water right was historically used on the Ranch to irrigate 121 acres of alfalfa and pasture lands. A detailed analysis was conducted to quantify historical water consumption, return flows, and depletions to Rapid Creek resulting from agricultural uses of the water right.

The Rapid Valley Sanitary District provides drinking water to residents and businesses in rural portions of Pennington County east of Rapid City, South Dakota. The District is contemplating purchasing the Higgins Ranch portion of the Murphy Ditch water right. Following a transfer proceeding with the South Dakota Department of Environment and Natural Resources, future diversions would occur at a District water treatment facility and supply a portion of RVSD's existing and future demand for potable water.

Historical diversions through the Murphy Ditch over the period 1950 through 1980 were estimated to average 2,951 ac-ft per year. Historical water deliveries from the Murphy Ditch to the Higgins Ranch were estimated to average 288 ac-ft per year (2.4 ac-ft per acre). The 121 acres irrigated on the ranch required a total of 473 ac-ft per year (3.9 ac-ft per acre) of delivery to fully meet the crop irrigation requirements. By comparing the historical deliveries to the required deliveries, the total transferable amount was estimated to be 269 ac-ft per year (2.2 ac-ft per year).

If irrigation on Ranch lands under the Murphy Ditch is discontinued, an average of 269 ac-ft per year could be diverted at an alternate point of diversion located at the District water treatment plant. This Report contains several terms and conditions on the future use of the Murphy Ditch water right by the District to protect other water rights owners on Rapid Creek.

I. INTRODUCTION

This Engineering Report summarizes an evaluation of the historical use of water diverted from Rapid Creek under the April 6, 1878 Murphy Ditch water right for irrigation purposes on the Higgins Ranch (the Ranch). The Report documents the historical operation of the Murphy Ditch as it relates to delivery of irrigation water to the Ranch and quantifies the historical agricultural consumptive use and depletions to Rapid Creek resulting from irrigation on the Ranch.

Rapid Valley Sanitary District (the District or RVSD) is currently negotiating with Higgins Ranch to acquire the Ranch's ownership interest in the 1878 Murphy Ditch water right. If acquired, the District would use the water right, 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 1878 water right at a treatment facility located approximately 3.5 river miles below the Ditch headgate on Rapid Creek. This Report also describes the amount of the 1878 Murphy Ditch water right that may be transferred for diversion at the District's water treatment facilities such that other water right owners in the Murphy Ditch and along Rapid Creek are not adversely affected.

II. BACKGROUND

II.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 1960's 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 1990's 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 than development from the 1960's to the 1980's. The continued growth has caused growing pains 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 and drought conditions will further strain the water system and potentially cause water shortages.

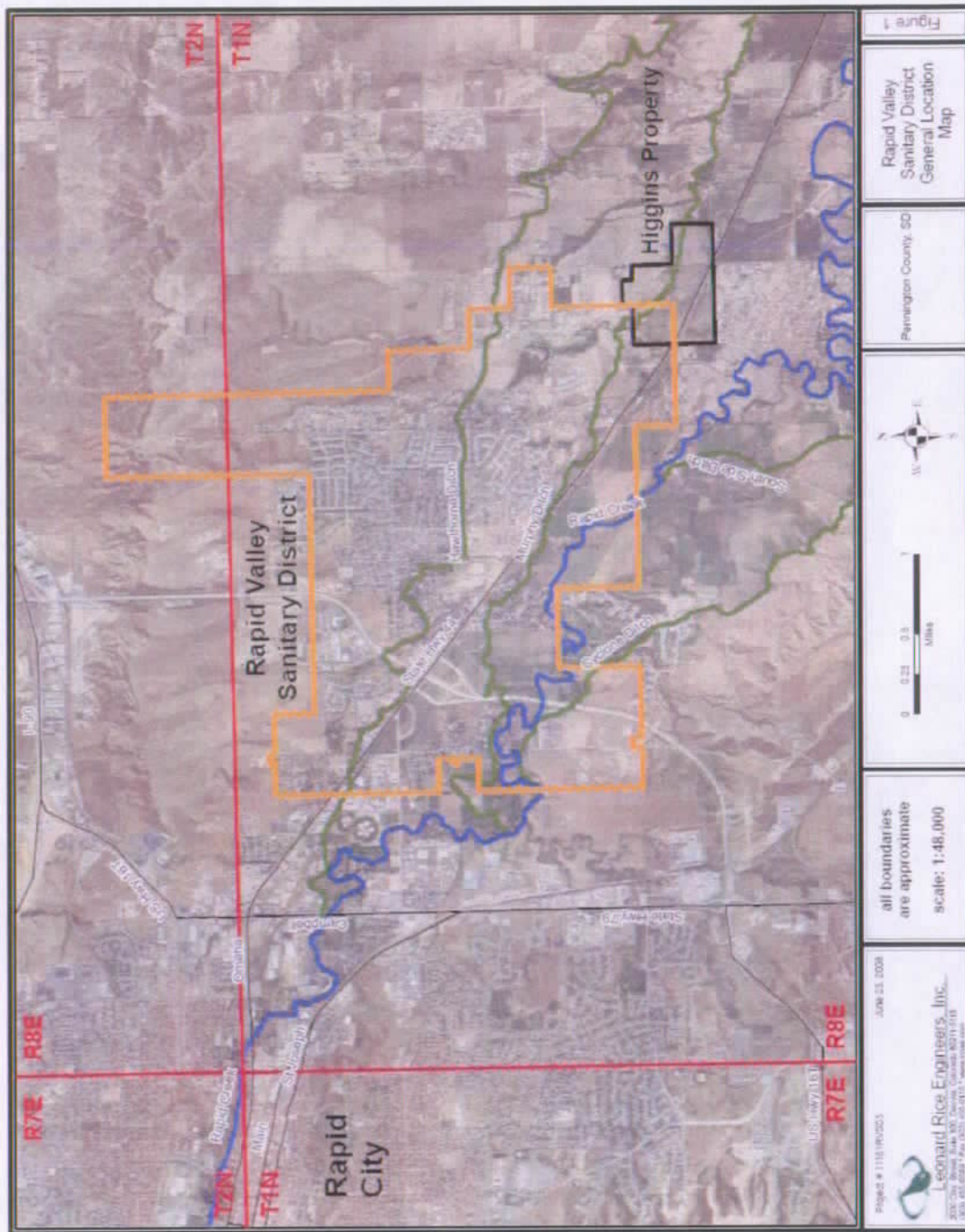


Figure 1. Rapid Valley Sanitary District General Location Map

II.2. HARNEY PEAK RANCH TRANSFER

In 2006, RVSD's transfer permit for 5.05 c.f.s of the Murphy Ditch historically used on the Harney Peak Ranch was approved. The Harney Peak Ranch was a 2,500 acre parcel of land located southeast of Rapid City on which 368 acres of alfalfa and pasture grass were irrigated using the senior Murphy Ditch water right.

Leonard Rice Engineers, Inc. in association with CETEC Engineering, Inc. completed a report September 21, 2005 entitled "Transfer of Lamb Property Water Rights, 1878 Murphy Ditch Priority" to support the transfer permit for the Harney Peak Ranch. A secondary letter report was completed May 4, 2006, entitled "Proposed Transfer of Murphy Ditch Water Rights." As part of these reports, methodologies for determination of crop consumptive use demands for the area and estimation of historical diversion records for Murphy Ditch were established. The reports ultimately found 5.05 c.f.s. or 867 ac-ft (2.36 ac-ft per acre) of transferable historic use. The following analysis of the Higgins Ranch relies on crop consumptive use demand methodologies and estimation of historical diversion records for the Murphy Ditch included in the September 21, 2005 and May 4, 2006 reports.

II.3. HIGGINS RANCH

II.3.1. General Description

Higgins Ranch is an approximately 200-acre parcel of land located southeast of Rapid City in the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 13 and the S $\frac{1}{2}$ of the S $\frac{1}{2}$ of the SE $\frac{1}{4}$ of the NE $\frac{1}{4}$ and the SE $\frac{1}{4}$ of Section 14, Township 1 North, Range 8 East of the Black Hills P.M., in Pennington County (**Figure 1**). The Murphy Ditch traverses the Ranch and supplies all of the water for irrigation of pasture and alfalfa below the ditch. The Ranch is currently owned by Ms. Jaynell Higgins and Ms. Joan Mumford and has been under ownership of the Higgins family for approximately 100 years.

II.3.2. Irrigation Water Supplies

Irrigation water has historically been supplied to the Ranch via the Murphy Ditch from Rapid Creek. No additional water supplies have been used for irrigation. Based on information obtained through research associated with the Harney Peak Ranch report, the water users on Rapid Creek have historically had good communication between farmers within ditches and with interests in other ditches. Also, there has been considerable flexibility by the water users on Rapid Creek and the State of South Dakota with respect to water right administration as opposed to operation under a strict priority system. The intercommunication and flexibility has allowed neighboring farmers and irrigation systems to work together to increase overall efficiencies of water use and maximize irrigation coverage with limited water supplies.

II.3.2.1. *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 Murphy 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 6th, 1878 priority date, the Murphy 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 Leedy Ditch right has been split into three components since its original permit was issued. The Murphy Ditch's junior priority, under Permit No., 1727-2, April 26th, 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.

There have been several transfers involving the 1878 Murphy Ditch water right since the early 1990's. Between 1991 and 2003, Rapid City transferred a total of 4.14 c.f.s for use in the City's municipal system. As previously mentioned, in 2006 RVSD transferred 5.05 c.f.s for use in their municipal system. We are not aware of any additional transfers to date. Therefore, of the original 17.0 c.f.s permitted for the 1878 priority, it is our understanding that approximately 7.8 c.f.s remain and continue to be diverted through the Murphy Ditch.

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.

The permit issued for the senior water right under the Murphy Ditch (17.0 c.f.s) identifies 1,103 irrigated acres. Of this total, 121 acres are irrigated within the boundary of Higgins Ranch. The pro-rata interest of this right by the Ranch is, therefore, approximately 11 percent (**Table 1**). The permit issued for the junior water right under the Murphy Ditch (3.0 c.f.s) identifies 189 irrigated acres. The Ranch has no ownership interest in the Murphy Ditch junior water right priority.

Table 1
Murphy Ditch and Higgins Ranch Ownership Interest

	Permit No. / Amount	Permit Acreage	Percent Ownership
Murphy Ditch	1727-2 / 17.0 c.f.s	1,103	
Higgins Ranch		121	11.0
Murphy Ditch	1727-2 / 3.0 c.f.s	189	
Higgins Ranch		0	0.0

11.3.2.2. Rapid Valley Water Conservancy District

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.

III. HISTORICAL USE OF WATER AT THE HIGGINS RANCH

III.1. STUDY PERIOD

Historical use of the Murphy Ditch for irrigation on the Ranch was evaluated over the period January 1950 through December 2004. This study period 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 2**.

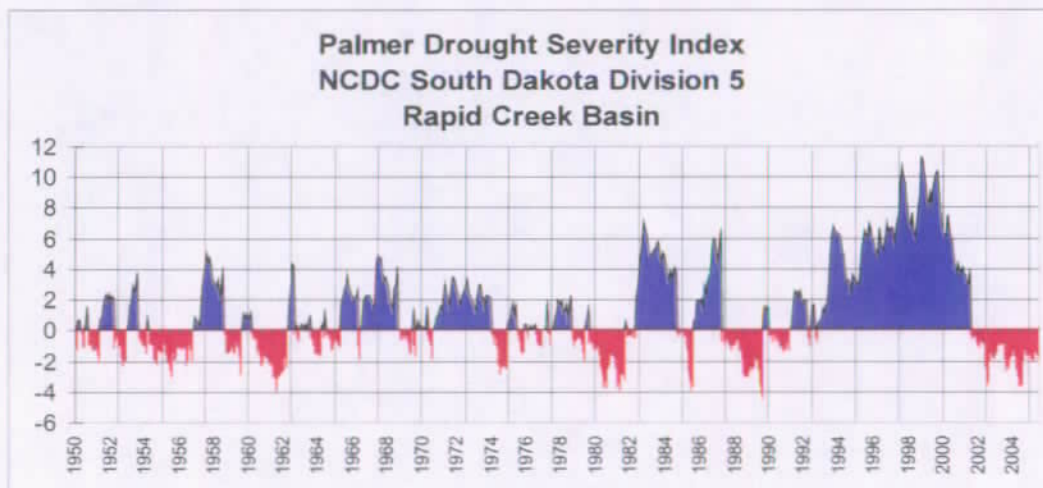


Figure 2. Monthly PDSI Values for the Rapid Creek basin in South Dakota.

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.

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.

III.2. OVERVIEW OF METHODOLOGY

An analysis was performed to determine historical consumptive use and depletions to Rapid Creek resulting from irrigation under the Murphy Ditch on the Ranch. 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. Geologic and ground water aquifer characteristics were also required to describe characteristics of subsurface return flows to Rapid Creek from irrigation on the Ranch. The analysis was conducted for the specific irrigated parcels within the Ranch that are served by the Murphy Ditch.

The Modified Blaney-Criddle method was used to calculate the potential consumptive use of water by crops irrigated by the Murphy Ditch (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. Climate data from the Rapid City, South Dakota weather station were used for the Modified Blaney-Criddle computations. Crop irrigation water requirements were defined for the purposes of this Engineering Report as the net potential consumptive use of the crops after considering effective precipitation. Computing tools and spreadsheets were used to manage the data involved in the depletion analysis, to perform the mathematical computations, and to present results.

Additional details concerning information sources, input data for the analysis, and engineering estimates and assumptions are discussed below.

III.3. INFORMATION SOURCES, DATA, ENGINEERING ASSUMPTIONS AND RESULTS

III.3.1. Discussions with Water Managers and Review of Previous Engineering Reports

Our investigations of historical use of irrigation water at the Higgins Ranch relied on discussions with several people familiar with local water management and administration, specifics of water rights and ditch operations, on-farm irrigation water management, and other relevant matters conducted as part of our Harney Peak Analysis. In addition, several reports were reviewed as part of our Harney Peak Analysis that had been prepared to support transfers of other water rights along Rapid Creek. The individuals and reports that have been relied upon for information include:

- Mr. Mark Rath, South Dakota Department of Environment and Natural Resources.
- Mr. Steve Murphy, Murphy Ditch Superintendent (Ditch Rider).
- Mr. Duane Scott, Rapid Creek Water Conservancy District, Rapid Creek Water Master.
- Mr. Kevin Hamm, Rapid Creek Water Conservancy District, Rapid Creek Water Master.
- Mr. Curt Anderson, U.S. Bureau of Reclamation, Pactola Reservoir.

- Previous engineering reports that address irrigation ditches serving the Ranch, including:
 - Engineering Report for Transfer of Tyler Property Share of Validated 1878 Murphy Ditch Company, Wright Water Engineers, Inc. October, 1990.
 - Engineering Report for Transfer of Strommer Property Portion of Southside Ditch Water Rights, Wright Water Engineers, Inc. March, 1992.
 - Rapid Valley Water Management Study, U.S. Bureau of Reclamation, Great Plains Region, Belle Fourche Projects Office. July, 1990.
 - Technical Report for M.P. Carley Property Water Rights (Murphy Ditch) Transfer, Brown and Caldwell, May, 2003.

Our analysis also relied upon data on streamflows, climate conditions (temperature and precipitation), and soils, that were compiled from the U.S. Geological Survey, the National Climatic Data Center, and the Natural Resources Conservation Service.

III.3.2. Ranch Owner Interviews

Ms. Mumford and Ms. Higgins, current owners of the Ranch, were interviewed to obtain information concerning historical water use and farming operations on the Ranch. The interviews of Ms. Mumford and Ms. Higgins consisted of numerous questions aimed at developing an understanding of historical farming practices, cropping patterns, water use and management. **Appendix B** contains an affidavit signed by Ms. Mumford and Ms. Higgins describing historical water use, irrigation practices, and crop yields on the Higgins Ranch.

III.3.3. Crop Consumptive Demands

This Section summarizes analyses that have been performed to determine historical cropping patterns and irrigated acreage on the Ranch, and to calculate potential consumptive use of irrigation water delivered under the Murphy Ditch senior water right.

III.3.3.1. Irrigated Acreage

Historically irrigated areas on the Higgins Ranch were identified and delineated through an interview with the Ranch owners as well as review of aerial photographs from 1998. Irrigated areas were digitized using ArcView GIS, and hardcopy maps were produced that showed irrigated fields overlying aerial photographs (**Figure 3**). Irrigated lands that were identified on the maps were then verified by comparing to locations noted within water right permits. We note that an additional 2008 aerial photograph was reviewed. While the irrigated acreage appeared to be the same as the 1998 aerial photography, the photo resolution was not sufficient to allow for acreage delineation.

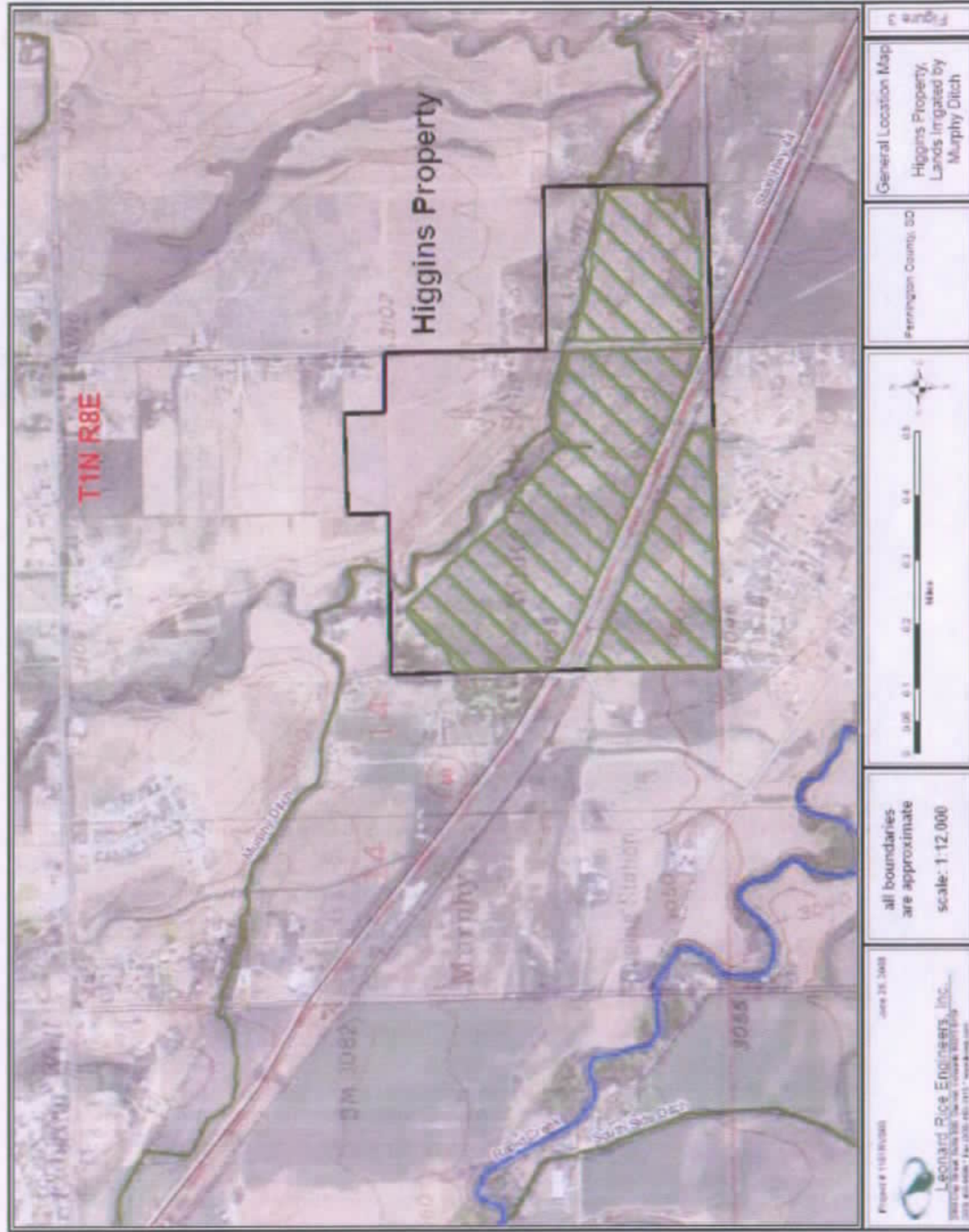


Figure 3. General Location Map, Higgins Property, Lands Irrigated by Murphy Ditch

III.3.3.2. Cropping Patterns

Table 2 provides a summary of the cropping distribution used in the historical consumptive use analysis. This information was developed through our interviews with the Ranch owners and the affidavits that they provided. Alfalfa and pasture grass each historically represented approximately half of the crops grown on the irrigated lands under the Murphy Ditch within the Ranch.

Table 2
Crops Irrigated on Ranch with Murphy Ditch

	Alfalfa	Pasture Grass	Total
Acreage	90.75 acres	30.25 acres	121 ac.
Percent	75%	25%	100%

III.3.3.3. Climate Data

Historical climate data from the Rapid City weather station (NOAA Station 6937, Rapid City 4NW) were used in the Modified Blaney-Criddle analysis. **Tables 3 and 4** present temperature and precipitation data at the Rapid City station, respectively

III.3.3.4. Potential Consumptive Use

In applying the Modified Blaney-Criddle method (Soil Conservation Service, 1967) to develop the potential consumptive use for each crop, the crop growth stage coefficients (k_c) 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). **Table 5** summarizes annual potential consumptive use of each crop, as calculated using the Modified Blaney-Criddle methodology. As shown in the table, the average potential consumptive use for alfalfa and pasture grass was 2.74 ac-ft per acre and 2.4 ac-ft per acre, respectively. Based on the 75 percent alfalfa and 25 percent pasture grass distribution, the weighted average potential consumptive use for the Ranch was 2.66 ac-ft per acre. **Table 6** shows average potential consumptive use on the Ranch lands irrigated under the Murphy Ditch of 322 ac-ft (2.66 ac-ft per acre).

Table 5
Average Potential Consumptive Use for Crops Grown on Higgins Ranch under Murphy Ditch (1950-2004)

Crop	Irrigated Acreage	Percent of Total	Potential CU (acre-ft/acre)
Alfalfa	90.75	75%	2.74
Pasture Grass	30.25	25%	2.4
Total	121	100%	n/a
Weighted Average	n/a	n/a	2.66

Table 3
Average Monthly Temperature (degrees F)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
1950	8.95	29.84	25.03	38	50.44	63.87	66.89	67.66	58.41	53.73	32.03	28.47	43.61
1951	20.73	27.7	33.83	40.62	56.26	65	71.04	69.5	55.83	46.63	33.12	17.42	44.81
1952	22.53	26.78	25.81	50.2	56.15	69	71.6	72.37	67.13	50.18	34.28	30.02	48
1953	31.26	25.73	36.65	38.33	52.53	66.77	72.44	72.47	63.13	55.84	41.7	30.37	48.94
1954	20.1	41.16	27.66	45.87	54.18	63.68	77.68	72.48	63.17	46.73	42.58	32.34	48.97
1955	23.92	19.25	28.61	49.82	59.19	62.18	76.94	76.15	62.18	51.76	24.67	21.79	46.37
1956	23.03	24.09	34.05	39.08	56.74	72.83	72.03	69.45	62.97	53.39	33.13	29.82	47.55
1957	10.74	27.57	33.65	40.97	53.97	62.26	75.26	71.58	59.17	47.42	35.42	34.9	46.08
1958	31.9	21.93	30.63	43.97	61.79	62.33	67.05	74.69	63.8	52.26	37.22	27.03	47.88
1959	20.61	21.71	37.9	43.32	53.71	70.05	73.76	75.66	58.82	44.45	27.87	34.19	46.84
1960	23.92	19.14	27.97	47.47	56.9	65.62	76.77	72.39	63.62	51.82	36.87	24.98	47.29
1961	27.32	33.18	39.4	41.75	55.73	71.28	73.08	77.18	55.6	49.84	34.88	22.95	48.52
1962	19.32	24.14	28.56	49.05	58.26	65.27	69.19	71.11	60.23	52.87	40.6	30.08	47.39
1963	12.27	30.18	39.65	44.52	56.95	68.07	74.35	73.74	66.48	59.42	39.58	22.69	48.99
1964	28.4	28.02	29.89	46.25	58.45	64.88	76.69	69.42	59.03	51.61	33.72	18.92	47.11
1965	25.42	25.61	21.19	46.97	54.66	64.48	72.13	70.66	49.73	54.74	38.15	33.29	46.42
1966	14.13	19.29	35.03	38.63	55.95	65.32	76.63	65.9	61.3	48.58	34.6	26.71	45.17
1967	27.92	27.52	35.16	44.03	49.79	59.95	70.58	70.61	63.35	50.13	34.58	22.5	46.34
1968	23.35	27.41	40.39	42.58	50.82	62.98	69.13	66.97	59.77	50.98	35.45	18.47	45.69
1969	15.94	25.41	27.81	49.58	57.42	59.78	70.95	73.74	64.75	40.58	38.72	28.21	46.07
1970	17.76	30.75	27.44	39.2	55.6	65.53	72.71	73.77	59.05	44.1	34.15	21.84	45.16
1971	17.52	22.59	32.61	45.97	53.61	66.32	67.98	73.84	57.4	46.06	34.5	23.26	45.14
1972	17.48	23.97	36.45	43.55	55.13	64.63	65.56	69.11	59.37	43.76	31.02	18.56	44.05
1973	26.74	28.84	37.42	42.83	53.73	64.65	70.69	74.24	57.07	51.32	32.33	25.31	47.1
1974	21.92	32.41	37.63	47.12	53.79	66.62	77.29	67.63	57.6	51.66	36.4	28.9	48.25
1975	23.65	17.63	27.56	40.52	53.95	62.18	74.68	70.27	58.5	49.15	33.8	29.4	45.11
1976	23.84	34.55	34.39	46.9	55.34	64.25	72.73	72.58	63.27	45.35	31.73	26.82	47.65
1977	12.68	34.54	36.4	49.48	60.23	69	73.35	65.97	60.97	48.81	33.27	21.84	47.21
1978	10.98	15.32	35.39	45.17	55.03	65.03	71.08	69.66	66.2	50.47	29.17	17.03	44.21
1979	7.35	16.73	35.37	44.4	53.56	65.32	70.39	68.47	66.25	50.82	32.95	33.11	45.39
1980	20.98	27.03	31.45	48.85	57.37	67.03	74.89	68.53	61.58	48.82	39.23	30.23	48
1981	32.61	29.3	40.03	51.5	54.87	64.88	71.94	70	63.53	47.66	40.4	25.81	49.38
1982	12.13	24.2	32.97	42.07	53.32	59.62	70.69	70.19	58.65	47.15	32.67	28.6	44.36
1983	32.11	37.25	36.35	40.65	51.95	63.08	73.65	77.95	60.75	49.39	34.87	8.06	47.17
1984	28.03	36.12	34.24	43.8	53.58	62.77	72.23	74.79	57.17	47.15	37.42	21.4	47.39
1985	21.55	23.84	35.87	51.98	61.76	62.1	74.56	69.03	55.52	47.26	16.02	20.98	45.04
1986	29.81	21.48	42.98	44.15	54.92	67.63	70.84	69.63	54.92	48.74	30.6	30.53	47.19
1987	31.03	32.41	32.58	51.35	59.44	67.12	75.4	68.11	61.37	47.13	40.28	28.87	49.59
1988	21.61	26.86	35.53	47.1	59.94	75.58	76.03	72.48	60.37	49.61	36.33	28.39	49.15
1989	28.66	14.38	31.06	45.77	55.32	63.97	76.97	73.08	61.03	48.79	36.43	19.39	46.24
1990	32.34	28.89	36.35	44.95	53.19	66.55	71.68	73.71	65.88	48.19	40.42	17.71	48.32
1991	18.34	35.93	38.44	46.33	56.56	67.15	72.9	73.98	61.13	46.42	29.95	32.66	48.32
1992	33.61	36.29	40.84	47.1	57.44	62.57	64.26	65.84	62.55	49.21	32.37	19.02	47.59
1993	16	15.14	37.56	43.53	56.13	60.33	65.06	68.58	56.6	48.23	32.38	31.42	44.25
1994	22.42	19.8	40.45	45.97	60.16	68.48	70.69	73.31	65.43	49.69	35.53	30.26	48.52
1995	29.16	31.82	33.15	40.3	51.76	62.83	70.6	73.58	60.02	46.48	33.67	25.4	46.56
1996	14.87	27.34	26.19	43.27	50.53	65.45	70.81	73.18	59.75	47.7	24.25	17.87	43.43
1997	18.1	28.79	36.65	38.67	52.82	66.25	70.9	68.71	62.5	48.58	33.15	30.31	46.29
1998	24.29	34.86	27.94	46.18	56.16	58.7	72.66	72.26	67.02	47.81	36.43	26.76	47.59
1999	25.6	36.61	36.27	42.6	52.97	62.58	71.29	71.42	55.62	49.87	41.7	33.3	48.32
2000	26.15	33.19	38.63	43.03	56	62.1	73.55	74.4	63.35	49.82	27.02	16.68	46.99
2001	29.73	16.91	34.34	45.98	56.15	64.05	74.76	74.4	62.5	47.84	39.41	28.89	47.91
2002	27.34	31.06	23.1	45.42	53.07	70.95	79.53	72.61	62.99	40.15	36.95	30.96	47.85
2003	26.2	22.58	35.81	48.84	55.97	63.2	78.19	77.57	60.41	52.76	28.79	29.41	48.31
2004	22.07	27.75	40.57	49.04	57.52	63.3	73.64	68.58	63.1	50.18	37.16	31.27	48.68
Average	22.48	26.96	33.80	44.81	55.43	65.04	72.52	71.55	60.87	49.07	34.40	25.92	46.90

Notes: Rapid City Weather Station (No. 6937)

Table 4
Total Monthly Precipitation (inches)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1950	0.25	0.06	2.66	1.63	2.43	0.9	1.62	2.74	2.79	0.4	0.35	0.04	15.87
1951	0.12	0.1	1.02	0.51	1.87	3	1.61	2.92	1.46	0.88	0.21	0.53	14.23
1952	0.01	0.65	0.81	0.32	3.75	3.04	1.51	0.7	0.21	0.01	0.15	0.08	11.24
1953	0.75	2.46	0.66	2.76	1.68	4.05	1.32	0.94	0.37	0.23	0.84	0.18	16.24
1954	0.18	0.34	2.28	0.27	2.68	3.18	1.24	2.11	0.2	1.92	0.64	0.25	15.29
1955	0.46	0.88	0.63	1.55	1.7	2.14	2.14	1.65	3.08	0.26	0.36	0.68	15.53
1956	0.47	0.52	0.75	1.69	2.09	1.32	2.27	3.15	0.3	0.1	1.48	0.36	14.5
1957	0.4	0.29	0.66	2.06	7.05	3.43	2.01	1.03	0.69	1.29	0.39	0.04	19.34
1958	0.43	0.84	1.08	3.03	1.04	3.86	4.49	0.26	0.03	0.22	0.42	0.37	16.07
1959	0.39	0.63	0.6	1.89	3.25	2.79	0.67	0.36	2.37	0.22	1.18	0.26	14.61
1960	0.16	0.85	0.78	1.21	2.23	2.19	0.7	1.24	0.68	0	0.39	0.8	11.23
1961	0.1	0.22	0.75	1.53	1.29	0.76	2.11	0.43	0.98	0.94	0.36	0.51	9.98
1962	0.51	0.98	1.28	0.69	6.9	4.01	4.53	1.03	0.67	1.63	0.08	0.19	22.5
1963	1.03	0.92	1.6	3.8	1.18	5.47	2.03	1.32	1.21	0.77	0.12	0.32	19.77
1964	0.35	0.83	0.63	1.24	2.52	4.69	0.77	1.87	0.69	0.5	0.3	0.78	15.17
1965	0.61	0.22	0.46	1.5	6.97	3.56	0.6	1.46	1.46	0.57	0.15	0.12	17.68
1966	0.24	1	1.78	2.5	0.33	1.31	3.93	3.24	2.84	1.5	0.95	0.79	20.41
1967	0.47	0.59	0.82	5.16	3.2	6.78	1.07	0.95	2.1	0.28	0.28	0.89	22.59
1968	0.43	0.35	0.21	1.82	1.68	7	2.44	2.46	0.89	0.14	0.46	0.58	18.46
1969	0.11	0.73	0.66	1.6	2.2	2.04	6.13	0.31	0.35	0.85	0.35	0.57	15.9
1970	0.73	0.54	1.48	4.63	2.41	2.16	1.04	0.67	1.57	1.23	0.8	0.61	17.87
1971	1.18	1	1.25	2.86	3.7	1.92	1.46	0.52	2.32	2.02	0.79	0.15	19.17
1972	0.22	0.44	0.47	2.78	3.28	4.11	1.67	2.49	0.24	0.77	0.38	0.34	17.19
1973	0.11	0.31	2.71	2.69	2.37	0.64	1.46	0.74	1.44	1.38	0.73	0.54	15.12
1974	0.16	0.3	0.34	1.55	1.32	1.1	0.68	1.37	0.88	1.18	0.12	0.12	9.12
1975	1.05	0.35	2.45	1.37	1.23	5.63	1.57	0.87	0.03	0.69	0.57	1.65	17.46
1976	0.28	0.47	0.33	2.7	2.74	4.81	1.05	1.31	0.28	0.21	0.61	0.41	15.2
1977	0.83	0.25	2.63	1.57	2.49	1.76	2.98	1.79	2.86	1.06	0.82	0.36	19.4
1978	0.19	0.84	0.4	2.19	3.12	2.01	4.08	1.42	0.18	0.26	0.63	0.25	15.57
1979	0.49	0.33	0.47	0.31	1.17	3.6	4.11	2.32	0.07	0.9	0.15	0.07	13.99
1980	0.2	0.51	0.86	1.13	1.58	4.75	1.78	2.38	0.48	2.28	0.57	0.66	17.18
1981	0.14	0.09	0.12	0.32	2.81	1.89	4.47	1.74	0.16	1.81	0.23	0.35	14.13
1982	0.39	0.37	1.35	0.69	6.5	2.89	1.81	4.83	2.69	3.82	0.27	0.36	25.97
1983	0.34	0.18	0.84	1	2.18	3.01	1.94	2.39	0.33	1.74	1.07	0.47	15.49
1984	0.1	0.18	0.69	3.1	1.57	4.72	1.57	1	0.74	0.67	0.51	0.38	15.23
1985	0.46	0.06	1.55	0.32	1.24	1.58	1.03	1.86	1.57	0.98	2.22	0.77	13.64
1986	0.49	0.92	0.88	4.74	1.43	4.56	0.91	1.32	3.14	1.64	1.4	0.01	21.44
1987	0.04	1.71	1.14	0.02	3.39	1.37	0.83	2.37	0.68	0.26	0.3	0.31	12.42
1988	0.17	0.34	0.52	0.6	3.25	1.09	0.38	1.98	0.56	0.76	0.81	0.46	10.92
1989	0.02	0.34	0.96	1.46	1.4	1.04	0.82	1.7	3.09	1.49	0.43	0.82	13.57
1990	0.22	0.37	1.17	0.77	4.87	1.42	1.94	1.87	2.44	0.61	0.44	0.33	16.45
1991	0.32	0.77	0.63	2.99	4.4	3.27	1.97	0.58	0.59	1	0.73	0.04	17.29
1992	0.29	0.16	1.92	0.71	2.47	2.17	3.25	0.47	0.42	0.68	0.39	0.57	13.5
1993	0.68	0.61	0.82	3.05	2.16	3.39	4.31	1.18	1.46	0.9	0.7	0.53	19.79
1994	0.45	0.66	0.37	1.2	1.47	0.67	0.64	0.92	0.27	2.84	0.66	0.35	10.5
1995	0.09	0.55	0.79	2.57	4.03	4.5	2.87	0.46	0.86	2.42	0.42	0.13	19.69
1996	0.85	0.1	1.06	1.63	8.18	1.24	0.52	1.85	1.55	1.07	0.07	1.25	19.37
1997	0.65	0.28	0.2	4.8	5.35	3.43	3.67	3.93	0.78	0.47	0.19	0.08	23.83
1998	0.15	1.24	1.32	0.28	2.34	5.59	1.26	1.42	1.5	5.6	1.13	0.06	21.89
1999	0.21	0.02	1.32	2.45	3.74	5.24	3.68	0.47	0.85	0.11	0.43	0.21	18.73
2000	0.23	0.15	1.37	3.95	2.4	1.6	2.06	0.7	0.45	1.54	0.47	0.11	15.03
2001	0.24	0.17	0.42	2.16	1.73	3.57	2.46	1.59	0.91	0.97	0.07	0	14.29
2002	0.34	0.41	1.43	1.59	2.1	0.82	1.05	1.9	2.67	1	0.32	0.35	13.98
2003	0.66	0.74	1.57	2.34	2.28	2.77	1.01	1	1.47	0.81	0.94	0.49	16.09
2004	0.48	0.76	1.07	0.78	2.1	1.41	2.45	1.36	2.9	1.64	0.47	0.27	15.68
Average	0.38	0.55	1.04	1.89	2.82	2.93	2.04	1.54	1.20	1.08	0.55	0.40	16.41

Notes: Rapid City Weather Station (No. 6937)

Table 6
Summary of Average Potential Crop Consumptive Use and
Irrigation Water Requirement from 1950-2004 (ac-ft)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Potential Consumptive Use	6.3	40.4	65.4	84.2	72.5	40.1	12.7	321.5
Effective Precipitation	2.1	17.6	22.5	17.9	13.0	8.4	3.7	85.2
Irrigation Water Requirement	4.3	22.8	42.9	66.3	59.4	31.7	9.0	236.4

III.3.4. Crop Irrigation Water Requirement

Crop irrigation water requirement is determined by subtracting from potential consumptive use the amount of precipitation that may effectively be used by the crop (a portion of applied irrigation water percolated into the ground below the crop root zone and is unavailable for use by the plant). **Table 6** summarizes that portion of precipitation (volume) which is considered effective (85 ac-ft or 0.70 ac-ft per acre). Average crop irrigation water requirements (volume) are also shown in **Table 6**. The calculated historical crop irrigation water requirement averaged 236 ac-ft, or about 1.95 ac-ft per acre.

Detailed results of calculations of potential consumptive use, effective precipitation, and irrigation water requirement are provided in **Appendix C** of this Report.

III.3.5. Murphy Ditch Water Supply to Higgins Ranch

III.3.5.5. Historical Murphy Ditch Diversions

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.

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.

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. These records generally cover the period from 1946 through about 1994, although there are several years during this period when data are not available. It should be noted that transfers by Rapid City of portions of the Murphy Ditch water right also affect the amount of water carried by and recorded for the Ditch starting in the early 1990's.

Records of historical monthly diversions by the Murphy Ditch are presented in **Table 7**. 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).

III.3.5.6. Higgins Ranch Historical Water Supply

Table 8 shows the average historical water supply available to the Higgins Ranch from diversions through the Murphy Ditch. The values in **Table 8** reflect 1) an 11 percent pro-rata ownership interest in all diversions through the Ditch, and 2) a reduction of total headgate diversions by 11 percent to account for seepage losses from the ditch prior to reaching the Ranch (Wright Water Engineers, 1990). Water deliveries to the Ranch averaged 288.1 ac-ft per year (2.38 ac-ft per acre).

Table 8
Average Water Delivery to the Higgins Ranch (acre-feet)

Apr	May	Jun	Jul	Aug	Sep	Oct	Total
13.7	34.0	39.3	52.0	67.4	49.4	32.3	288.1

III.3.6. Irrigation Practices and Efficiencies

Irrigation water application efficiencies were estimated by considering the following:

- Water application techniques and facilities;
- Slope of the irrigated lands;
- Soil types on irrigated lands;
- Water conveyance and control systems;
- Tailwater collection systems;
- Crop distributions; and
- Irrigation management.

Water delivery systems to and within the Ranch consist of earthen laterals. Fields on portions of the Ranch are laid out such that tailwater from one field is available to irrigate lower fields. Slopes on the Ranch as characterized by soil type are generally less than 1 percent, and irrigated fields are typically laid out to minimize cross slope, which reduces the amount of tailwater. Based on the factors, we have used a maximum irrigation efficiency of 50 percent.

Table 7
Historical Diversion Records for Murphy Ditch (acre-feet)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
1946					994	614	404	
1947		421	547	517	730	1560	687	
1948	6	513	522	348	999	826	654	
1949		185	480	425	1130	876	220	
1950		34	1020	1150	798	673	300	
1951	314	902	470	297	803	84	51	
1952	101	998	393	555	1140	660	1	
1953			236	888	1030	1100		
1954			477	960	904	770		
1955								
1956		322	858	720	450	376		
1957		126	0	206	716	334		
1958		686	648	438	542	558		
1959		620	450	614	778	436		
1960								
1961								
1962								
1963		298	288	768	718	240		
1964		378	135	516	814	360		
1965		171	250	510	796	630		
1966		282	588	686	214	120		
1967		40	0	147	304	120		
1968		210	96	242	606	130		
1969								
1970			229	294	307	93		
1971		180	230	294	306	116		
1972		176	60	52	600	215		
1973		96	310	552	510	240		
1974		744	900	960	904	752		
1975		366	98	520	968	960		
1976		328	392	440	620	608		
1977		196	514	592	668	342		
1978		30	180	440	460	632		
1979		328	708	498	368	460		
1980		430	600	820	520	300		
1981								
1982								
1983								
1984		220	110	580	636	600		
1985		640	240	520	480			
1986								
1987								
1988								
1989		550	600	540	480	400		
1990								
1991								
1992								
1993								
1994		220	540	550	600	280		
Avg 46-80	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

1953-1985: "Status of Water Use on Rapid Creek" John Hamak, DWRN, SD, December, 1980, App. IV

No data available

III.3.7. Transferable Amount of Water

The crop irrigation requirement for the Higgins Ranch averaged 236.4 ac-ft (**Table 9**). Based on an irrigation efficiency of 50 percent, approximately 472 ac-ft would have historically been delivered to the Ranch by the 1878 Murphy Ditch vested water right to fully meet that requirement. The water supply that was actually delivered to the Ranch was estimated to be approximately 288 ac-ft. The amount of the 1878 Murphy Ditch vested water right for natural flow that will be transferable to RVSD was estimated on a monthly basis based on the minimum of the delivery of water required to meet the irrigation water requirement and the actual delivery of water to the Ranch. Based on the analysis herein, the annual transferable amount of water associated with the use of the 1878 Murphy Ditch vested water right on the Higgins Ranch is 268.7 ac-ft.

Table 9
Determination of Transferable Amount (acre-feet)

	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Irrigation Water Requirement	4.3	22.8	42.9	66.3	59.4	31.7	9.0	236.4
Required Irrigation Water Delivery	8.6	45.6	85.7	132.6	118.9	63.4	18.0	472.7
Actual Ranch Delivery	13.7	34.0	39.3	52.0	67.4	49.4	32.3	288.1
Transferable Amount	8.6	34.0	39.3	52.0	67.4	49.4	18.0	268.7

III.4. FUTURE USE OF MURPHY DITCH WATER RIGHT

III.4.1. Use by RVSD

If acquired by the District, 11 percent of the 1878 Murphy Ditch water right (approximately 268.7 ac-ft per year of supply) would be transferred from the Murphy Ditch to an alternate point of diversion. The alternate point of diversion would be at the District water treatment facility located as shown in **Figure 4**. As a result of this transfer, the District's acquired interest in the Murphy Ditch would no longer be diverted for irrigation purposes on Higgins Ranch. 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 10**). Water use during the months of July, August and September is typically higher than other months of the year because of increased landscape irrigation. During these periods, we have estimated that indoor uses and outdoor irrigation are in approximately equal proportions. Furthermore, we have estimated that 5 percent of indoor use is consumptively used, i.e., 95 percent of indoor water use returns to Rapid Creek via waste water treatment systems. In addition, we estimate 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.

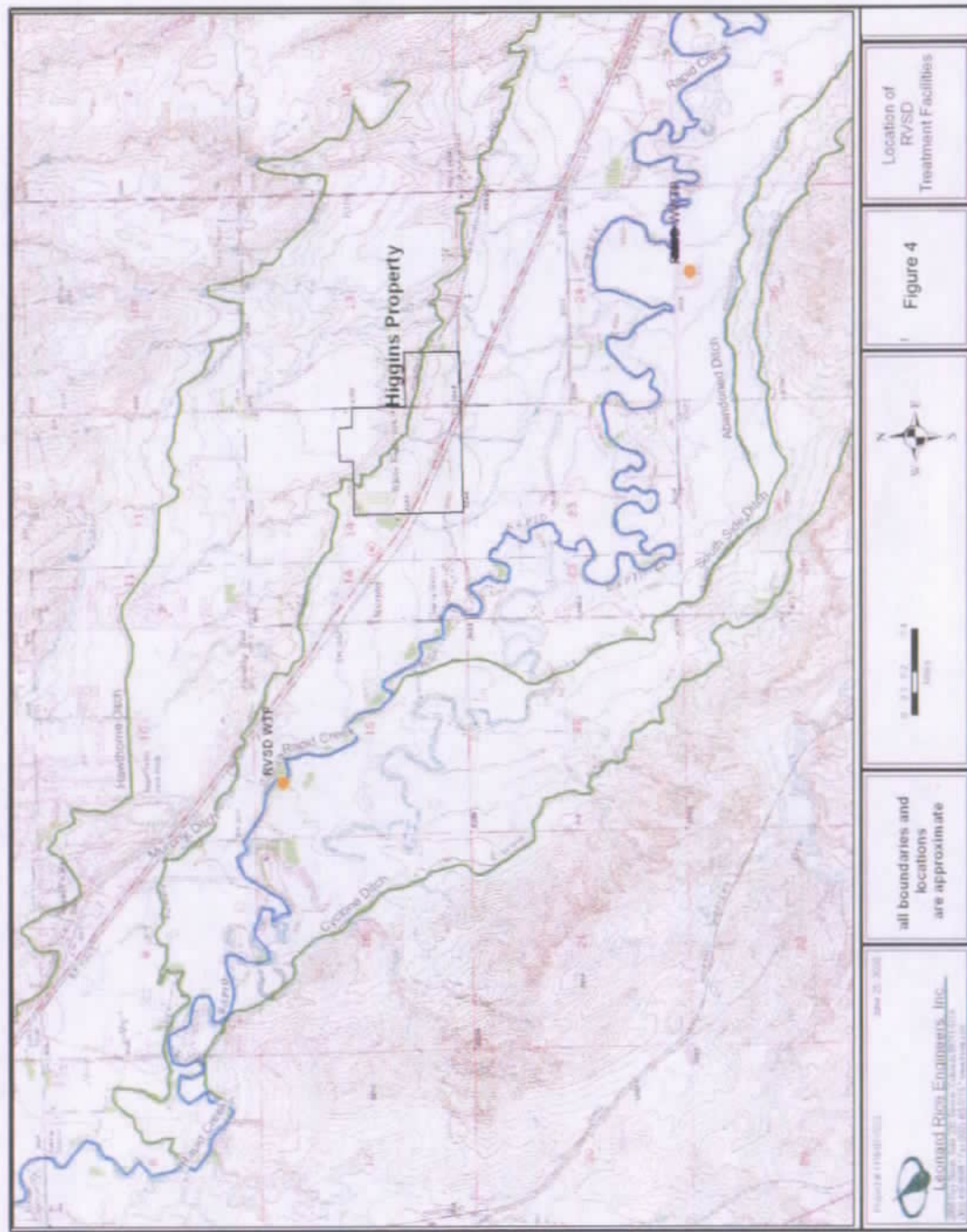


Figure 4. Location of RVSD Treatment Facilities

Table 10 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.

Table 10
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%

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).

III.4.2. Summary and Terms and Conditions

- RVSD is seeking to transfer the portion of the Murphy Ditch use historically associated with the irrigation of 121 acres on the Higgins Ranch in portions of the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 13 and the S $\frac{1}{2}$ of the S $\frac{1}{2}$ of the SE $\frac{1}{4}$ of the NE $\frac{1}{4}$ and the SE $\frac{1}{4}$ of Section 14, Township 1 North, Range 8 East of the Black Hills P.M., in Pennington County.
- Diversions for the Higgins Ranch have historically been made by the Murphy Ditch vested water right (Permit No. 1727-2) under the April 6, 1878 priority date. The transferred water right claimed by RVSD shall be administered based on the Murphy Ditch vested water right for natural flow.
- The majority of water that was historically delivered by the Murphy Ditch 1878 priority to the Higgins Ranch occurred from April through October. Diversion of the water transferred by RVSD will be limited to April through October.
- Deliveries of water to the Higgins Ranch under the 1878 water right of the Murphy Ditch averaged 288.1 ac-ft (2.4 ac-ft per acre) as shown in **Table 11**. In the future RVSD will limit their diversion of the transferred water right to a total monthly diversion of the values shown in **Table 11** and a total annual diversion of 268.7 ac-ft.

Table 11
Volumetric Limit on Diversions (ac-ft)

Apr	May	Jun	Jul	Aug	Sep	Oct	Total
8.6	34.0	39.3	52.0	67.4	49.4	18.0	268.7

- The prorata interest of the 1878 Murphy Ditch vested water right delivered to the Higgins farm was 1.66 c.f.s. (17 c.f.s. total water right * 11 % interest - 11% ditch loss). The future maximum rate of diversion of the transferred water will not exceed the District's prorata interest in the water right of 1.66 c.f.s. This will protect remaining shareholders in the ditch and other water rights holders on Rapid Creek.
- The existing point of diversion for Murphy Ditch on Rapid Creek is in the NE ¼ of the SW ¼ of Section 8, Township 1 North, Range 8 East of the Black Hills P.M., in Pennington County. In the future, RVSD will divert the transferred water at a point in the NE ¼ NW ¼ of Section 15, Township 1 North, Range 8 East of the Black Hills P.M., in Pennington County.
- As part of this analysis, RVSD does not request authorization of any new water appropriation from Rapid Creek.
- Water transferred shall be used for municipal, industrial, commercial, common distribution system, rural water system, suburban housing and domestic use purposes and shall not exceed the amount of water needed for beneficial use.
- The portion of water used by the District that is consumed is less depletive than occurred historically under agricultural uses, no depletion limit on the future use of the water right is required.
- Lands historically irrigated on Higgins Ranch by the transferred Murphy Ditch water right will be removed from irrigation to ensure that agricultural depletions cease as soon as water is used by the District. This will prevent an expansion of the use of the water right over historical conditions and will protect other vested water right owners on Rapid Creek.
- RVSD will report to the SDNER the amount of water withdrawn each month on an annual basis.

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

WATER LICENSE NO. 1727-2

(1) WHEREAS, On the 7th day of January A. D. 19 80
Rapid Valley Water Company, Inc.

made Water Right Application No. 1727-2 Vested Right
 for a permit to use 20 cubic feet per second of the waters
 of Rapid Creek

County of Pennington, State of South Dakota, for irrigation
 purposes; and -

(2) WHEREAS, On the 25th day of September A. D. 19 80
 Permit No. 1727-2, With a date of priority of 17 cfs from 1878 and 3 cfs
 was issued to said applicant S recognizing
 for the diversion of said water, and ~~providing for~~ the completion of construction of the water
 supply system therein described ~~xxxxxxx~~ and for the
 application to beneficial use of said water ~~xxxxxxx~~

and:

(3) WHEREAS, It is hereby certified that the applicant has complied with the provisions of the laws of the State of South Dakota
 relating to completion of the construction of the water supply system and is entitled to divert 20 cubic feet
 per second of water for beneficial use and,

(4) WHEREAS, It is hereby certified that the applicant has complied with the provisions of the laws of the State of South Dakota
 relating to the application of water to beneficial use of the following extent,

		1893 Priority:
1) Guy Simons	45 acres E $\frac{1}{2}$ SW $\frac{1}{4}$, Sec. 9-T1N-R8E	23) Rosanne Heavlin- 41 acres in the
2) C.E. Morris	64 acres W $\frac{1}{2}$ SE $\frac{1}{4}$, Sec. 9-T1N-R8E	SE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 19, and NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 30-T1N-R9E
13) C.E. Morris	66 acres Sec. 24-T1N-R8E	24) Merlin Stromer- 125 acres in the
14) C.E. Morris	38 acres $\frac{1}{2}$ of the 76 acres in Sec. 24-T1N-R8E	SW $\frac{1}{4}$ of Sec. 20, and NW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 29-T1N-R9E
3) R.W. Lamb	187 acres SW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 10, NW $\frac{1}{4}$ & NE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 15, T1N-R8E	25) James Bloom- 38 acres SW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 20 and NW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 29- T1N-R9E
4) R.W. Lamb	130 acres in the SE $\frac{1}{4}$ NE $\frac{1}{4}$ and NW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 15; 90 acres in the SE $\frac{1}{4}$ Sec. 15, NW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 20-T1N-R8E	TOTAL 1042 ACRES
4) R.W. Lamb	38 acres in the NW $\frac{1}{4}$ SW $\frac{1}{4}$, Sec. 14, T1N, R8E	
5) A.K. Walker	8 acres in the SW $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 14-T1N-R8E	
7) Jim Long	10 acres in the NE $\frac{1}{4}$ SW $\frac{1}{4}$ and SE $\frac{1}{4}$ NW $\frac{1}{4}$, Sec. 14-T1N-R8E	
6) David Murphy Est.	43 acres in the W $\frac{1}{2}$, Sec. 14-T1N-R8E	
8 & 9) Cora & Kenneth Buckholz	10 acres in the W $\frac{1}{2}$ of center quarter of Sec. 14-T1N-R8E	
10) Elsie Higgins	121 acres in the SE $\frac{1}{4}$ of Sec. 14; and SW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 13-T1N-R8E	
11) Wayne Anderson	12 acres in the SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 13-T1N-R8E	
12) Dale Wileman	6 acres in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ of Sec. 13-T1N-R8E	
16) John Sweeney	1 acre NW $\frac{1}{4}$ NE $\frac{1}{4}$ of Sec. 24-T1N-R8E	
15) Doug Peters	28 acres $\frac{1}{2}$ of 8 and 48 acres in the W $\frac{1}{2}$ NE $\frac{1}{4}$ of Sec. 24-T1N-R8E	
17) Raymond Tyler	65 acres in the W $\frac{1}{2}$ NW $\frac{1}{4}$ Sec. 19-T1N-R9E	
19) M.P. Carlay	145 acres in Sec. 19-T1N-R9E	
20) Bruce Webber	63 acres in SW $\frac{1}{4}$ Sec. 19, NW $\frac{1}{4}$ Sec. 30-T1N-R9E	
21) Dr. Ahrlin	51 acres in SE $\frac{1}{4}$ Sec. 19, NE $\frac{1}{4}$ Sec. 30, T1N-R9E	

1878 PRIORITY DATE

Land
Parcel
Number

Legal
Description

Acreage

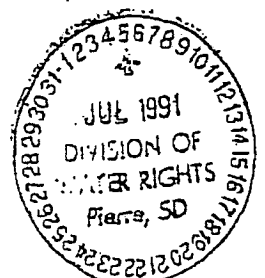


1	NE1/4 SW1/4	S9-T1N-R8E	20
	SE1/4 SW1/4	S9-T1N-R8E	25
2	NW1/4 SE1/4	S9-T1N-R8E	29
	SW1/4 SE1/4	S9-T1N-R8E	35
3	SW1/4 SW1/4	S10-T1N-R8E	25 ✓
	NW1/4 NW1/4	S15-T1N-R8E	31
	SW1/4 NW1/4	S15-T1N-R8E	38 ✓
	NW1/4 SW1/4	S15-T1N-R8E	30
	SE1/4 NW1/4	S15-T1N-R8E	32
	NE1/4 SW1/4	S15-T1N-R8E	31
	SW1/4 NE1/4	S15-T1N-R8E	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 ACRES 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
14	NW1/4 NE1/4	S24-T1N-R8E	1
15	28 ACRES OF THE TOTAL 56 ACRES		
	NE1/4 NE1/4	S24-T1N-R8E	31
	SE1/4 NE1/4	S24-T1N-R8E	25
16	NW1/4 NW1/4	S19-T1N-R9E	12
	SW1/4 NW1/4	S19-T1N-R9E	37
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



APPENDIX B
Joan Mumford and Jaynell Higgins
Affidavits

AFFIDAVIT

State of South Dakota)
)ss.
County of Pennington)

I, **Joan Mumford**, being duly sworn, do hereby state and affirm as follows:

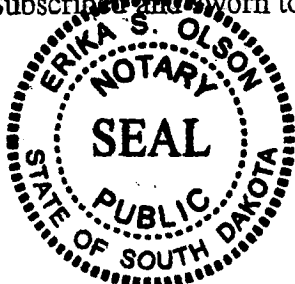
1. I am over 21 years of age and make this affidavit based upon my own personal knowledge and belief.
2. I own the Higgins Ranch and approximately 11 percent of the 1878 water right permitted for the Rapid Valley Water Company, Inc., a/k/a Murphy Ditch ("Murphy Ditch") and diverted into the Murphy Ditch from Rapid Creek along with my sister Jaynell Higgins.
3. My family has been ranching and farming the Higgins Ranch for approximately 100 years. I began working at the Higgins Ranch in 1940 and assumed partial ownership around 1965.
4. The lands now known as the Higgins Ranch and irrigated through the Murphy Ditch are the same lands that have been irrigated by the 11 percent of the 1878 water right since that time.
5. I have been actively involved in the management and farming of the Higgins Ranch, including management of water supplies for irrigation.
6. I have regularly requested, received, and applied my full entitlement of water diverted through the Murphy Ditch, or close thereto, during the period from April through October of each year. At no time have I not used or abandoned any water right.
7. Diversions of water through the Murphy Ditch of the 1878 water right have been used for irrigation of about 121 acres of alfalfa (75%) and pasture grass (25%).
8. Water received on the Higgins Ranch under the 1878 priority water right during my employment, management, and ownership has generally been sufficient to meet crop irrigation needs.

Dated this 17 day of July, 2009.

Signed

Joan Mumford
Joan Mumford

Subscribed and sworn to before me this 17th day of July, 2009.



Erika S. Olson
Notary Public-South Dakota
My Commission Expires October 18, 2012

AFFIDAVIT

State of South Dakota)
)ss.
County of Pennington)

I, **Jaynell Higgins**, being duly sworn, do hereby state and affirm as follows:

1. I am over 21 years of age and make this affidavit based upon my own personal knowledge and belief.
2. I own the Higgins Ranch and approximately 11 percent of the 1878 water right permitted for the Rapid Valley Water Company, Inc., a/k/a Murphy Ditch ("Murphy Ditch") and diverted into the Murphy Ditch from Rapid Creek along with my sister Joan Mumford.
3. My family has been ranching and farming the Higgins Ranch for approximately 100 years. I began working at the Higgins Ranch in 1940 and assumed partial ownership around 1965.
4. The lands now known as the Higgins Ranch and irrigated through the Murphy Ditch are the same lands that have been irrigated by the 11 percent of the 1878 water right since that time.
5. I have been actively involved in the management and farming of the Higgins Ranch, including management of water supplies for irrigation.
6. I have regularly requested, received, and applied my full entitlement of water diverted through the Murphy Ditch, or close thereto, during the period from April through October of each year. At no time have I not used or abandoned any water right.
7. Diversions of water through the Murphy Ditch of the 1878 water right have been used for irrigation of about 121 acres of alfalfa (75%) and pasture grass (25%).
8. Water received on the Higgins Ranch under the 1878 priority water right during my employment, management, and ownership has generally been sufficient to meet crop irrigation needs.

Dated this 17 day of July, 2009.

Signed

Jaynell Higgins
Jaynell Higgins

Subscribed and sworn to before me this 17th day of July, 2009.



Erika S. Olson
Notary Public-South Dakota
My Commission Expires October 18, 2012

APPENDIX C
Detailed Results of Potential Consumptive Use Computations

StateCU Version 13.01 06/22/09 11:11AM
 Scenario name: Higgins

Model execution time: 07-22-2009 16:09:14
 Historic Potential Consumptive Use Analysis for the Higgins Property

July 2009

Revised for SD

Detailed Results of the Consumptive Use Calculation Blaney-Criddle Method

1100501 MURPHY DITCH

ALFALFA.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1950	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May14	58.1	53.57	5.97	3.20	0.61	1.20	0.74	2.36	0.99	1.37
Jun	100.0	63.87	10.39	6.64	0.79	1.24	0.98	6.49	0.77	5.72
Jul	100.0	66.89	10.49	7.02	0.84	1.22	1.02	7.19	1.41	5.78
Aug	100.0	67.66	9.71	6.57	0.86	1.16	0.99	6.53	2.18	4.35
Sep	100.0	58.41	8.41	4.91	0.70	1.08	0.75	3.69	1.89	1.80
Oct15	48.4	54.94	3.79	2.08	0.64	1.01	0.65	1.35	0.12	1.22
Season Total								27.61	7.36	20.26

GRASS_PASTURE.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1950	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 2	96.8	50.89	9.93	5.05	0.57	0.98	0.56	2.81	1.55	1.26
Jun	100.0	63.87	10.39	6.64	0.79	1.00	0.79	5.27	0.72	4.55
Jul	100.0	66.89	10.49	7.02	0.84	1.01	0.85	5.96	1.31	4.65
Aug	100.0	67.66	9.71	6.57	0.86	0.99	0.84	5.55	2.06	3.49
Sep	100.0	58.41	8.41	4.91	0.70	0.95	0.66	3.24	1.84	1.40
Oct27	87.1	54.03	6.70	3.62	0.62	0.87	0.54	1.96	0.22	1.75
Season Total								24.80	7.70	17.10

ALFALFA.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1951	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 3	93.5	56.55	9.59	5.43	0.66	1.19	0.79	4.30	1.30	3.00
Jun	100.0	65.00	10.39	6.75	0.81	1.24	1.00	6.77	2.39	4.38
Jul	100.0	71.04	10.49	7.45	0.91	1.22	1.11	8.29	1.49	6.80
Aug	100.0	69.50	9.71	6.75	0.89	1.16	1.03	6.96	2.36	4.60
Sep	100.0	55.83	8.41	4.70	0.65	1.08	0.70	3.30	1.03	2.28
Oct15	48.4	49.00	3.79	1.86	0.53	1.01	0.54	1.01	0.28	0.72
Season Total								30.62	8.85	21.78

GRASS_PASTURE.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1951	
Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR

Higgins.obc

		(F)	(%)					(in)	(in)	(in)
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Apr24	23.3	46.67	2.22	1.04	0.49	0.95	0.47	0.49	0.08	0.41
May	100.0	56.26	10.25	5.77	0.66	0.98	0.65	3.73	1.32	2.41
Jun	100.0	65.00	10.39	6.75	0.81	1.00	0.81	5.49	2.23	3.26
Jul	100.0	71.04	10.49	7.45	0.91	1.01	0.92	6.87	1.37	5.50
Aug	100.0	69.50	9.71	6.75	0.89	0.99	0.88	5.91	2.23	3.68
Sep	100.0	55.83	8.41	4.70	0.65	0.95	0.62	2.90	1.00	1.90
Oct19	61.3	48.41	4.77	2.31	0.52	0.89	0.46	1.07	0.35	0.72

Season Total								26.47	8.58	17.89
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ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1952

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)

Apr15	53.3	51.74	4.99	2.58	0.58	1.11	0.64	1.66	0.10	1.56
May	100.0	56.15	10.25	5.76	0.66	1.19	0.78	4.50	2.56	1.93
Jun	100.0	69.00	10.39	7.17	0.88	1.24	1.09	7.80	2.56	5.24
Jul	100.0	71.60	10.49	7.51	0.92	1.22	1.12	8.44	1.41	7.03
Aug	100.0	72.37	9.71	7.03	0.94	1.16	1.09	7.65	0.63	7.02
Sep	100.0	67.13	8.41	5.65	0.85	1.08	0.91	5.16	0.11	5.05
Oct15	48.4	54.55	3.79	2.07	0.63	1.01	0.64	1.32	0.00	1.32

Season Total								36.54	7.38	29.16
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GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1952

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)

Apr 9	73.3	51.16	6.78	3.47	0.57	0.94	0.54	1.86	0.14	1.73
May	100.0	56.15	10.25	5.76	0.66	0.98	0.64	3.71	2.45	1.26
Jun	100.0	69.00	10.39	7.17	0.88	1.00	0.88	6.33	2.36	3.96
Jul	100.0	71.60	10.49	7.51	0.92	1.01	0.93	7.00	1.30	5.70
Aug	100.0	72.37	9.71	7.03	0.94	0.99	0.92	6.50	0.59	5.91
Sep	100.0	67.13	8.41	5.65	0.85	0.95	0.80	4.54	0.10	4.43
Oct25	80.6	51.82	6.22	3.22	0.58	0.88	0.51	1.65	0.00	1.65

Season Total								31.59	6.95	24.63
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ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1953

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)

May10	71.0	54.90	7.29	4.00	0.64	1.20	0.76	3.05	0.88	2.18
Jun	100.0	66.77	10.39	6.94	0.84	1.24	1.04	7.22	3.19	4.03
Jul	100.0	72.44	10.49	7.60	0.94	1.22	1.14	8.67	1.26	7.41
Aug	100.0	72.47	9.71	7.04	0.94	1.16	1.09	7.68	0.86	6.82
Sep	100.0	63.13	8.41	5.31	0.78	1.08	0.84	4.46	0.25	4.21
Oct15	48.4	57.72	3.79	2.19	0.68	1.01	0.69	1.52	0.06	1.47

Season Total								32.60	6.49	26.11
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GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1953

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)

Apr29	6.7	45.20	0.64	0.29	0.47	0.96	0.45	0.13	0.11	0.02
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Higgins.obc

May	100.0	52.53	10.25	5.39	0.59	0.98	0.58	3.14	1.16	1.98
Jun	100.0	66.77	10.39	6.94	0.84	1.00	0.84	5.85	2.96	2.90
Jul	100.0	72.44	10.49	7.60	0.94	1.01	0.95	7.20	1.16	6.03
Aug	100.0	72.47	9.71	7.04	0.94	0.99	0.93	6.52	0.80	5.72
Sep	100.0	63.13	8.41	5.31	0.78	0.95	0.74	3.92	0.25	3.67
Oct	100.0	55.84	7.64	4.27	0.65	0.87	0.57	2.41	0.11	2.30
Nov 8	26.7	46.88	1.84	0.86	0.50	0.79	0.39	0.34	0.14	0.19

Season Total 29.51 6.69 22.82

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1954

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr30	3.3	49.89	0.32	0.16	0.55	1.14	0.62	0.10	0.00	0.09
May	100.0	54.18	10.25	5.55	0.62	1.19	0.74	4.11	1.87	2.25
Jun	100.0	63.68	10.39	6.62	0.79	1.24	0.97	6.45	2.47	3.97
Jul	100.0	77.68	10.49	8.15	1.03	1.22	1.25	10.20	1.24	8.96
Aug	100.0	72.48	9.71	7.04	0.94	1.16	1.09	7.68	1.84	5.84
Sep	100.0	63.17	8.41	5.31	0.78	1.08	0.84	4.46	0.09	4.37
Oct15	48.4	50.97	3.79	1.93	0.57	1.01	0.58	1.11	0.60	0.51

Season Total 34.12 8.12 25.99

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1954

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr14	56.7	47.75	5.28	2.52	0.51	0.94	0.48	1.22	0.08	1.14
May	100.0	54.18	10.25	5.55	0.62	0.98	0.61	3.40	1.79	1.60
Jun	100.0	63.68	10.39	6.62	0.79	1.00	0.79	5.23	2.31	2.92
Jul	100.0	77.68	10.49	8.15	1.03	1.01	1.04	8.46	1.17	7.29
Aug	100.0	72.48	9.71	7.04	0.94	0.99	0.93	6.52	1.72	4.80
Sep	100.0	63.17	8.41	5.31	0.78	0.95	0.74	3.92	0.09	3.83
Oct28	90.3	47.79	6.95	3.32	0.51	0.87	0.45	1.48	1.09	0.39

Season Total 30.23 8.26 21.97

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1955

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr16	50.0	52.24	4.68	2.44	0.59	1.11	0.65	1.60	0.54	1.06
May	100.0	59.19	10.25	6.07	0.71	1.19	0.84	5.12	1.31	3.81
Jun	100.0	62.18	10.39	6.46	0.76	1.24	0.94	6.09	1.70	4.38
Jul	100.0	76.94	10.49	8.07	1.02	1.22	1.24	9.98	2.12	7.86
Aug	100.0	76.15	9.71	7.39	1.00	1.16	1.16	8.61	1.55	7.07
Sep	100.0	62.18	8.41	5.23	0.76	1.08	0.82	4.30	2.13	2.16
Oct15	48.4	54.45	3.79	2.07	0.63	1.01	0.64	1.32	0.07	1.25

Season Total 37.01 9.42 27.59

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1955

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr 9	73.3	51.33	6.78	3.48	0.57	0.94	0.54	1.88	0.76	1.11
May	100.0	59.19	10.25	6.07	0.71	0.98	0.70	4.23	1.25	2.98

Higgins.obc

Jun	100.0	62.18	10.39	6.46	0.76	1.00	0.76	4.94	1.60	3.34
Jul	100.0	76.94	10.49	8.07	1.02	1.01	1.03	8.28	1.93	6.35
Aug	100.0	76.15	9.71	7.39	1.00	0.99	0.99	7.32	1.44	5.88
Sep	100.0	62.18	8.41	5.23	0.76	0.95	0.72	3.78	2.07	1.70
Oct23	74.2	53.10	5.74	3.05	0.60	0.88	0.53	1.62	0.10	1.53

Season Total 32.03 9.14 22.89

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1956

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 4	90.3	57.81	9.27	5.36	0.69	1.19	0.82	4.39	1.41	2.98
Jun	100.0	72.83	10.39	7.57	0.95	1.24	1.17	8.86	1.27	7.58
Jul	100.0	72.03	10.49	7.56	0.93	1.22	1.13	8.56	2.06	6.50
Aug	100.0	69.45	9.71	6.74	0.89	1.16	1.03	6.95	2.52	4.43
Sep	100.0	62.97	8.41	5.30	0.78	1.08	0.84	4.43	0.19	4.24
Oct15	48.4	55.86	3.79	2.12	0.65	1.01	0.66	1.40	0.00	1.40

Season Total 34.59 7.46 27.13

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1956

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr25	20.0	46.49	1.91	0.89	0.49	0.95	0.47	0.42	0.22	0.20
May	100.0	56.74	10.25	5.82	0.67	0.98	0.65	3.81	1.47	2.34
Jun	100.0	72.83	10.39	7.57	0.95	1.00	0.95	7.18	1.16	6.02
Jul	100.0	72.03	10.49	7.56	0.93	1.01	0.94	7.10	1.90	5.20
Aug	100.0	69.45	9.71	6.74	0.89	0.99	0.88	5.90	2.38	3.52
Sep	100.0	62.97	8.41	5.30	0.78	0.95	0.74	3.89	0.18	3.71
Oct28	90.3	54.01	6.95	3.75	0.62	0.87	0.54	2.03	0.00	2.03

Season Total 30.33 7.31 23.01

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1957

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 6	83.9	54.80	8.61	4.72	0.63	1.20	0.76	3.58	3.58	0.00
Jun	100.0	62.26	10.39	6.47	0.76	1.24	0.94	6.11	2.59	3.51
Jul	100.0	75.26	10.49	7.90	0.99	1.22	1.20	9.48	1.95	7.53
Aug	100.0	71.58	9.71	6.95	0.92	1.16	1.07	7.46	0.93	6.53
Sep	100.0	59.17	8.41	4.98	0.71	1.08	0.77	3.81	0.50	3.31
Oct15	48.4	50.45	3.79	1.91	0.56	1.01	0.57	1.08	0.42	0.67

Season Total 31.52 9.96 21.55

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1957

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr24	23.3	46.00	2.22	1.02	0.48	0.95	0.46	0.47	0.31	0.16
May	100.0	53.97	10.25	5.53	0.62	0.98	0.61	3.36	3.36	0.00
Jun	100.0	62.26	10.39	6.47	0.76	1.00	0.77	4.95	2.43	2.52
Jul	100.0	75.26	10.49	7.90	0.99	1.01	1.00	7.86	1.78	6.09
Aug	100.0	71.58	9.71	6.95	0.92	0.99	0.91	6.34	0.87	5.46
Sep	100.0	59.17	8.41	4.98	0.71	0.95	0.67	3.35	0.49	2.86

Oct21 67.7 49.32 5.26 2.59 Higgins.obc 0.54 0.88 0.48 1.24 0.57 0.67

Season Total 27.57 9.81 17.76

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1958

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr25	20.0	51.44	1.91	0.98	0.58	1.13	0.65	0.64	0.40	0.24
May	100.0	61.79	10.25	6.33	0.75	1.19	0.90	5.68	0.85	4.83
Jun	100.0	62.33	10.39	6.48	0.76	1.24	0.95	6.12	2.88	3.25
Jul	100.0	67.05	10.49	7.03	0.85	1.22	1.03	7.23	3.49	3.74
Aug	100.0	74.69	9.71	7.25	0.98	1.16	1.14	8.24	0.19	8.05
Sep	100.0	63.80	8.41	5.37	0.79	1.08	0.85	4.57	0.00	4.57
Oct15	48.4	55.24	3.79	2.10	0.64	1.01	0.65	1.36	0.05	1.31
Season Total								33.85	7.85	26.00

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1958

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr17	46.7	49.14	4.39	2.16	0.54	0.95	0.51	1.09	0.88	0.21
May	100.0	61.79	10.25	6.33	0.75	0.98	0.74	4.69	0.80	3.89
Jun	100.0	62.33	10.39	6.48	0.76	1.00	0.77	4.97	2.70	2.27
Jul	100.0	67.05	10.49	7.03	0.85	1.01	0.85	6.00	3.26	2.74
Aug	100.0	74.69	9.71	7.25	0.98	0.99	0.96	7.00	0.17	6.82
Sep	100.0	63.80	8.41	5.37	0.79	0.95	0.75	4.02	0.00	4.02
Oct30	96.8	52.63	7.42	3.90	0.60	0.87	0.52	2.02	0.10	1.92
Season Total								29.78	7.91	21.87

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1959

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 5	87.1	54.80	8.94	4.90	0.63	1.19	0.76	3.71	1.94	1.76
Jun	100.0	70.05	10.39	7.28	0.90	1.24	1.11	8.08	2.42	5.67
Jul	100.0	73.76	10.49	7.74	0.96	1.22	1.17	9.05	0.65	8.39
Aug	100.0	75.66	9.71	7.35	0.99	1.16	1.16	8.49	0.31	8.18
Sep	100.0	58.82	8.41	4.95	0.70	1.08	0.76	3.76	1.64	2.12
Oct15	48.4	48.16	3.79	1.83	0.52	1.01	0.53	0.96	0.05	0.91
Season Total								34.04	7.01	27.04

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1959

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr20	36.7	46.67	3.46	1.62	0.49	0.95	0.47	0.76	0.45	0.31
May	100.0	53.71	10.25	5.51	0.62	0.98	0.60	3.32	2.12	1.21
Jun	100.0	70.05	10.39	7.28	0.90	1.00	0.90	6.56	2.22	4.34
Jul	100.0	73.76	10.49	7.74	0.96	1.01	0.97	7.50	0.60	6.90
Aug	100.0	75.66	9.71	7.35	0.99	0.99	0.98	7.21	0.28	6.92
Sep	100.0	58.82	8.41	4.95	0.70	0.95	0.67	3.30	1.60	1.70
Oct14	45.2	48.62	3.55	1.73	0.53	0.89	0.47	0.81	0.04	0.77
Season Total								29.46	7.31	22.15

Higgins.obc

ALFALFA.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1960

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr23	26.7	51.12	2.54	1.30	0.57	1.12	0.64	0.83	0.23	0.60
May	100.0	56.90	10.25	5.83	0.67	1.19	0.80	4.65	1.63	3.01
Jun	100.0	65.62	10.39	6.82	0.82	1.24	1.02	6.93	1.82	5.10
Jul	100.0	76.77	10.49	8.05	1.01	1.22	1.23	9.92	0.70	9.22
Aug	100.0	72.39	9.71	7.03	0.94	1.16	1.09	7.66	1.12	6.54
Sep	100.0	63.62	8.41	5.35	0.79	1.08	0.85	4.54	0.52	4.02
Oct15	48.4	54.87	3.79	2.08	0.64	1.01	0.64	1.34	0.00	1.34

Season Total

35.87 6.02 29.85

GRASS_PASTURE.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1960

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr12	63.3	49.30	5.88	2.90	0.54	0.94	0.51	1.47	0.52	0.96
May	100.0	56.90	10.25	5.83	0.67	0.98	0.66	3.84	1.56	2.28
Jun	100.0	65.62	10.39	6.82	0.82	1.00	0.82	5.62	1.69	3.92
Jul	100.0	76.77	10.49	8.05	1.01	1.01	1.02	8.23	0.65	7.58
Aug	100.0	72.39	9.71	7.03	0.94	0.99	0.93	6.50	1.05	5.45
Sep	100.0	63.62	8.41	5.35	0.79	0.95	0.75	3.99	0.50	3.49
Oct29	93.5	52.20	7.17	3.74	0.59	0.87	0.51	1.92	0.00	1.92

Season Total

31.57 5.98 25.59

ALFALFA.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1961

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 3	93.5	56.25	9.59	5.40	0.66	1.19	0.79	4.24	0.92	3.32
Jun	100.0	71.28	10.39	7.41	0.92	1.24	1.14	8.42	0.72	7.70
Jul	100.0	73.08	10.49	7.67	0.95	1.22	1.15	8.85	1.96	6.89
Aug	100.0	77.18	9.71	7.49	1.02	1.16	1.19	8.89	0.39	8.49
Sep	100.0	55.60	8.41	4.68	0.65	1.08	0.70	3.27	0.70	2.57
Oct15	48.4	51.33	3.79	1.95	0.57	1.01	0.58	1.13	0.31	0.83

Season Total

34.80 5.00 29.80

GRASS_PASTURE.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1961

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr22	30.0	46.71	2.84	1.33	0.49	0.95	0.47	0.62	0.30	0.32
May	100.0	55.73	10.25	5.71	0.65	0.98	0.64	3.64	0.93	2.71
Jun	100.0	71.28	10.39	7.41	0.92	1.00	0.92	6.83	0.66	6.17
Jul	100.0	73.08	10.49	7.67	0.95	1.01	0.96	7.34	1.80	5.54
Aug	100.0	77.18	9.71	7.49	1.02	0.99	1.01	7.55	0.36	7.18
Sep	100.0	55.60	8.41	4.68	0.65	0.95	0.61	2.87	0.68	2.19
Oct25	80.6	50.40	6.22	3.14	0.56	0.88	0.49	1.53	0.50	1.03

Season Total

30.39 5.24 25.15

ALFALFA.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1962

Month	percent month	temp	daylight	f	Higgins.obc		k	ETp	Re	IWR
		(F)	(%)		kt	kc		(in)	(in)	(in)
Apr18	43.3	51.72	4.07	2.11	0.58	1.11	0.65	1.36	0.21	1.15
May	100.0	58.26	10.25	5.97	0.69	1.19	0.82	4.92	4.44	0.49
Jun	100.0	65.27	10.39	6.78	0.82	1.24	1.01	6.84	3.10	3.74
Jul	100.0	69.19	10.49	7.26	0.88	1.22	1.07	7.79	3.63	4.16
Aug	100.0	71.11	9.71	6.91	0.92	1.16	1.06	7.35	0.92	6.42
Sep	100.0	60.23	8.41	5.07	0.73	1.08	0.79	3.98	0.49	3.49
Oct15	48.4	54.77	3.79	2.08	0.63	1.01	0.64	1.34	0.53	0.80
Season Total								33.57	13.32	20.25

GRASS_PASTURE.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1962	
Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
Apr 9	73.3	50.54	6.78	3.43	0.56	0.94	0.53	1.81	0.34	1.46
May	100.0	58.26	10.25	5.97	0.69	0.98	0.68	4.07	4.07	0.00
Jun	100.0	65.27	10.39	6.78	0.82	1.00	0.82	5.55	2.88	2.66
Jul	100.0	69.19	10.49	7.26	0.88	1.01	0.89	6.46	3.37	3.09
Aug	100.0	71.11	9.71	6.91	0.92	0.99	0.90	6.24	0.87	5.37
Sep	100.0	60.23	8.41	5.07	0.73	0.95	0.69	3.50	0.48	3.02
Oct	100.0	52.87	7.64	4.04	0.60	0.87	0.52	2.10	1.06	1.04
Nov 5	16.7	45.51	1.16	0.53	0.47	0.80	0.38	0.20	0.00	0.20
Season Total								29.91	13.07	16.84

ALFALFA.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1963	
Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
Apr28	10.0	50.13	0.96	0.48	0.55	1.13	0.63	0.30	0.24	0.06
May	100.0	56.95	10.25	5.84	0.67	1.19	0.80	4.66	0.90	3.75
Jun	100.0	68.07	10.39	7.07	0.86	1.24	1.07	7.56	4.21	3.34
Jul	100.0	74.35	10.49	7.80	0.97	1.22	1.18	9.21	1.93	7.28
Aug	100.0	73.74	9.71	7.16	0.96	1.16	1.12	8.00	1.21	6.78
Sep	100.0	66.48	8.41	5.59	0.84	1.08	0.90	5.04	0.95	4.10
Oct15	48.4	61.24	3.79	2.32	0.75	1.01	0.76	1.76	0.27	1.49
Season Total								36.52	9.72	26.80

GRASS_PASTURE.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1963	
Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
Apr16	50.0	47.73	4.68	2.23	0.51	0.95	0.48	1.08	1.08	0.00
May	100.0	56.95	10.25	5.84	0.67	0.98	0.66	3.84	0.86	2.98
Jun	100.0	68.07	10.39	7.07	0.86	1.00	0.87	6.13	3.89	2.24
Jul	100.0	74.35	10.49	7.80	0.97	1.01	0.98	7.64	1.77	5.87
Aug	100.0	73.74	9.71	7.16	0.96	0.99	0.95	6.79	1.13	5.66
Sep	100.0	66.48	8.41	5.59	0.84	0.95	0.79	4.43	0.92	3.52
Oct	100.0	59.42	7.64	4.54	0.71	0.87	0.62	2.81	0.53	2.28
Nov 7	23.3	46.85	1.61	0.76	0.50	0.79	0.39	0.30	0.00	0.29
Season Total								33.03	10.20	22.83

ALFALFA.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1964	
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Month	percent month	temp	daylight	f	Higgins.obc		k	ETp	Re	IWR
		(F)	(%)		kt	kc				
Apr24	23.3	50.97	2.22	1.13	0.57	1.12	0.64	0.72	0.20	0.52
May	100.0	58.45	10.25	5.99	0.70	1.19	0.83	4.96	1.85	3.11
Jun	100.0	64.88	10.39	6.74	0.81	1.24	1.00	6.74	3.53	3.21
Jul	100.0	76.69	10.49	8.05	1.01	1.22	1.23	9.90	0.77	9.13
Aug	100.0	69.42	9.71	6.74	0.89	1.16	1.03	6.94	1.58	5.36
Sep	100.0	59.03	8.41	4.96	0.71	1.08	0.76	3.79	0.50	3.29
Oct15	48.4	53.52	3.79	2.03	0.61	1.01	0.62	1.26	0.16	1.10
Season Total								34.32	8.60	25.72

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1964

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)							
Apr13	60.0	49.00	5.59	2.74	0.53	0.94	0.50	1.38	0.50	0.88
May	100.0	58.45	10.25	5.99	0.70	0.98	0.68	4.10	1.77	2.33
Jun	100.0	64.88	10.39	6.74	0.81	1.00	0.81	5.47	3.29	2.18
Jul	100.0	76.69	10.49	8.05	1.01	1.01	1.02	8.21	0.72	7.49
Aug	100.0	69.42	9.71	6.74	0.89	0.99	0.87	5.90	1.49	4.40
Sep	100.0	59.03	8.41	4.96	0.71	0.95	0.67	3.33	0.49	2.84
Oct26	83.9	52.33	6.47	3.39	0.59	0.87	0.52	1.75	0.27	1.48
Season Total								30.13	8.52	21.61

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1965

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)							
Apr27	13.3	50.44	1.28	0.65	0.56	1.13	0.63	0.41	0.14	0.27
May	100.0	54.66	10.25	5.60	0.63	1.19	0.75	4.20	4.20	0.00
Jun	100.0	64.48	10.39	6.70	0.80	1.24	0.99	6.64	2.76	3.88
Jul	100.0	72.13	10.49	7.57	0.93	1.22	1.13	8.59	0.57	8.02
Aug	100.0	70.66	9.71	6.86	0.91	1.16	1.05	7.24	1.28	5.96
Sep	100.0	49.73	8.41	4.18	0.55	1.08	0.59	2.47	0.98	1.49
Oct15	48.4	53.45	3.79	2.03	0.61	1.01	0.62	1.26	0.19	1.07
Season Total								30.80	10.11	20.69

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1965

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)							
Apr13	60.0	48.71	5.59	2.72	0.53	0.94	0.50	1.36	0.60	0.76
May	100.0	54.66	10.25	5.60	0.63	0.98	0.62	3.47	3.47	0.00
Jun	100.0	64.48	10.39	6.70	0.80	1.00	0.80	5.39	2.57	2.81
Jul	100.0	72.13	10.49	7.57	0.93	1.01	0.94	7.12	0.52	6.60
Aug	100.0	70.66	9.71	6.86	0.91	0.99	0.90	6.15	1.20	4.94
Sep	100.0	49.73	8.41	4.18	0.55	0.95	0.52	2.17	0.96	1.20
Oct	100.0	54.74	7.64	4.18	0.63	0.87	0.55	2.30	0.38	1.92
Nov 3	10.0	45.34	0.70	0.32	0.47	0.80	0.38	0.12	0.00	0.12
Season Total								28.07	9.71	18.36

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1966

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
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month

(F)

(%)

(in)

(in)

(in)

May 5	87.1	56.57	8.94	5.06	0.66	1.19	0.79	4.01	0.19	3.82
Jun	100.0	65.32	10.39	6.79	0.82	1.24	1.01	6.85	1.13	5.72
Jul	100.0	76.63	10.49	8.04	1.01	1.22	1.23	9.88	3.61	6.28
Aug	100.0	65.90	9.71	6.40	0.83	1.16	0.96	6.14	2.47	3.67
Sep	100.0	61.30	8.41	5.16	0.75	1.08	0.81	4.15	1.97	2.18
Oct15	48.4	51.86	3.79	1.97	0.58	1.01	0.59	1.16	0.48	0.68

Season Total 32.20 9.85 22.35

GRASS_PASTURE.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1966

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
Apr26	16.7	45.89	1.59	0.73	0.48	0.95	0.46	0.33	0.26	0.07
May	100.0	55.95	10.25	5.74	0.65	0.98	0.64	3.68	0.21	3.47
Jun	100.0	65.32	10.39	6.79	0.82	1.00	0.82	5.56	1.05	4.50
Jul	100.0	76.63	10.49	8.04	1.01	1.01	1.02	8.20	3.28	4.92
Aug	100.0	65.90	9.71	6.40	0.83	0.99	0.81	5.21	2.35	2.87
Sep	100.0	61.30	8.41	5.16	0.75	0.95	0.71	3.65	1.91	1.73
Oct23	74.2	50.22	5.74	2.88	0.55	0.88	0.49	1.41	0.72	0.69

Season Total 28.04 9.79 18.25

ALFALFA.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1967

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
May16	51.6	52.50	5.31	2.79	0.59	1.21	0.72	2.00	1.11	0.89
Jun	100.0	59.95	10.39	6.23	0.72	1.24	0.89	5.57	4.53	1.04
Jul	100.0	70.58	10.49	7.40	0.91	1.22	1.10	8.16	1.00	7.16
Aug	100.0	70.61	9.71	6.86	0.91	1.16	1.05	7.22	0.85	6.38
Sep	100.0	63.35	8.41	5.33	0.78	1.08	0.84	4.50	1.53	2.96
Oct15	48.4	53.54	3.79	2.03	0.61	1.01	0.62	1.26	0.07	1.19

Season Total 28.71 9.10 19.61

GRASS_PASTURE.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1967

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
Apr20	36.7	45.89	3.46	1.59	0.48	0.95	0.46	0.72	0.72	0.00
May	100.0	49.79	10.25	5.10	0.55	0.98	0.54	2.74	2.02	0.72
Jun	100.0	59.95	10.39	6.23	0.72	1.00	0.73	4.52	4.27	0.24
Jul	100.0	70.58	10.49	7.40	0.91	1.01	0.91	6.77	0.93	5.84
Aug	100.0	70.61	9.71	6.86	0.91	0.99	0.89	6.14	0.80	5.34
Sep	100.0	63.35	8.41	5.33	0.78	0.95	0.74	3.95	1.49	2.46
Oct25	80.6	51.41	6.22	3.20	0.58	0.88	0.50	1.61	0.12	1.49

Season Total 26.45 10.35 16.10

ALFALFA.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1968

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
May12	64.5	53.25	6.63	3.53	0.61	1.20	0.73	2.58	0.78	1.79

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Jun	100.0	62.98	10.39	6.54	0.78	1.24	0.96	6.28	4.85	1.43
Jul	100.0	69.13	10.49	7.25	0.88	1.22	1.07	7.77	2.11	5.67
Aug	100.0	66.97	9.71	6.50	0.84	1.16	0.98	6.38	1.96	4.41
Sep	100.0	59.77	8.41	5.03	0.72	1.08	0.78	3.91	0.66	3.25
Oct15	48.4	53.25	3.79	2.02	0.61	1.01	0.62	1.24	0.01	1.23

Season Total 28.15 10.37 17.78

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1968

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr24	23.3	45.77	2.22	1.02	0.48	0.95	0.45	0.46	0.27	0.19
May	100.0	50.82	10.25	5.21	0.57	0.98	0.55	2.89	1.14	1.75
Jun	100.0	62.98	10.39	6.54	0.78	1.00	0.78	5.09	4.53	0.56
Jul	100.0	69.13	10.49	7.25	0.88	1.01	0.89	6.45	1.96	4.49
Aug	100.0	66.97	9.71	6.50	0.84	0.99	0.83	5.42	1.86	3.56
Sep	100.0	59.77	8.41	5.03	0.72	0.95	0.68	3.43	0.64	2.79
Oct27	87.1	51.55	6.70	3.45	0.58	0.87	0.50	1.74	0.02	1.72

Season Total 25.48 10.43 15.05

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1969

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr17	46.7	51.86	4.39	2.27	0.58	1.11	0.65	1.48	0.52	0.96
May	100.0	57.42	10.25	5.89	0.68	1.19	0.81	4.75	1.62	3.13
Jun	100.0	59.78	10.39	6.21	0.72	1.24	0.89	5.53	1.58	3.95
Jul	100.0	70.95	10.49	7.44	0.91	1.22	1.11	8.26	4.83	3.43
Aug	100.0	73.74	9.71	7.16	0.96	1.16	1.12	8.00	0.24	7.75
Sep	100.0	64.75	8.41	5.45	0.81	1.08	0.87	4.74	0.24	4.50
Oct15	48.4	46.82	3.79	1.78	0.50	1.01	0.50	0.89	0.27	0.62

Season Total 33.65 9.31 24.34

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1969

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr 9	73.3	50.84	6.78	3.45	0.57	0.94	0.53	1.83	0.78	1.05
May	100.0	57.42	10.25	5.89	0.68	0.98	0.67	3.92	1.55	2.37
Jun	100.0	59.78	10.39	6.21	0.72	1.00	0.72	4.49	1.49	2.99
Jul	100.0	70.95	10.49	7.44	0.91	1.01	0.92	6.85	4.47	2.39
Aug	100.0	73.74	9.71	7.16	0.96	0.99	0.95	6.79	0.23	6.56
Sep	100.0	64.75	8.41	5.45	0.81	0.95	0.76	4.16	0.23	3.93
Oct10	32.3	49.16	2.55	1.25	0.54	0.90	0.48	0.61	0.18	0.43

Season Total 28.66 8.93 19.73

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1970

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 5	87.1	56.26	8.94	5.03	0.66	1.19	0.79	3.96	1.52	2.44
Jun	100.0	65.53	10.39	6.81	0.82	1.24	1.01	6.90	1.80	5.11
Jul	100.0	72.71	10.49	7.63	0.94	1.22	1.15	8.75	1.01	7.74
Aug	100.0	73.77	9.71	7.16	0.96	1.16	1.12	8.00	0.62	7.39

Higgins.obc										
Sep	100.0	59.05	8.41	4.97	0.71	1.08	0.76	3.79	1.13	2.66
Oct15	48.4	47.96	3.79	1.82	0.52	1.01	0.52	0.95	0.39	0.56

Season Total								32.36	6.46	25.90
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GRASS_PASTURE.TR21	METHOD=TR21 Modified Blaney-Criddle							Year=1970		
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Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
Apr26	16.7	46.08	1.59	0.73	0.48	0.95	0.46	0.34	0.34	0.00
May	100.0	55.60	10.25	5.70	0.65	0.98	0.64	3.62	1.65	1.97
Jun	100.0	65.53	10.39	6.81	0.82	1.00	0.82	5.60	1.67	3.93
Jul	100.0	72.71	10.49	7.63	0.94	1.01	0.95	7.26	0.93	6.33
Aug	100.0	73.77	9.71	7.16	0.96	0.99	0.95	6.80	0.58	6.22
Sep	100.0	59.05	8.41	4.97	0.71	0.95	0.67	3.33	1.10	2.23
Oct14	45.2	48.44	3.55	1.72	0.52	0.89	0.47	0.81	0.36	0.44

Season Total								27.75	6.63	21.12
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ALFALFA.TR21	METHOD=TR21 Modified Blaney-Criddle							Year=1971		
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Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
May 1	100.0	53.61	10.25	5.50	0.61	1.19	0.73	4.01	2.47	1.55
Jun	100.0	66.32	10.39	6.89	0.83	1.24	1.03	7.10	1.63	5.47
Jul	100.0	67.98	10.49	7.13	0.86	1.22	1.05	7.47	1.30	6.17
Aug	100.0	73.84	9.71	7.17	0.96	1.16	1.12	8.02	0.47	7.55
Sep	100.0	57.40	8.41	4.83	0.68	1.08	0.73	3.54	1.59	1.95
Oct15	48.4	48.99	3.79	1.86	0.53	1.01	0.54	1.01	0.63	0.38

Season Total								31.15	8.08	23.07
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GRASS_PASTURE.TR21	METHOD=TR21 Modified Blaney-Criddle							Year=1971		
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Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
Apr13	60.0	47.70	5.59	2.67	0.51	0.94	0.48	1.29	1.06	0.22
May	100.0	53.61	10.25	5.50	0.61	0.98	0.60	3.31	2.37	0.94
Jun	100.0	66.32	10.39	6.89	0.83	1.00	0.84	5.76	1.52	4.24
Jul	100.0	67.98	10.49	7.13	0.86	1.01	0.87	6.20	1.21	4.99
Aug	100.0	73.84	9.71	7.17	0.96	0.99	0.95	6.81	0.44	6.38
Sep	100.0	57.40	8.41	4.83	0.68	0.95	0.64	3.11	1.55	1.56
Oct18	58.1	48.62	4.54	2.21	0.53	0.89	0.47	1.03	0.74	0.29

Season Total								27.50	8.88	18.62
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ALFALFA.TR21	METHOD=TR21 Modified Blaney-Criddle							Year=1972		
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Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
May 2	96.8	55.45	9.93	5.50	0.65	1.19	0.77	4.23	2.19	2.04
Jun	100.0	64.63	10.39	6.72	0.80	1.24	0.99	6.68	3.14	3.54
Jul	100.0	65.56	10.49	6.88	0.82	1.22	1.00	6.85	1.42	5.44
Aug	100.0	69.11	9.71	6.71	0.88	1.16	1.02	6.87	2.04	4.83
Sep	100.0	59.37	8.41	4.99	0.71	1.08	0.77	3.84	0.13	3.71
Oct15	48.4	47.79	3.79	1.81	0.51	1.01	0.52	0.94	0.25	0.70

Season Total								29.42	9.16	20.26
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Higgins.obc

GRASS_PASTURE.TR21										
METHOD=TR21 Modified Blaney-Criddle										
Year=1972										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr19	40.0	47.29	3.78	1.79	0.50	0.95	0.48	0.85	0.69	0.16
May	100.0	55.13	10.25	5.65	0.64	0.98	0.63	3.55	2.16	1.39
Jun	100.0	64.63	10.39	6.72	0.80	1.00	0.81	5.42	2.92	2.49
Jul	100.0	65.56	10.49	6.88	0.82	1.01	0.83	5.69	1.33	4.36
Aug	100.0	69.11	9.71	6.71	0.88	0.99	0.87	5.83	1.92	3.91
Sep	100.0	59.37	8.41	4.99	0.71	0.95	0.68	3.38	0.12	3.25
Oct13	41.9	48.29	3.30	1.59	0.52	0.90	0.47	0.75	0.21	0.53
Season Total								25.46	9.36	16.09

ALFALFA.TR21										
METHOD=TR21 Modified Blaney-Criddle										
Year=1973										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 5	87.1	54.46	8.94	4.87	0.63	1.19	0.75	3.65	1.46	2.19
Jun	100.0	64.65	10.39	6.72	0.80	1.24	1.00	6.69	0.55	6.14
Jul	100.0	70.69	10.49	7.42	0.91	1.22	1.10	8.19	1.35	6.84
Aug	100.0	74.24	9.71	7.21	0.97	1.16	1.13	8.12	0.69	7.43
Sep	100.0	57.07	8.41	4.80	0.67	1.08	0.73	3.49	1.02	2.46
Oct15	48.4	52.80	3.79	2.00	0.60	1.01	0.61	1.22	0.45	0.77
Season Total								31.35	5.52	25.83

GRASS_PASTURE.TR21										
METHOD=TR21 Modified Blaney-Criddle										
Year=1973										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr21	33.3	46.70	3.16	1.48	0.49	0.95	0.47	0.69	0.56	0.14
May	100.0	53.73	10.25	5.51	0.62	0.98	0.60	3.33	1.60	1.73
Jun	100.0	64.65	10.39	6.72	0.80	1.00	0.81	5.42	0.51	4.91
Jul	100.0	70.69	10.49	7.42	0.91	1.01	0.92	6.80	1.25	5.55
Aug	100.0	74.24	9.71	7.21	0.97	0.99	0.96	6.90	0.64	6.25
Sep	100.0	57.07	8.41	4.80	0.67	0.95	0.64	3.06	1.00	2.06
Oct25	80.6	51.88	6.22	3.23	0.58	0.88	0.51	1.65	0.73	0.92
Season Total								27.85	6.29	21.56

ALFALFA.TR21										
METHOD=TR21 Modified Blaney-Criddle										
Year=1974										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr28	10.0	50.13	0.96	0.48	0.55	1.13	0.63	0.30	0.11	0.19
May	100.0	53.79	10.25	5.51	0.62	1.19	0.73	4.04	0.97	3.07
Jun	100.0	66.62	10.39	6.92	0.84	1.24	1.04	7.18	0.97	6.21
Jul	100.0	77.29	10.49	8.11	1.02	1.22	1.24	10.08	0.68	9.40
Aug	100.0	67.63	9.71	6.57	0.86	1.16	0.99	6.53	1.16	5.37
Sep	100.0	57.60	8.41	4.84	0.68	1.08	0.74	3.57	0.64	2.93
Oct15	48.4	53.19	3.79	2.02	0.61	1.01	0.62	1.24	0.39	0.85
Season Total								32.94	4.92	28.02

GRASS_PASTURE.TR21										
METHOD=TR21 Modified Blaney-Criddle										
Year=1974										

Month	percent month	temp	daylight	f	Higgins.obc		k	ETp	Re	IWR
		(F)	(%)		kt	kc				
Apr 9	73.3	48.20	6.78	3.27	0.52	0.94	0.49	1.60	0.75	0.85
May	100.0	53.79	10.25	5.51	0.62	0.98	0.60	3.34	0.94	2.40
Jun	100.0	66.62	10.39	6.92	0.84	1.00	0.84	5.82	0.90	4.92
Jul	100.0	77.29	10.49	8.11	1.02	1.01	1.03	8.36	0.64	7.72
Aug	100.0	67.63	9.71	6.57	0.86	0.99	0.84	5.54	1.10	4.45
Sep	100.0	57.60	8.41	4.84	0.68	0.95	0.65	3.13	0.62	2.51
Oct28	90.3	52.04	6.95	3.61	0.59	0.87	0.51	1.84	0.71	1.14
Season Total								29.64	5.65	23.99

ALFALFA.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1975	
Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)							
May 7	80.6	54.77	8.28	4.53	0.63	1.20	0.76	3.44	0.74	2.69
Jun	100.0	62.18	10.39	6.46	0.76	1.24	0.94	6.09	3.98	2.11
Jul	100.0	74.68	10.49	7.84	0.98	1.22	1.19	9.31	1.54	7.77
Aug	100.0	70.27	9.71	6.82	0.90	1.16	1.05	7.14	0.77	6.37
Sep	100.0	58.50	8.41	4.92	0.70	1.08	0.75	3.71	0.00	3.71
Oct15	48.4	51.56	3.79	1.96	0.58	1.01	0.59	1.15	0.22	0.92
Season Total								30.83	7.26	23.57

GRASS_PASTURE.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1975	
Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)							
Apr25	20.0	46.15	1.91	0.88	0.48	0.95	0.46	0.41	0.18	0.23
May	100.0	53.95	10.25	5.53	0.62	0.98	0.61	3.36	0.88	2.48
Jun	100.0	62.18	10.39	6.46	0.76	1.00	0.76	4.94	3.73	1.20
Jul	100.0	74.68	10.49	7.84	0.98	1.01	0.99	7.72	1.41	6.32
Aug	100.0	70.27	9.71	6.82	0.90	0.99	0.89	6.07	0.73	5.34
Sep	100.0	58.50	8.41	4.92	0.70	0.95	0.66	3.26	0.00	3.26
Oct23	74.2	50.36	5.74	2.89	0.56	0.88	0.49	1.42	0.34	1.08
Season Total								27.17	7.26	19.91

ALFALFA.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1976	
Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)							
Apr26	16.7	50.44	1.59	0.80	0.56	1.13	0.63	0.51	0.29	0.21
May	100.0	55.34	10.25	5.67	0.64	1.19	0.76	4.34	1.93	2.41
Jun	100.0	64.25	10.39	6.68	0.80	1.24	0.99	6.59	3.57	3.01
Jul	100.0	72.73	10.49	7.63	0.94	1.22	1.15	8.75	1.02	7.74
Aug	100.0	72.58	9.71	7.05	0.94	1.16	1.09	7.71	1.19	6.52
Sep	100.0	63.27	8.41	5.32	0.78	1.08	0.84	4.48	0.17	4.31
Oct15	48.4	49.97	3.79	1.90	0.55	1.01	0.56	1.06	0.04	1.01
Season Total								33.43	8.21	25.22

GRASS_PASTURE.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1976	
Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)							

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Apr11	66.7	48.53	6.19	3.00	0.53	0.94	0.50	1.49	1.13	0.36
May	100.0	55.34	10.25	5.67	0.64	0.98	0.63	3.58	1.85	1.73
Jun	100.0	64.25	10.39	6.68	0.80	1.00	0.80	5.34	3.33	2.01
Jul	100.0	72.73	10.49	7.63	0.94	1.01	0.95	7.26	0.93	6.33
Aug	100.0	72.58	9.71	7.05	0.94	0.99	0.93	6.54	1.11	5.43
Sep	100.0	63.27	8.41	5.32	0.78	0.95	0.74	3.94	0.17	3.77
Oct16	51.6	49.97	4.05	2.02	0.55	0.89	0.49	0.99	0.05	0.95
Season Total								29.14	8.57	20.58

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1977										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr16	50.0	52.25	4.68	2.45	0.59	1.11	0.65	1.60	0.55	1.05
May	100.0	60.23	10.25	6.17	0.73	1.19	0.86	5.34	1.87	3.47
Jun	100.0	69.00	10.39	7.17	0.88	1.24	1.09	7.80	1.57	6.23
Jul	100.0	73.35	10.49	7.70	0.95	1.22	1.16	8.93	2.68	6.25
Aug	100.0	65.97	9.71	6.41	0.83	1.16	0.96	6.15	1.45	4.70
Sep	100.0	60.97	8.41	5.13	0.74	1.08	0.80	4.10	1.98	2.12
Oct15	48.4	51.95	3.79	1.97	0.58	1.01	0.59	1.17	0.35	0.82
Season Total								35.09	10.45	24.64

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1977										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr 5	86.7	50.52	7.94	4.01	0.56	0.94	0.52	2.11	0.91	1.20
May	100.0	60.23	10.25	6.17	0.73	0.98	0.71	4.41	1.78	2.63
Jun	100.0	69.00	10.39	7.17	0.88	1.00	0.88	6.33	1.45	4.88
Jul	100.0	73.35	10.49	7.70	0.95	1.01	0.96	7.41	2.46	4.94
Aug	100.0	65.97	9.71	6.41	0.83	0.99	0.82	5.23	1.38	3.85
Sep	100.0	60.97	8.41	5.13	0.74	0.95	0.70	3.60	1.92	1.68
Oct22	71.0	50.77	5.51	2.80	0.56	0.88	0.50	1.39	0.50	0.89
Season Total								30.47	10.40	20.07

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1978										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr30	3.3	49.94	0.32	0.16	0.55	1.14	0.62	0.10	0.05	0.05
May	100.0	55.03	10.25	5.64	0.64	1.19	0.76	4.28	2.15	2.12
Jun	100.0	65.03	10.39	6.76	0.81	1.24	1.00	6.78	1.67	5.11
Jul	100.0	71.08	10.49	7.46	0.92	1.22	1.11	8.30	3.41	4.89
Aug	100.0	69.66	9.71	6.76	0.89	1.16	1.03	7.00	1.23	5.77
Sep	100.0	66.20	8.41	5.57	0.83	1.08	0.90	4.99	0.08	4.92
Oct15	48.4	54.53	3.79	2.07	0.63	1.01	0.64	1.32	0.07	1.25
Season Total								32.76	8.66	24.11

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1978										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr15	53.3	47.71	4.99	2.38	0.51	0.95	0.48	1.15	0.75	0.41

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May	100.0	55.03	10.25	5.64	0.64	0.98	0.63	3.53	2.07	1.46
Jun	100.0	65.03	10.39	6.76	0.81	1.00	0.81	5.50	1.56	3.94
Jul	100.0	71.08	10.49	7.46	0.92	1.01	0.92	6.88	3.15	3.73
Aug	100.0	69.66	9.71	6.76	0.89	0.99	0.88	5.94	1.16	4.78
Sep	100.0	66.20	8.41	5.57	0.83	0.95	0.79	4.39	0.07	4.31
Oct23	74.2	52.50	5.74	3.01	0.59	0.88	0.52	1.58	0.10	1.48

Season Total 28.97 8.85 20.12

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1979

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
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May 4	90.3	54.34	9.27	5.04	0.63	1.19	0.75	3.76	0.79	2.98
Jun	100.0	65.32	10.39	6.79	0.82	1.24	1.01	6.85	2.82	4.03
Jul	100.0	70.39	10.49	7.39	0.90	1.22	1.10	8.11	3.40	4.71
Aug	100.0	68.47	9.71	6.65	0.87	1.16	1.01	6.72	1.90	4.82
Sep	100.0	66.25	8.41	5.57	0.83	1.08	0.90	5.00	0.00	5.00
Oct15	48.4	54.80	3.79	2.08	0.63	1.01	0.64	1.34	0.30	1.04

Season Total 31.79 9.21 22.58

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1979

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
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Apr17	46.7	47.06	4.39	2.06	0.50	0.95	0.47	0.98	0.08	0.90
May	100.0	53.56	10.25	5.49	0.61	0.98	0.60	3.30	0.83	2.47
Jun	100.0	65.32	10.39	6.79	0.82	1.00	0.82	5.56	2.62	2.93
Jul	100.0	70.39	10.49	7.39	0.90	1.01	0.91	6.73	3.14	3.58
Aug	100.0	68.47	9.71	6.65	0.87	0.99	0.86	5.71	1.79	3.91
Sep	100.0	66.25	8.41	5.57	0.83	0.95	0.79	4.40	0.00	4.40
Oct25	80.6	52.31	6.22	3.25	0.59	0.88	0.52	1.69	0.48	1.20

Season Total 28.35 8.96 19.39

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1980

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
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Apr19	40.0	51.60	3.78	1.95	0.58	1.12	0.65	1.26	0.32	0.94
May	100.0	57.37	10.25	5.88	0.68	1.19	0.81	4.74	1.20	3.54
Jun	100.0	67.03	10.39	6.97	0.85	1.24	1.05	7.29	3.68	3.61
Jul	100.0	74.89	10.49	7.86	0.98	1.22	1.19	9.37	1.73	7.64
Aug	100.0	68.53	9.71	6.65	0.87	1.16	1.01	6.73	1.94	4.79
Sep	100.0	61.58	8.41	5.18	0.75	1.08	0.81	4.20	0.34	3.85
Oct15	48.4	52.11	3.79	1.98	0.59	1.01	0.60	1.18	0.71	0.47

Season Total 34.77 9.92 24.84

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1980

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
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Apr 9	73.3	50.22	6.78	3.40	0.55	0.94	0.52	1.78	0.56	1.21
May	100.0	57.37	10.25	5.88	0.68	0.98	0.67	3.91	1.14	2.77
Jun	100.0	67.03	10.39	6.97	0.85	1.00	0.85	5.91	3.40	2.50
Jul	100.0	74.89	10.49	7.86	0.98	1.01	0.99	7.77	1.58	6.19

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Aug	100.0	68.53	9.71	6.65	0.87	0.99	0.86	5.72	1.84	3.88
Sep	100.0	61.58	8.41	5.18	0.75	0.95	0.71	3.69	0.33	3.35
Oct27	87.1	49.64	6.70	3.32	0.54	0.87	0.48	1.58	1.24	0.35

Season Total 30.36 10.10 20.26

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1981

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr12	63.3	52.15	5.88	3.07	0.59	1.10	0.65	1.99	0.12	1.86
May	100.0	54.87	10.25	5.62	0.64	1.19	0.75	4.24	1.96	2.28
Jun	100.0	64.88	10.39	6.74	0.81	1.24	1.00	6.74	1.58	5.16
Jul	100.0	71.94	10.49	7.55	0.93	1.22	1.13	8.53	3.74	4.79
Aug	100.0	70.00	9.71	6.80	0.90	1.16	1.04	7.08	1.49	5.59
Sep	100.0	63.53	8.41	5.34	0.79	1.08	0.85	4.53	0.05	4.47
Oct15	48.4	51.76	3.79	1.96	0.58	1.01	0.59	1.16	0.58	0.58

Season Total 34.27 9.52 24.75

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1981

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Mar28	12.9	45.38	1.12	0.51	0.47	0.88	0.41	0.21	0.00	0.21
Apr	100.0	51.50	9.05	4.66	0.58	0.93	0.54	2.51	0.19	2.32
May	100.0	54.87	10.25	5.62	0.64	0.98	0.62	3.51	1.88	1.62
Jun	100.0	64.88	10.39	6.74	0.81	1.00	0.81	5.47	1.47	4.00
Jul	100.0	71.94	10.49	7.55	0.93	1.01	0.94	7.08	3.45	3.63
Aug	100.0	70.00	9.71	6.80	0.90	0.99	0.88	6.01	1.41	4.61
Sep	100.0	63.53	8.41	5.34	0.79	0.95	0.74	3.98	0.05	3.93
Oct26	83.9	49.20	6.47	3.18	0.54	0.87	0.47	1.49	0.96	0.53

Season Total 30.25 9.41 20.84

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1982

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 6	83.9	53.95	8.61	4.64	0.62	1.20	0.74	3.44	3.38	0.06
Jun	100.0	59.62	10.39	6.20	0.72	1.24	0.89	5.50	2.16	3.34
Jul	100.0	70.69	10.49	7.42	0.91	1.22	1.10	8.19	1.65	6.54
Aug	100.0	70.19	9.71	6.82	0.90	1.16	1.05	7.12	3.70	3.43
Sep	100.0	58.65	8.41	4.93	0.70	1.08	0.76	3.73	1.83	1.90
Oct15	48.4	50.12	3.79	1.90	0.55	1.01	0.56	1.07	1.07	0.00

Season Total 29.05 13.78 15.27

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1982

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr23	26.7	46.42	2.54	1.18	0.49	0.95	0.47	0.55	0.12	0.43
May	100.0	53.32	10.25	5.47	0.61	0.98	0.60	3.26	3.26	0.00
Jun	100.0	59.62	10.39	6.20	0.72	1.00	0.72	4.46	2.03	2.42
Jul	100.0	70.69	10.49	7.42	0.91	1.01	0.92	6.80	1.52	5.27
Aug	100.0	70.19	9.71	6.82	0.90	0.99	0.89	6.05	3.48	2.57
Sep	100.0	58.65	8.41	4.93	0.70	0.95	0.66	3.28	1.79	1.49

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Oct20	64.5	49.38	5.02	2.48	0.54	0.88	0.48	1.19	1.19	0.00
Season Total								25.58	13.40	12.18
ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1983										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May10	71.0	53.81	7.29	3.92	0.62	1.20	0.74	2.90	1.10	1.80
Jun	100.0	63.08	10.39	6.55	0.78	1.24	0.96	6.30	2.34	3.96
Jul	100.0	73.65	10.49	7.73	0.96	1.22	1.17	9.01	1.84	7.18
Aug	100.0	77.95	9.71	7.57	1.03	1.16	1.20	9.09	2.23	6.87
Sep	100.0	60.75	8.41	5.11	0.74	1.08	0.80	4.06	0.21	3.85
Oct15	48.4	52.32	3.79	1.98	0.59	1.01	0.60	1.19	0.56	0.63
Season Total								32.56	8.27	24.30
GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1983										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr27	13.3	45.75	1.28	0.59	0.48	0.96	0.46	0.27	0.09	0.18
May	100.0	51.95	10.25	5.33	0.58	0.98	0.57	3.05	1.46	1.59
Jun	100.0	63.08	10.39	6.55	0.78	1.00	0.78	5.11	2.19	2.92
Jul	100.0	73.65	10.49	7.73	0.96	1.01	0.97	7.48	1.69	5.79
Aug	100.0	77.95	9.71	7.57	1.03	0.99	1.02	7.72	2.06	5.66
Sep	100.0	60.75	8.41	5.11	0.74	0.95	0.70	3.57	0.21	3.36
Oct24	77.4	50.86	5.99	3.05	0.57	0.88	0.50	1.51	0.87	0.65
Season Total								28.71	8.56	20.16
ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1984										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 4	90.3	54.19	9.27	5.02	0.62	1.19	0.74	3.74	1.04	2.70
Jun	100.0	62.77	10.39	6.52	0.77	1.24	0.95	6.23	3.45	2.78
Jul	100.0	72.23	10.49	7.58	0.94	1.22	1.14	8.61	1.48	7.14
Aug	100.0	74.79	9.71	7.26	0.98	1.16	1.14	8.26	0.94	7.32
Sep	100.0	57.17	8.41	4.81	0.68	1.08	0.73	3.50	0.53	2.97
Oct15	48.4	49.74	3.79	1.89	0.55	1.01	0.55	1.05	0.22	0.83
Season Total								31.39	7.66	23.74
GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1984										
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr19	40.0	46.95	3.78	1.77	0.50	0.95	0.47	0.84	0.76	0.08
May	100.0	53.58	10.25	5.49	0.61	0.98	0.60	3.30	1.10	2.20
Jun	100.0	62.77	10.39	6.52	0.77	1.00	0.77	5.05	3.23	1.82
Jul	100.0	72.23	10.49	7.58	0.94	1.01	0.94	7.15	1.36	5.78
Aug	100.0	74.79	9.71	7.26	0.98	0.99	0.97	7.02	0.88	6.14
Sep	100.0	57.17	8.41	4.81	0.68	0.95	0.64	3.08	0.52	2.56
Oct22	71.0	48.77	5.51	2.69	0.53	0.88	0.47	1.25	0.31	0.94
Season Total								27.69	8.15	19.53

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ALFALFA.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1985

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr12	63.3	53.87	5.88	3.17	0.62	1.10	0.68	2.16	0.12	2.03
May	100.0	61.76	10.25	6.33	0.75	1.19	0.90	5.67	1.00	4.67
Jun	100.0	62.10	10.39	6.45	0.76	1.24	0.94	6.07	1.29	4.78
Jul	100.0	74.56	10.49	7.82	0.98	1.22	1.19	9.28	1.03	8.25
Aug	100.0	69.03	9.71	6.70	0.88	1.16	1.02	6.85	1.57	5.28
Sep	100.0	55.52	8.41	4.67	0.65	1.08	0.70	3.26	1.10	2.16
Oct15	48.4	49.39	3.79	1.87	0.54	1.01	0.55	1.03	0.32	0.71
Season Total								34.31	6.42	27.89

GRASS_PASTURE.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1985

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr 2	96.7	52.30	8.79	4.59	0.59	0.93	0.55	2.53	0.18	2.35
May	100.0	61.76	10.25	6.33	0.75	0.98	0.74	4.69	0.95	3.74
Jun	100.0	62.10	10.39	6.45	0.76	1.00	0.76	4.92	1.21	3.71
Jul	100.0	74.56	10.49	7.82	0.98	1.01	0.98	7.69	0.94	6.76
Aug	100.0	69.03	9.71	6.70	0.88	0.99	0.87	5.82	1.48	4.34
Sep	100.0	55.52	8.41	4.67	0.65	0.95	0.61	2.86	1.07	1.79
Oct17	54.8	49.13	4.28	2.10	0.54	0.89	0.48	1.01	0.35	0.65
Season Total								29.52	6.18	23.34

ALFALFA.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1986

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 2	96.8	55.34	9.93	5.49	0.64	1.19	0.77	4.21	1.03	3.18
Jun	100.0	67.63	10.39	7.03	0.86	1.24	1.06	7.44	3.58	3.86
Jul	100.0	70.84	10.49	7.43	0.91	1.22	1.11	8.23	0.86	7.37
Aug	100.0	69.63	9.71	6.76	0.89	1.16	1.03	6.99	1.15	5.84
Sep	100.0	54.92	8.41	4.62	0.64	1.08	0.69	3.17	2.04	1.13
Oct15	48.4	50.33	3.79	1.91	0.56	1.01	0.56	1.08	0.52	0.56
Season Total								31.13	9.18	21.95

GRASS_PASTURE.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1986

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr17	46.7	47.28	4.39	2.07	0.50	0.95	0.48	0.99	0.99	0.00
May	100.0	54.92	10.25	5.63	0.64	0.98	0.62	3.51	1.02	2.49
Jun	100.0	67.63	10.39	7.03	0.86	1.00	0.86	6.03	3.31	2.72
Jul	100.0	70.84	10.49	7.43	0.91	1.01	0.92	6.83	0.79	6.04
Aug	100.0	69.63	9.71	6.76	0.89	0.99	0.88	5.94	1.08	4.86
Sep	100.0	54.92	8.41	4.62	0.64	0.95	0.60	2.79	1.99	0.79
Oct21	67.7	49.74	5.26	2.62	0.55	0.88	0.48	1.26	0.72	0.55
Season Total								27.35	9.90	17.45

ALFALFA.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=1987

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
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month

(F)

(%)

(in)

(in)

(in)

Apr13	60.0	53.18	5.59	2.97	0.61	1.11	0.67	1.99	0.00	1.99
May	100.0	59.44	10.25	6.09	0.71	1.19	0.85	5.17	2.44	2.73
Jun	100.0	67.12	10.39	6.97	0.85	1.24	1.05	7.31	1.21	6.10
Jul	100.0	75.40	10.49	7.91	0.99	1.22	1.20	9.52	0.83	8.69
Aug	100.0	68.11	9.71	6.61	0.86	1.16	1.00	6.64	1.93	4.71
Sep	100.0	61.37	8.41	5.16	0.75	1.08	0.81	4.16	0.51	3.66
Oct15	48.4	50.80	3.79	1.93	0.56	1.01	0.57	1.10	0.06	1.04

Season Total 35.90 6.97 28.92

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1987

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
Apr 5	86.7	52.13	7.94	4.14	0.59	0.94	0.55	2.28	0.00	2.28
May	100.0	59.44	10.25	6.09	0.71	0.98	0.70	4.27	2.32	1.95
Jun	100.0	67.12	10.39	6.97	0.85	1.00	0.85	5.93	1.12	4.81
Jul	100.0	75.40	10.49	7.91	0.99	1.01	1.00	7.90	0.77	7.13
Aug	100.0	68.11	9.71	6.61	0.86	0.99	0.85	5.64	1.82	3.82
Sep	100.0	61.37	8.41	5.16	0.75	0.95	0.71	3.66	0.49	3.17
Oct24	77.4	48.97	5.99	2.93	0.53	0.88	0.47	1.37	0.10	1.27

Season Total 31.04 6.62 24.43

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1988

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
Apr22	30.0	51.66	2.84	1.47	0.58	1.12	0.65	0.95	0.13	0.83
May	100.0	59.94	10.25	6.14	0.72	1.19	0.86	5.28	2.36	2.92
Jun	100.0	75.58	10.39	7.85	0.99	1.24	1.23	9.65	1.09	8.56
Jul	100.0	76.03	10.49	7.98	1.00	1.22	1.22	9.70	0.35	9.35
Aug	100.0	72.48	9.71	7.04	0.94	1.16	1.09	7.68	1.74	5.94
Sep	100.0	60.37	8.41	5.08	0.73	1.08	0.79	4.00	0.41	3.60
Oct15	48.4	52.39	3.79	1.99	0.59	1.01	0.60	1.19	0.25	0.94

Season Total 38.46 6.32 32.14

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1988

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)
Apr10	70.0	49.17	6.47	3.18	0.54	0.94	0.50	1.61	0.28	1.33
May	100.0	59.94	10.25	6.14	0.72	0.98	0.71	4.36	2.24	2.11
Jun	100.0	75.58	10.39	7.85	0.99	1.00	1.00	7.83	1.00	6.83
Jul	100.0	76.03	10.49	7.98	1.00	1.01	1.01	8.05	0.32	7.73
Aug	100.0	72.48	9.71	7.04	0.94	0.99	0.93	6.52	1.63	4.90
Sep	100.0	60.37	8.41	5.08	0.73	0.95	0.69	3.52	0.39	3.12
Oct26	83.9	50.65	6.47	3.28	0.56	0.87	0.49	1.61	0.42	1.19

Season Total 33.49 6.29 27.20

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1989

Month	percent month	temp	daylight	f	kt	kc	k	ETp	Re	IWR
		(F)	(%)					(in)	(in)	(in)

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Apr29	6.7	50.39	0.64	0.32	0.56	1.14	0.63	0.20	0.07	0.14
May	100.0	55.32	10.25	5.67	0.64	1.19	0.76	4.33	1.05	3.29
Jun	100.0	63.97	10.39	6.65	0.79	1.24	0.98	6.52	0.89	5.63
Jul	100.0	76.97	10.49	8.08	1.02	1.22	1.24	9.98	0.82	9.16
Aug	100.0	73.08	9.71	7.10	0.95	1.16	1.10	7.83	1.52	6.31
Sep	100.0	61.03	8.41	5.13	0.74	1.08	0.80	4.11	2.12	1.99
Oct15	48.4	51.95	3.79	1.97	0.58	1.01	0.59	1.17	0.48	0.69
Season Total								34.15	6.94	27.20

GRASS_PASTURE.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1989	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr14	56.7	47.93	5.28	2.53	0.52	0.94	0.49	1.23	0.55	0.68
May	100.0	55.32	10.25	5.67	0.64	0.98	0.63	3.58	1.00	2.58
Jun	100.0	63.97	10.39	6.65	0.79	1.00	0.80	5.29	0.83	4.46
Jul	100.0	76.97	10.49	8.08	1.02	1.01	1.03	8.28	0.77	7.51
Aug	100.0	73.08	9.71	7.10	0.95	0.99	0.94	6.65	1.43	5.22
Sep	100.0	61.03	8.41	5.13	0.74	0.95	0.70	3.61	2.06	1.55
Oct24	77.4	50.37	5.99	3.02	0.56	0.88	0.49	1.48	0.75	0.73
Season Total								30.11	7.38	22.73

ALFALFA.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1990	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 4	90.3	54.08	9.27	5.01	0.62	1.19	0.74	3.72	2.84	0.88
Jun	100.0	66.55	10.39	6.92	0.84	1.24	1.04	7.16	1.24	5.92
Jul	100.0	71.68	10.49	7.52	0.93	1.22	1.13	8.46	1.78	6.68
Aug	100.0	73.71	9.71	7.16	0.96	1.16	1.12	7.99	1.68	6.31
Sep	100.0	65.88	8.41	5.54	0.83	1.08	0.89	4.94	1.80	3.14
Oct15	48.4	52.76	3.79	2.00	0.60	1.01	0.61	1.22	0.20	1.02
Season Total								33.48	9.54	23.95

GRASS_PASTURE.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1990	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr15	53.3	47.08	4.99	2.35	0.50	0.95	0.47	1.11	0.27	0.84
May	100.0	53.19	10.25	5.45	0.61	0.98	0.59	3.24	3.00	0.25
Jun	100.0	66.55	10.39	6.92	0.84	1.00	0.84	5.81	1.15	4.66
Jul	100.0	71.68	10.49	7.52	0.93	1.01	0.93	7.02	1.64	5.38
Aug	100.0	73.71	9.71	7.16	0.96	0.99	0.95	6.78	1.57	5.22
Sep	100.0	65.88	8.41	5.54	0.83	0.95	0.78	4.34	1.74	2.60
Oct28	90.3	49.33	6.95	3.43	0.54	0.87	0.47	1.61	0.36	1.25
Season Total								29.91	9.73	20.19

ALFALFA.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1991	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr26	16.7	50.62	1.59	0.81	0.56	1.13	0.63	0.51	0.32	0.19
May	100.0	56.56	10.25	5.80	0.66	1.19	0.79	4.58	2.96	1.62

Higgins.obc

Jun	100.0	67.15	10.39	6.98	0.85	1.24	1.05	7.32	2.66	4.66
Jul	100.0	72.90	10.49	7.65	0.95	1.22	1.15	8.80	1.84	6.96
Aug	100.0	73.98	9.71	7.18	0.97	1.16	1.12	8.06	0.53	7.53
Sep	100.0	61.13	8.41	5.14	0.74	1.08	0.80	4.12	0.43	3.69
Oct15	48.4	50.22	3.79	1.90	0.55	1.01	0.56	1.07	0.33	0.75

Season Total 34.46 9.07 25.39

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1991

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr10	70.0	47.98	6.47	3.10	0.52	0.94	0.49	1.51	1.29	0.22
May	100.0	56.56	10.25	5.80	0.66	0.98	0.65	3.78	2.83	0.95
Jun	100.0	67.15	10.39	6.98	0.85	1.00	0.85	5.93	2.46	3.47
Jul	100.0	72.90	10.49	7.65	0.95	1.01	0.95	7.30	1.69	5.61
Aug	100.0	73.98	9.71	7.18	0.97	0.99	0.95	6.84	0.49	6.35
Sep	100.0	61.13	8.41	5.14	0.74	0.95	0.70	3.62	0.42	3.20
Oct18	58.1	49.74	4.54	2.26	0.55	0.89	0.49	1.10	0.38	0.71

Season Total 30.08 9.57 20.51

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1992

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr24	23.3	51.10	2.22	1.13	0.57	1.12	0.64	0.73	0.12	0.61
May	100.0	57.44	10.25	5.89	0.68	1.19	0.81	4.75	1.80	2.96
Jun	100.0	62.57	10.39	6.50	0.77	1.24	0.95	6.18	1.73	4.45
Jul	100.0	64.26	10.49	6.74	0.80	1.22	0.97	6.53	2.53	4.00
Aug	100.0	65.84	9.71	6.39	0.83	1.16	0.96	6.12	0.37	5.75
Sep	100.0	62.55	8.41	5.26	0.77	1.08	0.83	4.36	0.30	4.06
Oct15	48.4	52.65	3.79	2.00	0.60	1.01	0.61	1.21	0.22	0.99

Season Total 29.89 7.08 22.81

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1992

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr 5	86.7	48.10	7.94	3.82	0.52	0.94	0.49	1.86	0.41	1.45
May	100.0	57.44	10.25	5.89	0.68	0.98	0.67	3.93	1.72	2.21
Jun	100.0	62.57	10.39	6.50	0.77	1.00	0.77	5.01	1.62	3.39
Jul	100.0	64.26	10.49	6.74	0.80	1.01	0.80	5.42	2.38	3.04
Aug	100.0	65.84	9.71	6.39	0.83	0.99	0.81	5.20	0.35	4.85
Sep	100.0	62.55	8.41	5.26	0.77	0.95	0.73	3.83	0.29	3.54
Oct23	74.2	50.93	5.74	2.92	0.57	0.88	0.50	1.46	0.33	1.13

Season Total 26.71 7.11 19.60

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1993

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 1	100.0	56.13	10.25	5.75	0.66	1.19	0.78	4.50	1.57	2.93
Jun	100.0	60.33	10.39	6.27	0.73	1.24	0.90	5.66	2.50	3.15
Jul	100.0	65.06	10.49	6.83	0.81	1.22	0.99	6.73	3.28	3.45
Aug	100.0	68.58	9.71	6.66	0.87	1.16	1.01	6.75	1.02	5.73

Higgins.obc

	100.0	56.60	8.41	4.76	0.67	1.08	0.72	3.42	1.03	2.38
Sep	100.0	56.60	8.41	4.76	0.67	1.08	0.72	3.42	1.03	2.38
Oct15	48.4	50.39	3.79	1.91	0.56	1.01	0.57	1.08	0.29	0.79

Season Total								28.13	9.70	18.43
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GRASS_PASTURE.TR21				METHOD=TR21 Modified Blaney-Criddle				Year=1993		
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Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr19	40.0	47.59	3.78	1.80	0.51	0.95	0.48	0.87	0.75	0.12
May	100.0	56.13	10.25	5.75	0.66	0.98	0.64	3.71	1.50	2.20
Jun	100.0	60.33	10.39	6.27	0.73	1.00	0.73	4.59	2.36	2.23
Jul	100.0	65.06	10.49	6.83	0.81	1.01	0.82	5.58	3.07	2.51
Aug	100.0	68.58	9.71	6.66	0.87	0.99	0.86	5.73	0.96	4.77
Sep	100.0	56.60	8.41	4.76	0.67	0.95	0.63	3.00	1.01	1.99
Oct21	67.7	49.58	5.26	2.61	0.54	0.88	0.48	1.25	0.40	0.85

Season Total								24.73	10.06	14.67
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ALFALFA.TR21				METHOD=TR21 Modified Blaney-Criddle				Year=1994		
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Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr24	23.3	51.46	2.22	1.14	0.58	1.12	0.65	0.74	0.20	0.54
May	100.0	60.16	10.25	6.17	0.73	1.19	0.86	5.32	1.16	4.17
Jun	100.0	68.48	10.39	7.12	0.87	1.24	1.08	7.66	0.61	7.06
Jul	100.0	70.69	10.49	7.42	0.91	1.22	1.10	8.19	0.59	7.60
Aug	100.0	73.31	9.71	7.12	0.95	1.16	1.11	7.89	0.85	7.04
Sep	100.0	65.43	8.41	5.50	0.82	1.08	0.88	4.86	0.16	4.69
Oct15	48.4	53.75	3.79	2.04	0.62	1.01	0.62	1.27	0.88	0.40

Season Total								35.94	4.44	31.49
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GRASS_PASTURE.TR21				METHOD=TR21 Modified Blaney-Criddle				Year=1994		
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Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr10	70.0	48.26	6.47	3.12	0.52	0.94	0.49	1.53	0.56	0.97
May	100.0	60.16	10.25	6.17	0.73	0.98	0.71	4.40	1.10	3.30
Jun	100.0	68.48	10.39	7.12	0.87	1.00	0.87	6.21	0.56	5.66
Jul	100.0	70.69	10.49	7.42	0.91	1.01	0.92	6.80	0.55	6.25
Aug	100.0	73.31	9.71	7.12	0.95	0.99	0.94	6.70	0.80	5.90
Sep	100.0	65.43	8.41	5.50	0.82	0.95	0.78	4.27	0.16	4.11
Oct25	80.6	51.21	6.22	3.19	0.57	0.88	0.50	1.60	1.41	0.19

Season Total								31.50	5.13	26.37
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ALFALFA.TR21				METHOD=TR21 Modified Blaney-Criddle				Year=1995		
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Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May11	67.7	53.60	6.96	3.73	0.61	1.20	0.74	2.75	1.80	0.94
Jun	100.0	62.83	10.39	6.53	0.77	1.24	0.96	6.24	3.31	2.93
Jul	100.0	70.60	10.49	7.41	0.91	1.22	1.10	8.17	2.49	5.68
Aug	100.0	73.58	9.71	7.15	0.96	1.16	1.11	7.95	0.40	7.55
Sep	100.0	60.02	8.41	5.05	0.72	1.08	0.78	3.95	0.64	3.31
Oct15	48.4	49.97	3.79	1.90	0.55	1.01	0.56	1.06	0.74	0.32

Season Total 30.11 9.38 20.73

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1995

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr28	10.0	45.48	0.96	0.44	0.47	0.96	0.45	0.20	0.16	0.04
May	100.0	51.76	10.25	5.31	0.58	0.98	0.57	3.03	2.51	0.51
Jun	100.0	62.83	10.39	6.53	0.77	1.00	0.78	5.06	3.10	1.96
Jul	100.0	70.60	10.49	7.41	0.91	1.01	0.91	6.77	2.30	4.47
Aug	100.0	73.58	9.71	7.15	0.96	0.99	0.95	6.76	0.38	6.38
Sep	100.0	60.02	8.41	5.05	0.72	0.95	0.69	3.47	0.62	2.85
Oct19	61.3	49.10	4.77	2.34	0.54	0.89	0.48	1.11	0.92	0.20

Season Total 26.40 9.99 16.41

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1996

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May13	61.3	53.51	6.30	3.37	0.61	1.20	0.74	2.48	2.48	0.00
Jun	100.0	65.45	10.39	6.80	0.82	1.24	1.01	6.88	1.07	5.81
Jul	100.0	70.81	10.49	7.43	0.91	1.22	1.11	8.22	0.47	7.75
Aug	100.0	73.18	9.71	7.11	0.95	1.16	1.11	7.85	1.65	6.21
Sep	100.0	59.75	8.41	5.03	0.72	1.08	0.78	3.90	1.12	2.78
Oct15	48.4	50.81	3.79	1.93	0.57	1.01	0.57	1.10	0.35	0.76

Season Total 30.45 7.14 23.30

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1996

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr22	30.0	45.85	2.84	1.30	0.48	0.95	0.46	0.59	0.32	0.28
May	100.0	50.53	10.25	5.18	0.56	0.98	0.55	2.85	2.85	0.00
Jun	100.0	65.45	10.39	6.80	0.82	1.00	0.82	5.58	1.00	4.58
Jul	100.0	70.81	10.49	7.43	0.91	1.01	0.92	6.82	0.44	6.39
Aug	100.0	73.18	9.71	7.11	0.95	0.99	0.94	6.67	1.54	5.13
Sep	100.0	59.75	8.41	5.03	0.72	0.95	0.68	3.43	1.09	2.34
Oct19	61.3	50.03	4.77	2.39	0.55	0.89	0.49	1.17	0.43	0.74

Season Total 27.11 7.67 19.45

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1997

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 9	74.2	54.61	7.62	4.16	0.63	1.20	0.76	3.14	2.55	0.59
Jun	100.0	66.25	10.39	6.88	0.83	1.24	1.03	7.09	2.74	4.35
Jul	100.0	70.90	10.49	7.44	0.91	1.22	1.11	8.25	3.10	5.15
Aug	100.0	68.71	9.71	6.67	0.87	1.16	1.02	6.78	3.03	3.74
Sep	100.0	62.50	8.41	5.26	0.77	1.08	0.83	4.35	0.59	3.76
Oct15	48.4	52.17	3.79	1.98	0.59	1.01	0.60	1.18	0.15	1.03

Season Total 30.79 12.16 18.63

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=1997

Month	percent month	temp	daylight	Higgins.obc		f	kt	kc	k	ETp	Re	IWR
		(F)	(%)							(in)	(in)	(in)
Apr29	6.7	45.52	0.64	0.29	0.47	0.96	0.45	0.13	0.13	0.00	0.00	0.00
May	100.0	52.82	10.25	5.41	0.60	0.98	0.59	3.19	3.19	0.00	0.00	0.00
Jun	100.0	66.25	10.39	6.88	0.83	1.00	0.83	5.75	2.54	3.20	3.20	3.20
Jul	100.0	70.90	10.49	7.44	0.91	1.01	0.92	6.84	2.87	3.98	3.98	3.98
Aug	100.0	68.71	9.71	6.67	0.87	0.99	0.86	5.75	2.86	2.89	2.89	2.89
Sep	100.0	62.50	8.41	5.26	0.77	0.95	0.73	3.82	0.57	3.25	3.25	3.25
Oct22	71.0	50.83	5.51	2.80	0.57	0.88	0.50	1.39	0.21	1.18	1.18	1.18
Season Total										26.88	12.37	14.50

ALFALFA.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=1998	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr27	13.3	50.69	1.28	0.65	0.56	1.13	0.64	0.41	0.02	0.39
May	100.0	56.16	10.25	5.76	0.66	1.19	0.78	4.50	1.69	2.81
Jun	100.0	58.70	10.39	6.10	0.70	1.24	0.87	5.29	3.78	1.51
Jul	100.0	72.66	10.49	7.62	0.94	1.22	1.15	8.73	1.21	7.52
Aug	100.0	72.26	9.71	7.02	0.94	1.16	1.09	7.63	1.27	6.35
Sep	100.0	67.02	8.41	5.64	0.85	1.08	0.91	5.14	1.17	3.97
Oct15	48.4	52.77	3.79	2.00	0.60	1.01	0.61	1.22	1.22	0.00
Season Total								32.92	10.36	22.56

GRASS_PASTURE.TR21			METHOD=TR21 Modified Blaney-Criddle						Year=1998	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr14	56.7	48.43	5.28	2.56	0.52	0.94	0.49	1.27	0.09	1.18
May	100.0	56.16	10.25	5.76	0.66	0.98	0.65	3.71	1.62	2.10
Jun	100.0	58.70	10.39	6.10	0.70	1.00	0.70	4.29	3.58	0.71
Jul	100.0	72.66	10.49	7.62	0.94	1.01	0.95	7.25	1.11	6.13
Aug	100.0	72.26	9.71	7.02	0.94	0.99	0.92	6.48	1.19	5.28
Sep	100.0	67.02	8.41	5.64	0.85	0.95	0.80	4.52	1.13	3.39
Oct23	74.2	50.29	5.74	2.89	0.56	0.88	0.49	1.41	1.41	0.00
Season Total								28.93	10.13	18.80

ALFALFA.TR21			METHOD=TR21 Modified Blaney-Criddle						Year=1999	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 7	80.6	53.93	8.28	4.46	0.62	1.20	0.74	3.30	2.02	1.29
Jun	100.0	62.58	10.39	6.50	0.77	1.24	0.95	6.18	3.76	2.42
Jul	100.0	71.29	10.49	7.48	0.92	1.22	1.12	8.35	3.13	5.23
Aug	100.0	71.42	9.71	6.94	0.92	1.16	1.07	7.42	0.40	7.02
Sep	100.0	55.62	8.41	4.68	0.65	1.08	0.70	3.27	0.61	2.67
Oct15	48.4	51.35	3.79	1.95	0.57	1.01	0.58	1.14	0.00	1.14
Season Total								29.67	9.91	19.76

GRASS_PASTURE.TR21				METHOD=TR21 Modified Blaney-Criddle					Year=1999	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)

Higgins.obc

Apr22	30.0	46.28	2.84	1.32	0.49	0.95	0.46	0.61	0.46	0.15
May	100.0	52.97	10.25	5.43	0.60	0.98	0.59	3.21	2.38	0.83
Jun	100.0	62.58	10.39	6.50	0.77	1.00	0.77	5.01	3.52	1.49
Jul	100.0	71.29	10.49	7.48	0.92	1.01	0.93	6.93	2.89	4.04
Aug	100.0	71.42	9.71	6.94	0.92	0.99	0.91	6.30	0.38	5.92
Sep	100.0	55.62	8.41	4.68	0.65	0.95	0.61	2.87	0.59	2.28
Oct	100.0	49.87	7.64	3.81	0.55	0.87	0.48	1.81	0.00	1.81
Nov 3	10.0	45.24	0.70	0.32	0.47	0.80	0.38	0.12	0.03	0.09
Season Total								26.87	10.25	16.62

ALFALFA.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=2000	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 1	100.0	56.00	10.25	5.74	0.65	1.19	0.78	4.47	1.73	2.75
Jun	100.0	62.10	10.39	6.45	0.76	1.24	0.94	6.07	1.30	4.76
Jul	100.0	73.55	10.49	7.72	0.96	1.22	1.16	8.99	1.94	7.05
Aug	100.0	74.40	9.71	7.22	0.97	1.16	1.13	8.16	0.65	7.51
Sep	100.0	63.35	8.41	5.33	0.78	1.08	0.84	4.50	0.32	4.17
Oct15	48.4	53.31	3.79	2.02	0.61	1.01	0.62	1.25	0.50	0.75
Season Total								33.43	6.44	26.99

GRASS_PASTURE.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=2000	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr20	36.7	47.21	3.46	1.63	0.50	0.95	0.48	0.78	0.78	0.00
May	100.0	56.00	10.25	5.74	0.65	0.98	0.64	3.69	1.65	2.04
Jun	100.0	62.10	10.39	6.45	0.76	1.00	0.76	4.92	1.22	3.70
Jul	100.0	73.55	10.49	7.72	0.96	1.01	0.97	7.45	1.78	5.68
Aug	100.0	74.40	9.71	7.22	0.97	0.99	0.96	6.93	0.61	6.32
Sep	100.0	63.35	8.41	5.33	0.78	0.95	0.74	3.95	0.31	3.64
Oct21	67.7	52.00	5.26	2.73	0.59	0.88	0.52	1.42	0.68	0.73
Season Total								29.14	7.04	22.10

ALFALFA.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=2001	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr27	13.3	50.57	1.28	0.65	0.56	1.13	0.63	0.41	0.19	0.22
May	100.0	56.15	10.25	5.76	0.66	1.19	0.78	4.50	1.28	3.21
Jun	100.0	64.05	10.39	6.66	0.79	1.24	0.98	6.54	2.75	3.79
Jul	100.0	74.76	10.49	7.84	0.98	1.22	1.19	9.33	2.32	7.02
Aug	100.0	74.40	9.71	7.22	0.97	1.16	1.13	8.16	1.46	6.70
Sep	100.0	62.50	8.41	5.26	0.77	1.08	0.83	4.35	0.69	3.66
Oct15	48.4	51.62	3.79	1.96	0.58	1.01	0.59	1.15	0.32	0.83
Season Total								34.44	9.01	25.43

GRASS_PASTURE.TR21		METHOD=TR21 Modified Blaney-Criddle							Year=2001	
Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr13	60.0	48.28	5.59	2.70	0.52	0.94	0.49	1.33	0.83	0.50

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May	100.0	56.15	10.25	5.76	0.66	0.98	0.64	3.71	1.23	2.48
Jun	100.0	64.05	10.39	6.66	0.79	1.00	0.80	5.30	2.57	2.73
Jul	100.0	74.76	10.49	7.84	0.98	1.01	0.99	7.74	2.12	5.62
Aug	100.0	74.40	9.71	7.22	0.97	0.99	0.96	6.93	1.36	5.57
Sep	100.0	62.50	8.41	5.26	0.77	0.95	0.73	3.82	0.67	3.15
Oct25	80.6	49.26	6.22	3.06	0.54	0.88	0.47	1.45	0.51	0.93

Season Total 30.29 9.29 21.00

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=2002

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
May 3	93.5	53.67	9.59	5.15	0.61	1.19	0.73	3.77	1.40	2.37
Jun	100.0	70.95	10.39	7.37	0.91	1.24	1.13	8.33	0.78	7.56
Jul	100.0	79.53	10.49	8.34	1.06	1.22	1.29	10.77	1.05	9.72
Aug	100.0	72.61	9.71	7.05	0.94	1.16	1.09	7.71	1.68	6.04
Sep	100.0	62.99	8.41	5.30	0.78	1.08	0.84	4.43	1.89	2.54
Oct15	48.4	46.04	3.79	1.75	0.48	1.01	0.49	0.85	0.32	0.54

Season Total 35.87 7.11 28.76

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=2002

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr15	53.3	47.39	4.99	2.37	0.51	0.95	0.48	1.13	0.56	0.58
May	100.0	53.07	10.25	5.44	0.60	0.98	0.59	3.22	1.43	1.80
Jun	100.0	70.95	10.39	7.37	0.91	1.00	0.92	6.75	0.71	6.04
Jul	100.0	79.53	10.49	8.34	1.06	1.01	1.07	8.93	1.03	7.90
Aug	100.0	72.61	9.71	7.05	0.94	0.99	0.93	6.55	1.57	4.98
Sep	100.0	62.99	8.41	5.30	0.78	0.95	0.74	3.90	1.84	2.06
Oct 9	29.0	48.25	2.30	1.11	0.52	0.91	0.47	0.52	0.19	0.33

Season Total 31.01 7.32 23.69

ALFALFA.TR21 METHOD=TR21 Modified Blaney-Criddle Year=2003

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr20	36.7	51.14	3.46	1.77	0.57	1.12	0.64	1.13	0.57	0.56
May	100.0	55.97	10.25	5.74	0.65	1.19	0.78	4.46	1.65	2.81
Jun	100.0	63.20	10.39	6.57	0.78	1.24	0.96	6.33	2.18	4.16
Jul	100.0	78.19	10.49	8.20	1.04	1.22	1.26	10.35	1.01	9.34
Aug	100.0	77.57	9.71	7.53	1.03	1.16	1.19	8.99	0.98	8.01
Sep	100.0	60.41	8.41	5.08	0.73	1.08	0.79	4.01	1.07	2.93
Oct15	48.4	54.73	3.79	2.08	0.63	1.01	0.64	1.33	0.27	1.06

Season Total 36.60 7.73 28.87

GRASS_PASTURE.TR21 METHOD=TR21 Modified Blaney-Criddle Year=2003

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr 7	80.0	49.76	7.36	3.66	0.55	0.94	0.51	1.88	1.20	0.68
May	100.0	55.97	10.25	5.74	0.65	0.98	0.64	3.68	1.58	2.11
Jun	100.0	63.20	10.39	6.57	0.78	1.00	0.78	5.13	2.04	3.10
Jul	100.0	78.19	10.49	8.20	1.04	1.01	1.05	8.59	0.97	7.62

Higgins.obc

Aug	100.0	77.57	9.71	7.53	1.03	0.99	1.01	7.63	0.91	6.72
Sep	100.0	60.41	8.41	5.08	0.73	0.95	0.69	3.52	1.05	2.48
Oct25	80.6	53.50	6.22	3.33	0.61	0.88	0.54	1.79	0.44	1.35

Season Total								32.23	8.18	24.05
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ALFALFA.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=2004

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr18	43.3	51.50	4.07	2.10	0.58	1.11	0.64	1.35	0.24	1.11
May	100.0	57.52	10.25	5.90	0.68	1.19	0.81	4.77	1.56	3.21
Jun	100.0	63.30	10.39	6.58	0.78	1.24	0.97	6.36	1.18	5.18
Jul	100.0	73.64	10.49	7.73	0.96	1.22	1.17	9.01	2.27	6.75
Aug	100.0	68.58	9.71	6.66	0.87	1.16	1.01	6.75	1.16	5.58
Sep	100.0	63.10	8.41	5.31	0.78	1.08	0.84	4.45	2.04	2.41
Oct15	48.4	53.51	3.79	2.03	0.61	1.01	0.62	1.26	0.53	0.73

Season Total								33.94	8.98	24.97
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GRASS_PASTURE.TR21

METHOD=TR21 Modified Blaney-Criddle

Year=2004

Month	percent month	temp (F)	daylight (%)	f	kt	kc	k	ETp (in)	Re (in)	IWR (in)
Apr 1	100.0	49.31	9.09	4.48	0.54	0.93	0.50	2.26	0.52	1.73
May	100.0	57.52	10.25	5.90	0.68	0.98	0.67	3.94	1.49	2.45
Jun	100.0	63.30	10.39	6.58	0.78	1.00	0.78	5.15	1.10	4.05
Jul	100.0	73.64	10.49	7.73	0.96	1.01	0.97	7.48	2.08	5.40
Aug	100.0	68.58	9.71	6.66	0.87	0.99	0.86	5.73	1.10	4.63
Sep	100.0	63.10	8.41	5.31	0.78	0.95	0.74	3.91	1.98	1.93
Oct27	87.1	51.01	6.70	3.42	0.57	0.87	0.50	1.70	0.92	0.77

Season Total								30.16	9.20	20.97
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LEONARD RICE ENGINEERS, INC. PROVIDES CONSULTING SERVICES RELATED TO PLANNING, PERMITTING, MANAGEMENT, AND DEVELOPMENT OF WATER AT THE HIGHEST LEVEL OF TECHNICAL EXCELLENCE THAT IS PROFESSIONAL, ETHICAL, AND PROFITABLE.

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**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

October 28, 2009

Leslie Petersen
Dept. of Game, Fish and Parks
523 E. Capitol Avenue
Pierre SD 57501

Dear Leslie:

Enclosed is a copy of the report, recommendation and public notice for Water Permit Application No. 2641-2 filed by Rapid Valley Sanitary District. The application proposes to transfer the use of a portion of Rapid Creek natural flows from irrigation to municipal, ruwater water system and suburban housing purposes by the Sanitary District. The public notice is scheduled to be published November 5 and 12, 2009 in the Rapid City Journal for a hearing to be held before the Water Management Board on December 9, 2009.

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 application please contact Aaron Tieman at (605) 394-2229 or Mark Rath at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program
(605) 773-3352

enclosures



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

October 28, 2009

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

Dear Mr. Anderson:

Enclosed is a copy of the report, recommendation and public notice for Water Permit Application No. 2641-2 filed by Rapid Valley Sanitary District. The application proposes to transfer the use of a portion of Rapid Creek natural flows from irrigation to municipal, ruwater water system and suburban housing purposes by the Sanitary District. The public notice is scheduled to be published November 5 and 12, 2009 in the Rapid City Journal for a hearing to be held before the Water Management Board on December 9, 2009.

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 application please contact Aaron Tieman at (605) 394-2229 or Mark Rath at (605) 773-3352.

Sincerely,

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

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**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

October 28, 2009

Robert Ellis, Public Works Director
City of Rapid City
300 6th Street
Rapid City SD 57701-2724

Dear Mr. Ellis:

Enclosed is a copy of the report, recommendation and public notice for Water Permit Application No. 2641-2 filed by Rapid Valley Sanitary District. The application proposes to transfer the use of a portion of Rapid Creek natural flows from irrigation to municipal, ruwater water system and suburban housing purposes by the Sanitary District. The public notice is scheduled to be published November 5 and 12, 2009 in the Rapid City Journal for a hearing to be held before the Water Management Board on December 9, 2009.

This information is being sent to you because of the city's continuing interest in Rapid Creek water right issues. If you have any questions regarding DENR's review of the application please contact Aaron Tieman at (605) 394-2229 or Mark Rath at (605) 773-3352.

Sincerely,

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

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**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

October 28, 2009

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

Dear Mr. Hammerquist:

Enclosed is a copy of the report, recommendation and public notice for Water Permit Application No. 2641-2 filed by Rapid Valley Sanitary District. The application proposes to transfer the use of a portion of Rapid Creek natural flows from irrigation to municipal, ruwater water system and suburban housing purposes by the Sanitary District. The public notice is scheduled to be published November 5 and 12, 2009 in the Rapid City Journal for a hearing to be held before the Water Management Board on December 9, 2009.

This information is being sent to you because of your continuing interest in Rapid Creek water right issues. If you have any questions regarding DENR's review of the application please contact Aaron Tieman at (605) 394-2229 or Mark Rath at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program
(605) 773-3352

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**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

October 28, 2009

David Lamb
4555 Reservoir Road
Rapid City ST 57701

Dear Mr. Lamb:

Enclosed is a copy of the report, recommendation and public notice for Water Permit Application No. 2641-2 filed by Rapid Valley Sanitary District. The application proposes to transfer the use of a portion of Rapid Creek natural flows from irrigation to municipal, ruwater water system and suburban housing purposes by the Sanitary District. The public notice is scheduled to be published November 5 and 12, 2009 in the Rapid City Journal for a hearing to be held before the Water Management Board on December 9, 2009.

This information is being sent to you because of your continuing interest in Rapid Creek water right issues. If you have any questions regarding DENR's review of the application please contact Aaron Tieman at (605) 394-2229 or Mark Rath at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program
(605) 773-3352

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**DEPARTMENT of ENVIRONMENT
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October 28, 2009

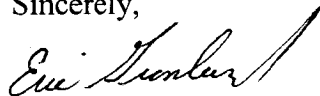
Keith Ham
15567 Hammerquist Road
Caputa SD 57725

Dear Mr. Ham:

Enclosed is a copy of the report, recommendation and public notice for Water Permit Application No. 2641-2 filed by Rapid Valley Sanitary District. The application proposes to transfer the use of a portion of Rapid Creek natural flows from irrigation to municipal, ruwater water system and suburban housing purposes by the Sanitary District. The public notice is scheduled to be published November 5 and 12, 2009 in the Rapid City Journal for a hearing to be held before the Water Management Board on December 9, 2009.

This information is being sent to you because of your continuing interest in Rapid Creek water right issues. If you have any questions regarding DENR's review of the application please contact Aaron Tieman at (605) 394-2229 or Mark Rath at (605) 773-3352.

Sincerely,


Eric Gronlund
Water Rights Program
(605) 773-3352

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**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

October 28, 2009

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

Dear Mr. Ham:

Enclosed is a copy of the report, recommendation and public notice for Water Permit Application No. 2641-2 filed by Rapid Valley Sanitary District. The application proposes to transfer the use of a portion of Rapid Creek natural flows from irrigation to municipal, ruwater water system and suburban housing purposes by the Sanitary District. The public notice is scheduled to be published November 5 and 12, 2009 in the Rapid City Journal for a hearing to be held before the Water Management Board on December 9, 2009.

This information is being sent to you because of your continuing interest in Rapid Creek water right issues. If you have any questions regarding DENR's review of the application please contact Aaron Tieman at (605) 394-2229 or Mark Rath at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program
(605) 773-3352

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**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

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523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

October 28, 2009

Joan Mumford
6495 Higgins Lane
Rapid City SD 57703

Dear Ms. Mumford

Enclosed is a copy of the report, recommendation and public notice for Water Permit Application No. 2641-2 filed by Rapid Valley Sanitary District. The application proposes to transfer the use of a portion of Rapid Creek natural flows from irrigation to municipal, ruwater water system and suburban housing purposes by the Sanitary District. The public notice is scheduled to be published November 5 and 12, 2009 in the Rapid City Journal for a hearing to be held before the Water Management Board on December 9, 2009.

This information is being sent to you because of the irrigated land the application proposes to transfer the water from belongs to Jaynell Higgins and you. Please share this information with Ms. Higgins. If you have any questions regarding DENR's review of the application please contact Aaron Tieman at (605) 394-2229 or Mark Rath at (605) 773-3352.

Sincerely,

Eric Gronlund
Water Rights Program
(605) 773-3352

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CITY OF RAPID CITY

RAPID CITY, SOUTH DAKOTA 57701-5035

Public Works Department

300 Sixth Street

Telephone: (605) 394-4154

FAX: (605) 394-6636

Web: www.rcgov.org

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WATER RIGHTS
PROGRAM

November 2, 2009

Eric Gronlund
Water Rights Program, DENR
PMB 2020
Joe Foss Building
523 E. Capitol
Pierre, SD 57501-3182

Dear Mr. Gronlund,

I am in receipt of Water Right Permit Application No. 2641-2. I have no objection to the Chief Engineer's recommendation of approval provided the eight qualifications noted in the October 27, 2009 memo titled "Recommendation of Chief Engineer for Water Permit Application No. 2641-2, Rapid Valley Sanitary District" be included as conditions of approval.

Thank you and please feel free to contact me at (605) 394-4154 should you have any questions.

Sincerely,

Robert B. Ellis, P.E.
Public Works Director



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WATER RIGHTS
PROGRAM

JAMES W. OLSON
ROBERT M. NASH
ERIKA S. OLSON

WILSON, OLSON & NASH, P.C.
LAWYERS
CREEKSIDE PROFESSIONAL OFFICES
2640 JACKSON BOULEVARD, SUITE 1
P.O. BOX 1552
RAPID CITY, SOUTH DAKOTA 57709

ERNEST GUNDERSEN (1915-1972)
J.H. BOTTUM (1903-1984)
JAMES H. WILSON (1927-1989)

(605) 342-7090
FAX (605) 342-9259

November 25, 2009

Chief Engineer
Water Rights Program
Foss Building
523 E. Capitol
Pierre, SD 57501

Re: Application No. 2641-2

I represent Joan Mumford and Jaynell Higgins, the current owners of that portion of Vested Water Right No. 1727-2 for which Rapid Valley Sanitary District is seeking a transfer of use. They are interested persons for purposes of this application.

Due to continuing discussions with the Sanitary District regarding the purchase of this water right, my clients request an automatic delay of the December 9, 2009 hearing date.

Thank you.

Very truly yours,

WILSON, OLSON & NASH, P.C.



Erika S. Olson

ESO/eo

cc: Rapid Valley Sanitary District c/o Brian D. Hagg, attorney
Joan Mumford and Jaynell Higgins



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
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523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

December 1, 2009

NOTICE

TO: Jim Jester
Rapid Valley Sanitary District
4611 Teak Drive
Rapid City SD 57703

Erika S. Olson
Wilson, Olson & Nash, PC
PO Box 1552
Rapid City SD 57709

Robert B. Ellis, PE
City of Rapid City
300 Sixth Street
Rapid City SD 57701-5035

FROM: Garland Erbele, Chief Engineer
Water Rights Program

SUBJECT: Automatic Delay of Hearing for Water Permit Application No. 2641-2, Rapid Valley Sanitary District

Erika Olson, counsel for Joan Mumford and Jaynell Higgins submitted a petition requesting an automatic delay of the December 9, 2009 hearing on Water Permit Application No. 2641-2 filed by the Rapid Valley Sanitary District. Therefore, the hearing on Application No. 2641-2 is automatically delayed pursuant to SDCL 46-2A-4 and 46-2A-5 and will not be held on December 9, 2009.

The hearing to consider Application Nos. 2641-2 will now be scheduled for the March 10 - 11, 2010 Water Management Board meeting tentatively to be held in Pierre. Future notice of the time and place of the hearing for Application No. 2641-2 will be provided to all parties of record.

The city of Rapid City submitted a letter agreeing with the Chief Engineer's recommendation on Application No. 2641-2. Enclosed is a copy of the city's letter and the petition submitted by Ms. Olson.

Please contact Eric Gronlund at (605) 773-3352, if you have any questions.

enclosures

c: Diane Best, Assistant Attorney General
Brian Hagg, Attorney, Whiting, Hagg and Hagg, PO Box 8008, Rapid City SD 57709

CERTIFICATION

I hereby certify that on December 1, 2009, I have personally deposited with the United States mail at Pierre, South Dakota, first class postage, prepaid envelopes containing a Notice dated December 1, 2009, regarding the continuance of the December 9, 2009 hearing on Water Right Permit Application No. 2641-2, as addressed below:

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

Erika S. Olson
Wilson, Olson & Nash, PC
PO Box 1552
Rapid City SD 57709

Robert B. Ellis, PE
City of Rapid City
300 Sixth Street
Rapid City SD 57701-5035

Brian Hagg, Attorney
Whiting, Hagg and Hagg
PO Box 8008
Rapid City SD 57709

Diane Best, Assistant Attorney General
300 N Dakota Avenue, Suite 403
Sioux Falls SD 57104



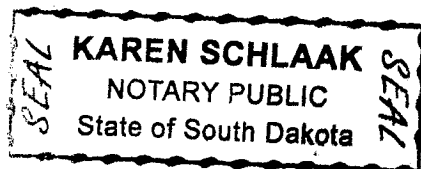
Gail Jacobson
Water Rights Program, DENR

STATE OF SOUTH DAKOTA)
) SS
COUNTY OF HUGHES)

Sworn to, before me, this 1st day of December 2009.



Karen Schlaak
Notary Public
My Commission expires April 1, 2013





**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

February 18, 2010

NOTICE

TO: Jim Jester
Rapid Valley Sanitary District
4611 Teak Drive
Rapid City SD 57703

Erika S. Olson
Wilson, Olson & Nash, PC
PO Box 1552
Rapid City SD 57709

Robert B. Ellis, PE
City of Rapid City
300 Sixth Street
Rapid City SD 57701-5035

FROM: Garland Erbele, Chief Engineer
Water Rights Program *Garland Erbele*

SUBJECT: Scheduling of Hearing for Water Permit Application No. 2641-2, Rapid Valley
Sanitary District

The Water Management Board will conduct a hearing to consider Application No. 2641-2 filed by Rapid Valley Sanitary District at 2:00 PM (CST) on March 10, 2010 at the Floyd Matthew Training Center, Joe Foss Building, 523 E Capitol Avenue, Pierre SD. The agenda time is an estimate and may be delayed due to prior agenda items.

Applicable provisions of the notice of hearing published November 5 and 12, 2009 in the Rapid City Journal will still apply at this hearing. The hearing on this application was originally scheduled for December 9, 2009. A petition filed by Erika Olson on behalf of Joan Mumford and Jaynell Higgins requested an automatic delay pursuant to SDCL 46-2A-4 and 46-2A-5. Therefore, the December 9th hearing was cancelled and rescheduled for March 10, 2010.

Enclosed is a copy of the report, recommendation, affidavit of publication and petitions in the matter of Water Permit Application No. 2641-2. State law directs the Chief Engineer to provide Water Management Board members with a copy of all pleadings including petitions for each proceeding. This same information will be sent to the Board members in advance of the hearing. In addition, enclosed are two documents intended to acquaint parties with the hearing process entitled "Procedure for Hearings before the Water Management Board" and "Summary of South Dakota Water Laws and Rules". You are encouraged to review these documents prior to the hearing.

Questions regarding the hearing process may be directed to Eric Gronlund, Water Rights Program at (605) 773-3352. 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.

Please contact Eric Gronlund at (605) 773-3352, if you have any questions.

enclosures

c: Diane Best, Assistant Attorney General
Brian Hagg, Attorney, Whiting, Hagg and Hagg, PO Box 8008, Rapid City SD 57709

CERTIFICATION

I hereby certify that on February 18, 2010, I have personally deposited with the United States mail at Pierre, South Dakota, first class postage, prepaid envelopes containing a Notice dated December 1, 2009, regarding scheduling of the February 18, 2010 hearing on Water Right Permit Application No. 2641-2, as addressed below:

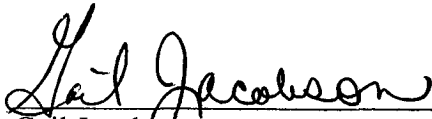
Jim Jester
Rapid Valley Sanitary District
4611 Teak Drive
Rapid City SD 57703

Erika S. Olson
Wilson, Olson & Nash, PC
PO Box 1552
Rapid City SD 57709

Robert B. Ellis, PE
City of Rapid City
300 Sixth Street
Rapid City SD 57701-5035

Brian Hagg, Attorney
Whiting, Hagg and Hagg
PO Box 8008
Rapid City SD 57709

Diane Best, Assistant Attorney General
300 N Dakota Avenue, Suite 403
Sioux Falls SD 57104

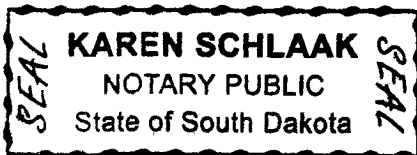

Gail Jacobson

Water Rights Program, DENR

STATE OF SOUTH DAKOTA)
) SS
COUNTY OF HUGHES)

Sworn to, before me, this 18th day of February, 2010.


Karen Schlaak
Notary Public
My Commission expires April 1, 2013



JAMES W. OLSON
ROBERT M. NASH
ERIKA S. OLSON

WILSON, OLSON & NASH, P.C.
LAWYERS
CREEKSIDE PROFESSIONAL OFFICES
2640 JACKSON BOULEVARD, SUITE 1
P.O. BOX 1552
RAPID CITY, SOUTH DAKOTA 57709

(605) 342-7090
FAX (605) 342-9259

March 2, 2010

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MAR - 3 2010

**WATER RIGHTS
PROGRAM**

ERNEST GUNDERSEN (1915-1972)
J.H. BOTTUM (1903-1984)
JAMES H. WILSON (1927-1989)

Chief Engineer
Water Rights Program
South Dakota Dept. of Environment and Natural Resources
Foss Building
523 E. Capitol
Pierre, SD 57501

Re: Application No. 2641-2

On behalf of Joan Mumford and Jaynell Higgins, the current owners of that portion of Vested Water Right No. 1727-2 for which Rapid Valley Sanitary District is seeking a transfer of use, I wish to inform you that Ms. Mumford and Ms. Higgins have no objection to the proposed transfer and will not be making an appearance at the hearing scheduled for March 10, 2010.

Thank you.

Very truly yours,

WILSON, OLSON & NASH, P.C.



Erika S. Olson

ESO/ts

cc: Rapid Valley Sanitary District c/o Brian D. Hagg, attorney
Joan Mumford and Jaynell Higgins
Diane Best, Attorney General's Office



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 2641-2, 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. 2641-2, Rapid Valley Sanitary District, c/o Jim Jester, 4611 Teak Drive, Rapid City SD 57703.

The Chief Engineer is recommending APPROVAL of Application No. 2641-2 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. 2641-2 is limited to a diversion rate of 1.66 cfs for a total annual volume of 269 acre feet. The Rapid Valley Sanitary District shall measure diversion at the District's water treatment plant. The total monthly diversion shall not exceed the amount listed in the following table.

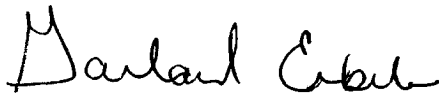
Monthly Volume Limitation

<i>Month</i>	<i>(ac-ft)</i>
April	9
May	34
June	39
July	52
August	68
September	49
October	18
TOTAL	269

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. 2641-2 authorized 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. 2641-2 in the event that additional information shows that changes need to be made in the monthly or total annual volumes authorized by Permit No. 2641-2.

5. Diversion under Permit No. 2641-2 may not interfere with existing water rights in effect prior to approval of Permit No. 2641-2 or any domestic rights.
6. The amount of water with a April 6, 1878 priority date, which may be appropriated under Vested Water Right No. 1727-2 is reduced by 1.66 cfs.
7. The approval of Permit No. 2641-2 retires the 121 acres held by the Higgins Ranch which has been historically irrigated from using Murphy Ditch, located in the SW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 13 and SE $\frac{1}{4}$ NE $\frac{1}{4}$ and SE $\frac{1}{4}$ Section 14: all in T1N, R8E from future irrigation.
8. The permit holder shall permanently render inoperable the structural means of diverting water to the land which is no longer subject to Water Permit 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.

See report on application for additional information.



Garland Erbele, Chief Engineer
October 27, 2009

REPORT ON APPLICATION NO. 2641-2

For Rapid Valley Sanitary District

October 22, 2009

Water Permit Application No. 2641-2 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 121 acres at the Higgins Ranch owned by Joan Mumford and Jaynell Higgins. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 1.66 cubic feet of water per second (cfs) with an annual volume limitation of 269 acre feet of water.

Historically, the 1.66 cfs has been used to irrigate 121 acres located in portions of the SW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 13 and the SE $\frac{1}{4}$ NE $\frac{1}{4}$ and the SE $\frac{1}{4}$ Section 14; 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 1.66 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.

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 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. In 2006, Rapid Valley Sanitary District transferred 5.05 cfs for municipal use. Therefore, of the original 17.0 cfs permitted by the 1878 priority, approximately 7.8 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 will prohibit granting any new water permit applications for irrigation of the lands involved in this transfer 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 Higgins Ranch acreage. 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 1950 through 1980 were estimated to average 2,951 ac-ft per year. Given that the Higgins Ranch acreage (121 acres) constituted 11% of the original Murphy Ditch irrigated acreage and subtracting 11% carriage loss, the historical water delivery to the Higgins Ranch was calculated to average 288 ac-ft per year. The same 121 acres irrigated on the ranch required a total of 473 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 calculated to be 269 ac-ft per year. Therefore, the portion of Rapid Creek natural flows to be transferred to the Sanitary District is 1.66 cfs with an annual volume limitation of 269 ac-ft of water. The total monthly diversion shall not exceed the amount listed in the following table.

Monthly Volume Limitation

<u>Month</u>	<u>(ac-ft)</u>
April	9
May	34
June	39
July	52
Aug	68
Sept	49
<u>Oct</u>	<u>18</u>
Total	269

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 this application is approved, the authorized diversion rate and acres under Water Right No. 1727-2 should be decrease by 1.66 cfs and 121 acres respectively. Also the Water Management Board should monitor the operation and management of the proposed transfer 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 after the transfer. Water Rights staff and the Rapid Valley Water Master have received complaints concerning this issue. In order to help rectify future problems if approved this permit 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 covered by 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 has been historically used to irrigate 121 acres.
2. The diversion rate to be transferred is 1.66 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 has an annual volume limitation of 269 ac-ft.
4. The total monthly diversion shall not exceed the amount listed in the following table.

Monthly Volume Limitation

<u>Month</u>	<u>(ac-ft)</u>
April	9
May	34
June	39
July	52
Aug	68
Sept	49
<u>Oct</u>	<u>18</u>
Total	269

5. If application No. 2641-2 is approved, the authorized diversion rate and acreage of Water Right No. 1727-2 should be decreased by 1.66 cfs and 121 acres.
6. The Water Management Board should retain jurisdiction in order to monitor the management and operation of the proposed transfer.

7. If approved the water permit should contain the following qualifications:

The permit holder shall permanently render inoperable the structural means of diverting water to the land which is no longer covered by Water Permit 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. This transfer only involves the transfer of natural flow water and does not include any rights to stored water available under contract with the Bureau of Reclamation from Pactola and Deerfield Reservoirs.
9. During certain dry periods in the past, natural flow water has not been available for Water Right No. 1727-2, so approval of this application does not guarantee that natural flow water will be available every year.



Aaron R. Tieman
Natural Resources Project Engineer

Approved by



Mark D. Rath
Natural Resources Engineering Specialist

BIBLIOGRAPHY

Leonard Rice Engineers, Inc., 2009. Engineering Report -- Transfer of Higgins Property Water Rights -- 1878 Murphy Ditch Priority.

Water Rights, 2009, Unpublished Water Rights Data, SD DENR, DES, Water Rights Program, Pierre, SD, 57501.

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NOV 13 2009

WATER RIGHTS
PROGRAM

Form 8

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)
) SS
County of Pennington)I, Patricia K. Van Pattencertify that the attached printed Notice was
takenfrom the Rapid City Journalprinted and published in Rapid CityCounty of Pennington andstate of South Dakota. The notice was
published

in the newspaper on the following two dates:

November 5, 2009November 12, 2009Cost of Printing Two hundred six dollarsand forty-eight cents (\$206.48)

(Signature)

(Title)

(Date Signed)

Since this application does 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 30, 2009.

This application is 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; 46-6-3, 46-6-3.1, 46-6-6.1, 46-6-10, 46-6-13, 46-6-14, 46-6-26; 46-5-33 thru 46-5-35 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 \$206.48.)

Nov. 5, 12 L20409348

NOTICE OF HEARING
ON APPLICATION NO. 2641-2
TO APPROPRIATE WATER

Notice is given that Rapid Valley Sanitary District, c/o Jim Jester, 4611 Teak Drive, Rapid City, SD 57703, has filed Water Permit Application No. 2641-2 pursuant to SDCL 46-5-34.1 to transfer the use of a portion of Rapid Creek natural flows appropriated for irrigation use to municipal, rural water system and suburban housing purposes by the Sanitary District.

Water Permit Application No. 2641-2 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 to irrigate 121 acres at the Higgins Ranch owned by Joan Mumford and Jaynell Higgins. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 1.66 cubic feet of water per second (cfs) with an annual volume limitation of 269 acre feet of water.

Historically, the 1.66 cfs has been used to irrigate 121 acres located in portions of the SW¼ SW¼ Section 13 and the SE¼ NE¼ and the SE¼ Section 14; all in T1N-R8E. The existing diversion point on Rapid Creek for Murphy Ditch is located in the NE¼ SW¼ Section 8-T1N-R8E. This permit changes the diversion point for 1.66 cfs to a permanent diversion point for use by the Sanitary District to be located in the NE¼ NW¼ 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 No. 2641-2 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 this application 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 recommendation. 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 30, 2009. The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, 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 this application at 1:00 p.m. on Wednesday, December 9, 2009, at the Matthew Training Center, Joe Foss Building, 523 E. Capitol Ave., Pierre, SD. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny this application based on the facts presented at the public hearing. The December 9, 2009, 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 application. The request for an automatic delay must be filed by November 30, 2009.

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 30, 2009, at the above Water Rights Program address to request copies of information pertaining to this application, to assure access to the hearing by the handicapped or to obtain an interpreter for the hearing.



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

PMB 2020
JOE FOSS BUILDING
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PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

October 27, 2009

Rapid City Journal
Legal Advertising
PO Box 450
Rapid City SD 57709

ATTENTION: Legal Public Notice

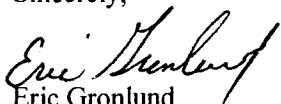
Enclosed is a Notice on Application No. 2641-2 to Appropriate Water to be published twice. Please publish the first notice on November 5, 2009 with the second publication 7 days later. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352.

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 – Water Services, 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-----

No. 2641-2

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

Date _____

We are in receipt of your letter of October 27, 2009 enclosing Notice to Appropriate Water by Application No. 2641-2 which was first published in our issue of _____. ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

PMB 2020
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
denr.sd.gov

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

October 27, 2009

Rapid Valley Sanitary Dist – Water Service
c/o Jim Jester
4611 Teak Dr
Rapid City SD 57703

Dear Mr. Jester:

Water Permit Application No. 2641-2 for municipal use has 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 # 605-394-8300). 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 applications 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 applications.

Sincerely,

Eric Gronlund
Natural Resources Engineer
(605) 773-3352

enclosures

cc: Ted Schultz, CETEC Engineering, 1560 Concourse Dr., Rapid City SD 57702

NOTE: If you plan to contest any part of the Chief Engineer's recommendation, 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 application.

Instruction to Newspaper - Publish first Notice on November 5, 2009 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 Application No. 2641-2 to Appropriate Water

Notice is given that Rapid Valley Sanitary District, c/o Jim Jester, 4611 Teak Drive, Rapid City SD 57703 has filed Water Permit Application No. 2641-2 pursuant to SDCL 46-5-34.1 to transfer the use of a portion of Rapid Creek natural flows appropriated for irrigation use to municipal, rural water system and suburban housing purposes by the Sanitary District.

Water Permit Application No. 2641-2 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 to irrigate 121 acres at the Higgins Ranch owned by Joan Mumford and Jaynell Higgins. The portion of Rapid Creek natural flows to be transferred to the Sanitary District is 1.66 cubic feet of water per second (cfs) with an annual volume limitation of 269 acre feet of water.

Historically, the 1.66 cfs has been used to irrigate 121 acres located in portions of the SW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 13 and the SE $\frac{1}{4}$ NE $\frac{1}{4}$ and the SE $\frac{1}{4}$ Section 14; 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 permit changes the diversion point for 1.66 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. 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 No. 2641-2 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 this application 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 recommendation. 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 30, 2009. The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, 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 this application at 1:00 p.m. on Wednesday, December 9, 2009 at the Matthew Training Center, Joe Foss Building, 523 E Capitol Ave., Pierre SD. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny this application based on the facts presented at the public hearing. The December 9, 2009 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 application. The request for an automatic delay must be filed by November 30, 2009.

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 30, 2009, at the above Water Rights Program address to request copies of information pertaining to this application, to assure access to the hearing by the handicapped or to obtain an interpreter for the hearing impaired.

Since this application does 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 30, 2009.

This application is 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; 46-6-3, 46-6-3. 1, 46-6-6.1, 46-6-10, 46-6-13, 46-6-14, 46-6-26; 46-5-33 thru 46-5-35; 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
denr.sd.gov

MAY 10 2010

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

Dear Mr. Jester:

Enclosed is Water Permit No. 2641-2 authorizing construction of your water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

Form 10, *Notice of Completion of Works and Application of Water to Beneficial Use*, is enclosed. Please return this completed form after you have finished the system and have put the water to beneficial use. An investigation can then be scheduled so the water license 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

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WRITTEN ACTION OF THE BOARD OF DIRECTORS OF
RAPID VALLEY WATER COMPANY, INC.JUN 02 2010
DEPT OF ENVIRONMENT & NATURAL
RESOURCES - RAPID CITY

The undersigned, Joan Mumford, Jaynell Higgins, and Jim Williams, being the duly elected directors of Rapid Valley Water Company, Inc., do hereby waive notice of meeting and formal meeting and take the following action in writing in lieu thereof.

WHEREAS, Joan Mumford and Jaynell Higgins, holders of 60 shares of stock in the Company have transferred their stock to Rapid Valley Sanitary District of 4611 Teak Drive, Rapid City, SD 57703,

WHEREAS, due to the length of time that such shares have been in the Higgins family, the shareholders have been unable to locate any stock certificate representing such shares,

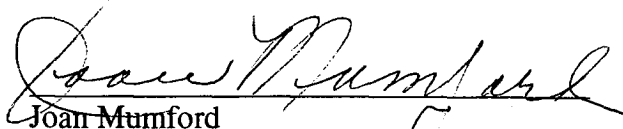
WHEREAS, the directors have reviewed the Company records and determined that no sums are due from the shareholders, Joan Mumford and Jaynell Higgins.

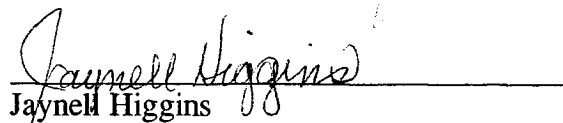
NOW THEREFORE, IT IS

RESOLVED:

1. The Company affirms that according to the records of the Company, Joan Mumford and Jaynell Higgins are the owners of 60 shares of stock in the Company;
2. That such shares and the owners thereof are current on any and all fees and assessments assessed by the Company;
3. That the officers of the Company are authorized to transfer the ownership of such shares of stock on the books of the Company and when requested by the transferee of such share, Rapid Valley Sanitary District, to issue a new stock certificate in the name of Rapid Valley Sanitary District.

Dated this 22 day of May, 2010.


Joan Mumford


Jaynell Higgins


Jim Williams

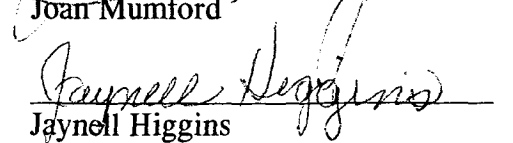
State of South Dakota)
)Ss
 County of Pennington)

AFFIDAVIT FOR LOST STOCK CERTIFICATE

The undersigned, Joan Mumford and Jaynell Higgins, ("Shareholders") being duly sworn, represent and warrant to Rapid Valley Water Company, Inc., ("Corporation"), and Rapid Valley Sanitary District ("Transferee") the following:

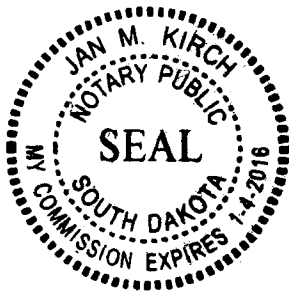
1. The Shareholders are the legal, beneficial, and record owner of 60 shares of common stock of the Corporation ("Shares"), which may have at some point been represented by one or more stock certificates.
2. Neither the Shares nor the rights of the Shareholders have been assigned, transferred, hypothecated, pledged, or otherwise disposed of, either in whole or in part, except for the pending transfer to the Transferee.
3. The Shareholders are entitled to the full and exclusive possession of any and all stock certificates representing such Shares. The Shareholders are the heirs and successors in interest of Elsie Higgins, the original owner of such shares, and Janet Thompson, a successor in interest to Elsie Higgins.
4. Any such stock certificates have been misplaced, lost or destroyed over the long course of history of the Corporation.
5. The Shareholders hereby request that the Corporation issue a new certificate in lieu of the missing certificate(s).
6. The Shareholders agree to
 - a. Indemnify, defend and hold harmless the Corporation, its officers, directors, registrars, transfer agents, successors and assigns, and any and all of the Corporation's shareholders including Transferee from and against any and all claims and action and lawsuits, and from and against any liabilities, losses, damages, costs, charges, and other expenses, arising directly or indirectly out of the issuance of the new certificate; and
 - b. Deliver or cause to be delivered to the Corporation the certificate(s) for cancellation whenever found, if ever found.
7. This Affidavit is being made to induce the delivery to Transferee of a new certificate without the surrender of the Shareholders' certificate(s) for cancellation.

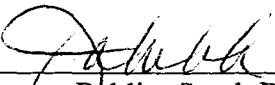
Dated May 27, 2010.


 Joan Mumford

 Jaynell Higgins

Sworn to and subscribed to before me, the undersigned officer, this 27th day of May, 2010.

(SEAL)

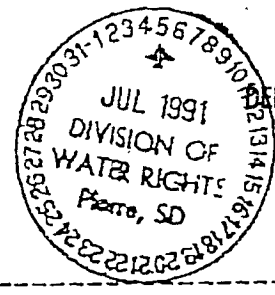



Notary Public, South Dakota
My commission expires: 1-4-2016

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JUN 02 2010

DEPT OF ENVIRONMENT & NATURAL
RESOURCES - RAPID CITY



1878 PRIORITY DATE

Land
Parcel
Number

Legal
Description

Acreage

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

Permit No. 2641-2
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. 2641-2, bearing the priority date of April 6, 1878. Permit No. 2641-2 is authorized to appropriate a total of 1.66 cfs with an annual volume limitation of 269 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:

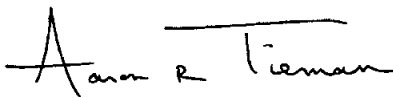
Municipal distribution lines.

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 1.66 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 1.66 cfs with an annual volume limitation of 269 acre-feet.

All structures, wells and lands on map Y
Exceptions to compliance are: none.

Comments: Water Permit No. 2641-2 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 121 acres at the Higgins Ranch owned by Joan Mumford and Jaynell Higgins. The portion of Rapid Creek natural flows to be transferred to Rapid Valley Sanitary District is 1.66 cfs with an annual volume limitation of 269 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. 2641-2

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:

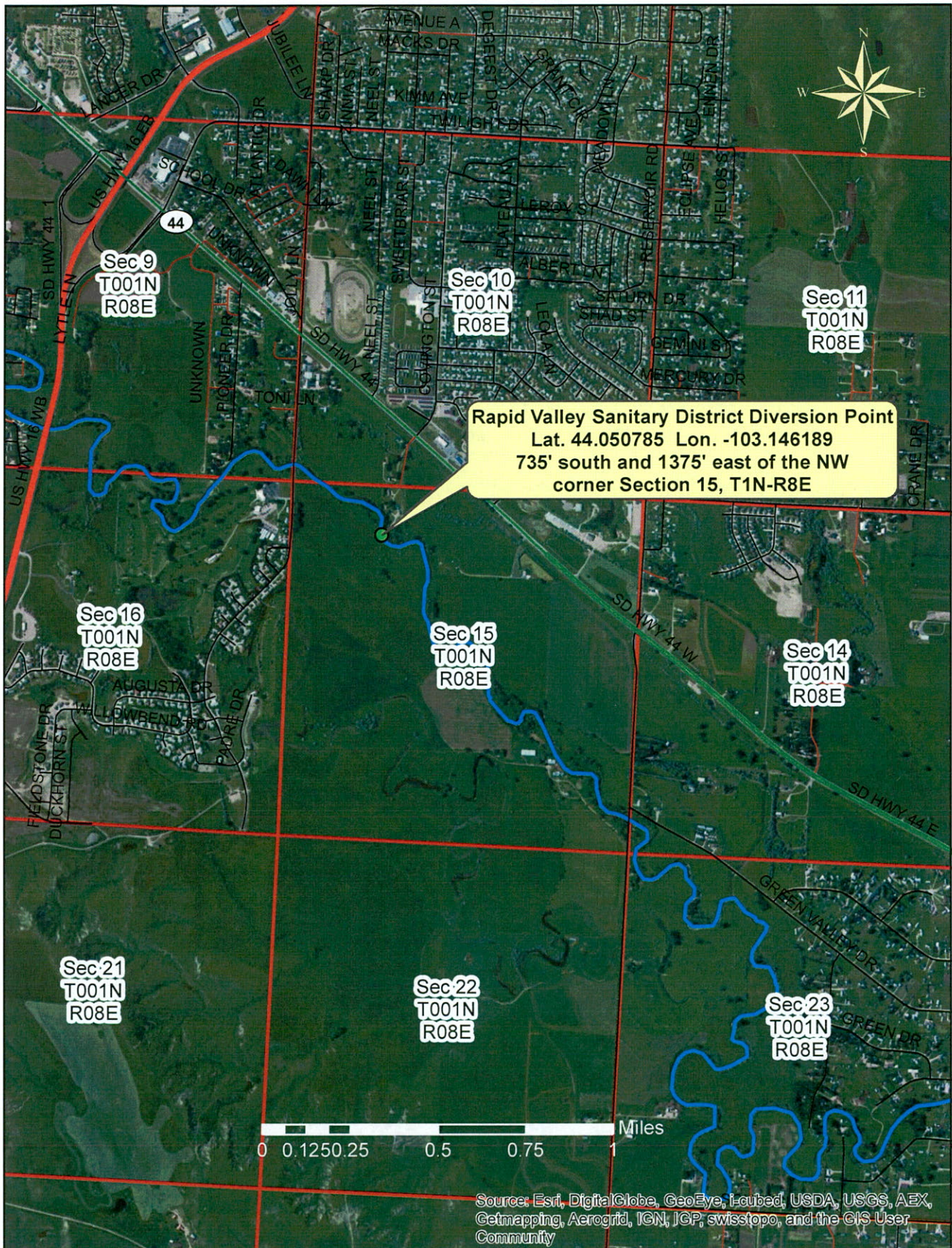
- 1) Type: Municipal distribution lines.

PERMIT QUALIFICATIONS:

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

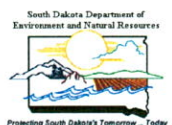
COMMENTS: Water Permit No. 2641-2 changes the diversion point location and transfers a portion of Rapid Valley Water Company (aka Murphy Ditch) stockholder/landowner's use of Rapid Creek natural flows appropriated under Vested Water Right No. 1727-2 from Murphy Ditch.

Water Right 2641-2
Rapid Valley Sanitary District
June 6, 2012



Aaron R. Tieman

Aaron Tieman
Natural Resources Engineer II
DNR 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.

WATER PERMIT NO. 2641-2 (THREE STRUCTURES, BEFORE AND AFTER)



**STATE OF SOUTH DAKOTA
WATER LICENSE NO. 2641-2**

(1) The Rapid Valley Sanitary District, 4611 Teak Drive, Rapid City SD 57703 made Application No. 2641-2, August 17, 2009 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 121.0 acres of the Higgins Ranch property owned by Joan Mumford and Jaynell Higgins. The portion of Rapid Creek natural flows transferred to the Sanitary District was 1.66 cubic feet of water per second (cfs) with an annual volume limitation of 269.0 acre feet of water.

Water Permit No. 2641-2, 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. 2641-2 did not authorize a new appropriation from Rapid Creek and is limited to 1.66 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 1.66 cubic feet of water per second for beneficial use with an annual volume limitation of 269.0 acre feet of water. 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. 2641-2 is issued a license to appropriate water, the right to use 1.66 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. 2641-2 and subject to the following qualifications:

- Permit No. 2641-2 is limited to a diversion rate of 1.66 cfs for a total annual volume of 269 acre feet. The Rapid Valley Sanitary District shall measure diversion at the District's water treatment plant. The total monthly diversion shall not exceed the amount listed in the following table.

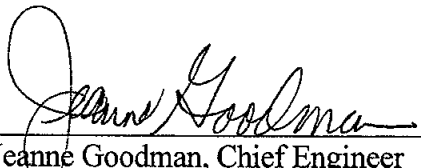
Monthly Volume Limitation

Month	acre feet
April	9.0
May	34.0
June	39.0
July	52.0
August	68.0
September	49.0
October	18.0
TOTAL	269.0

(continued)

Water Permit No 2641-2
Rapid Valley Sanitary District
Page 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.
- Permit No. 2641-2 authorized 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. 2641-2 in the event that additional information shows that changes need to be made in the monthly or total annual volumes authorized by Permit No. 2641-2.
- Diversion under Permit No. 2641-2 may not interfere with existing water rights in effect prior to approval of Permit No. 2641-2 or any domestic rights.
- The amount of water with a April 6, 1878 priority date, which may be appropriated under Vested Water Right No. 1727-2 is reduced by 1.66 cfs.
- The approval of Permit No. 2641-2 retires the 121 acres held by the Higgins Ranch which has been historically irrigated from using Murphy Ditch, located in the SW ¼ SW ¼ Section 13 and SE ¼ NE ¼ and SE ¼ Section 14: all in T1N, R8E from future irrigation.
- The permit holder shall permanently render inoperable the structural means of diverting water to the land which is no longer subject to Water Permit 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.
- 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, as determined by the South Dakota Water Management Board.



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