



**DEPARTMENT OF ENVIRONMENT
and NATURAL RESOURCES**

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**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 2676-2, City of Rapid City**

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. 2676-2, City of Rapid City, c/o Terry Wolterstorff, Director of Public Works, 300 6th Street, Rapid City SD 57701.

The Chief Engineer is recommending APPROVAL of Application No. 2676-2 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. 2676-2 is limited to a diversion rate of 1.73 cfs for a total annual volume of 138.7 acre feet of water annually at Pactola Reservoir or a total annual volume of 277.4 acre feet of water annually at the SE ¼ NE ¼ Section 3 (Rapid City Water Treatment Plant; SW ¼ SW ¼ Section 3 (Sioux Park Gallery); SE ¼ NE ¼ Section 9 (Meadowbrook Gallery); NW ¼ SE ¼ Section 8 (Jackson Springs Gallery); all in T1N, R7E. Maximum monthly diversion volumes at Pactola or the diversion points with Rapid City are as follows:

Monthly Volume Limitation (acre-feet)

<u>Month</u>	<u>City Intakes</u>	<u>Pactola</u>
April	32.5	16.2
May	25.9	13.0
June	39.4	19.7
July	47.2	23.6
Aug	59.8	29.9
Sept	39.4	19.7
Oct	33.2	16.6
Total	277.4	138.7

Diversion during a month may be made at either Pactola Reservoir or at the diversion Points within Rapid City, but not simultaneously at both Pactola and the Rapid City diversion points.

2. Permit No. 2655-2 authorizes diversions of only natural flow water by the city of Rapid City and does not include any rights to stored irrigation water available under contract from Deerfield Reservoir.

3. Diversions under this permit when taken at the Jackson Springs treatment plant Rapid Creek intake are limited to natural flows that exceed 10 cubic feet of water per second (cfs) as measured at USGS gaging station Rapid City above Canyon Lake near Rapid City No. 06412500. During the period April 1 through September 30 natural flow diversions are limited to the amount exceeding 20 cfs with the remainder of the diversion being released supplemental water equal to the amount released from storage through Rapid City's Deerfield and Pactola contracts with the United States Bureau of Reclamation.
4. The city of Rapid City shall report to the Chief Engineer annually the amount of water withdrawn each month at Pactola reservoir or the diversion points within Rapid City.
5. The Water Management Board is retaining jurisdiction of Permit No. 2676-2 in the event that additional information shows that changes need to be made in the monthly or total annual volumes authorized by Permit No. 2676-2.
6. Diversion under Permit No. 2676-2 may not interfere with existing water rights in effect prior to approval of No. 2676-2 or any domestic rights.
7. The amount of water with a May 30, 1880, priority date which may be appropriated under Vested Water Rights No. 2040-2 is reduced by 1.73 cfs.
8. Approval of Permit No. 2676-2 transferring the use of Rapid Creek natural flows for 154 acres located in E ½ NE ¼, NW ¼ NE ¼ Section 25, T1N, R8E and in the SW ¼ SW ¼ Section 19 and the W ½ NW ¼ Section 30, T1N, R9E and is owned by the city of Rapid City and historically irrigation under South Side Ditch's Vested Water Right No. 2040-2 may not qualify for another the irrigation right from any source.
9. The permit holder shall permanently render inoperable the structural means of diverting water to lands which is no longer subject to Vested Water Right No. 2040-2 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.


Jeanne Goodman, Chief Engineer
August 18, 2014

REPORT ON APPLICATION NO. 2676-2

For City of Rapid City

July 03, 2014

Water Permit Application No. 2676-2 proposes to transfer a portion of Rapid Creek natural flows appropriated for irrigation use to municipal, industrial, commercial, common distribution systems, rural water system, suburban housing and domestic use by the City of Rapid City.

Water Permit Application No. 2676-2 proposes to transfer a portion of South Side Ditch use of Rapid Creek natural flows appropriated under Vested Water Right No. 2040-2. The transfer is for use of a portion of Rapid Creek natural flows historically used for irrigation of 154 acres from the South Side Ditch. The 154 acres are owned by the city of Rapid City and located near the wastewater treatment plant near Rapid City Regional Airport in the valley. The portion of Rapid Creek natural flows to be transferred is 1.73 cubic feet of water per second (cfs) with an annual volume limitation of 277.4 acre-feet, if diverted at the water treatment plants and infiltration galleries or 138.7 acre-feet, if stored in Pactola Reservoir.

Historically, the 1.73 cfs has been used to irrigate approximately 154 acres located in the E $\frac{1}{2}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 25, T1N-R8E and in the SW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 19 and the W $\frac{1}{2}$ NW $\frac{1}{4}$ Section 30, T1N-R9E. The existing diversion point on Rapid Creek for South Side Ditch is located in the SE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 15, T1N-R8E. This application, if approved, changes the diversion point for 1.73 cfs to diversion points for use by the city to be located in the SE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 3 (Mountain View Water Treatment Plant); the NW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 8 (Jackson Springs Water Treatment Plant); the SW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 3 (Sioux Park Gallery); the NW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 8 (Jackson Springs Gallery); all within T1N-R7E or to allow storage in Pactola Reservoir. The location of the Pactola Reservoir diversion point is in the NW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 2, T1N-R5E and impounds water in portions of Sections 2, 3, 4, 5, 10, 11 of T1N-R5E and Sections 31, 32, 33, 34 of T2N-R5E; all in Pennington County, South Dakota.

The transferable diversion rate is based on the pro-rated share of South Side Ditch water decreased by the 9.8 percent carriage loss that remains in the ditch. Additionally, South Dakota Codified Law, SDCL 46-5-34.1 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", so if this application is approved, it will retain the May 3, 1880, priority date established by the South Side Ditch vested water right and will not be eligible for any new water appropriation from any source.

SOUTH SIDE DITCH ACREAGE VALIDATION

During initial discussion and review of this permit application, the Water Rights Program concluded that 74 of the 154 acres included in the proposed transfer from South Side Ditch does not appear on the validated list of irrigated land included in Vested Water Right No. 2040-2. Therefore, additional supporting documentation was requested to provide justification that the property, 74 acres, owned by the City of Rapid City near the waste water treatment plant (10 acres in the NW $\frac{1}{4}$ NW $\frac{1}{4}$, 25 acres in the NE $\frac{1}{4}$ NE $\frac{1}{4}$, 39 acres in the SE $\frac{1}{4}$ NE $\frac{1}{4}$; all in Section 25, T1N-R8E) should be included in the South Side Ditch's list of irrigated acres.

The City of Rapid City contracted with RESPEC Consulting to conduct an assessment to determine if 74 acres of land owned by the City of Rapid City was inadvertently left out of the South Side Ditch Company's application for Vested Water Right No. 2040-2 validated by the Water

Management Board (Board) in 1987. Geographic Information System (GIS) visual analysis, site inspection, literature review, conversations with City of Rapid City wastewater treatment plant staff and a past South Side Ditch Company president, and payment records all indicate this property historically has, and continues to be, irrigated with flows diverted from the South Side Ditch and should be added to the property that can be serviced through Vested Water Right No. 2040-2. Upon review of the supporting documentation provided, the Water Rights Program does concur with the City of Rapid City's conclusion that this property historically has, and continues to be, irrigated by water diverted through the South Side Ditch headgate.

Previous Board action should be noted. In 1987, Lone Tree Ditch Company filed a vested right claim, and the Board validated Vested Water Right No. 2038-2 in 1988. In 1990, Lone Tree Ditch Company became aware that a number of acres had been inadvertently omitted from the validation completed in 1988. Therefore, Lone Tree Ditch Company filed Vested Water Right Claim No. 2479-2 for the additional acres. In 2002, during the hearing for validation of Vested Water Right 2479-2, Lone Tree Ditch Company's attorney successfully argued that based on a 1974 South Dakota Supreme Court ruling (*Jewett v. Redwater Ditch Co.*) that Lone Tree Ditch Company is a pre-1907 stock-share irrigation company (established in corporate by-laws), and that the water right is not appurtenant to the land. The Board determined Lone Tree Ditch Company had continued to practice the allocation of irrigation water based upon the number of shares held by individual stockholders rather than the number of acres irrigated. The Board concluded that water rights held by these ditch companies are not appurtenant to any particular land unless the by-laws or organization of the ditch company so provide. Specific to these pre-1907 stock-share ditch companies, the Board's decision allows the Chief Engineer to regulate the maximum diversion rate and where the water is taken but not where it is used.

In the case of Water Right Permit Application No. 2676-2 the City of Rapid City is proposing to transfer a portion of South Side Ditch Company's water right. In regards to the Board's decision in 2002 Lone Tree Ditch Company decision, South Side Ditch Company is a similar pre-1907 stock-share company as stated in their by-laws, thus the water right is not appurtenant to any particular land. The City of Rapid City has stock in the South Side Ditch Company, and the ditch company has been billing them consistently over the years for their share of the irrigation.

The City of Rapid City contracted with RESPEC Consulting & Services (RESPEC) to work on the methodology based upon the City shares in the ditch company for transferring the water associated with irrigating this land from irrigation to municipal use. According to RESPEC's analysis, the method for transfer based on the number of shares held by the individual land owner is unclear as the number of shares held per acre are not equivalent or consistent. At this point there does not appear to be a way to equitably split the City of Rapid City's portion of the irrigation right from the rest of South Side Ditch Company's water right based on shares. Therefore, based on RESPEC's analysis and the ditch's practice of billing by land irrigated, the proposed transfer amount should be quantified using the fraction of land (pro rata share) method that has been used in past transfers for the city.

DELIVERY SYSTEM LOSS DISCUSSION

Delivery system losses were estimated in a Bureau of Reclamation 1989 study to be 9.8 percent for South Side Ditch. This number has been consistently referenced in all previous transfers to Rapid City from South Side 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 PROPOSED TRANSFER

Due to the inefficiency and inconsistency of the shares per acre represented by South Side Ditch Company, the methodology proposed will be acres-based rather than share-based. An engineering analysis was completed to determine the volume and flow rate that were available for transfer. To complete this analysis, the historic crop water use for the 154-acre parcel as well as historic diversion records to the South Side Ditch were assessed. The irrigation right to be transferred was found by taking the lesser of the two analyses (crop water use or diversions) except in April and October where the crop water use amount was used because no historic delivery records exist.

For the historic crop water use assessment, an online irrigation scheduling consultant tool was used which was developed for the individual landowners within the Belle Fourche Irrigation District (BFID) in western South Dakota. This consultant tool tracks the daily water balance in a field and provides recommendation of irrigation timing and depth. Because of the proximity of the BFID to this property, the methods used to develop the tool were deemed appropriate to assess historic crop water use. The assessment ran daily (April 1 to October 31) from 1970-2004. The inputs required to track a daily water balance are local weather and rainfall estimates, crop type and field boundaries. Weather and rainfall data were collected from the Rapid City Regional Airport located approximately 2 miles northeast of the property and, therefore, deemed representative. The weather data were input into the American Society of Civil Engineers (ASCE) Penman Monteith (PM) equation to calculate daily evapotranspiration (ET). This equation requires daily values of dew point, high temperature, low temperature, average wind speed and solar radiation, all of which were available from the airport weather station for the entire analysis period.

For the historic diversion assessment, diversion records were collected by the Bureau of Reclamation for the South Side Ditch on a monthly basis over a 13-year period. These recorded diversions were then multiplied by the fraction of land (pro rate share) that the City of Rapid City property encompasses minus estimated delivery losses to determine the monthly delivery amount.

The analysis concluded that 277.4 acre-feet per year is available for transfer to diversion points in Rapid City not to exceed a prorated acreage share of 1.73 cfs. A total annual volume of 138.7 acre-feet per year is available for transfer to storage in Pactola Reservoir. The following table provides a monthly summary of the findings in acre-feet, subtracting out the 9.8 percent delivery losses as well as the irrigation rights available for transfer in acre-feet and cfs.

	April	May	June	July	August	September	October	Total
Historic Diversions to Ditch (acre-feet)	*	350	532	638	808	532	*	2,860.0
Pro Rata Share of Historic Diversions (acre-feet)	*	25.9	39.4	47.2	59.8	39.4	*	211.7
Crop Demand (acre-feet)	32.5	99.8	104.1	135.7	146.7	79.9	33.3	632.0
Irrigation Right to be Transferred to Rapid City Diversion Points (acre-feet)	32.5	25.9	39.4	47.2	59.8	39.4	33.3	277.4
Irrigation Right to be Transferred to Storage in Pactola Reservoir (acre-feet)	16.2	13.0	19.7	23.6	29.9	19.7	16.7	138.7

* Crop demand amount was used due to the unavailability of historic delivery records.

If this application is approved, the authorized diversion rate and acres under Vested Water Right No. 2040-2 should be decreased by 1.73 cfs and 154 acres respectively. Credited diversions taken at the City's intakes include crop consumptive use and return flows that historically have been available to downstream water right holders. The City returns treated effluent to Rapid Creek 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 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 change. In the case of storing water in Pactola, the city does not receive the credited diversion for treated effluent returned to the creek since it cannot be determined when or if it will be available to downstream water right holders.

REVIEW OF EXISTING WATER PERMITS/RIGHTS

There are 113 existing water rights/permits appropriating 266.04 cfs on Rapid Creek between Pactola Reservoir and the confluence with the Cheyenne River. Seventy-seven (77) of these rights/permits which appropriate 215.15 cfs are junior in priority and thirty-six (36) of these rights/permits which appropriate 50.89 cfs are senior in priority to the May 3, 1880, South Side Ditch right.

APPLICABLE STATUTES

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.

An issue that has come up involving a few of the previous water right transfers is the unauthorized irrigation of the land involved in the transfer. Water Rights staff and the Rapid Valley Water

Master have received complaints concerning this issue. To help prevent 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 subject to Water Right No. 2040-2 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.

The South Dakota Water Management Board should retain jurisdiction to monitor the management and operation of the proposed transfer.

CONCLUSIONS

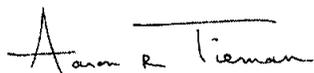
1. The water diverted by South Side Ditch headgate has been historically used to irrigate 154 acres, including the 74 acres inadvertently omitted from the 1987 Validation of Vested Water Right 2040-2.
2. The diversion rate to be transferred is 1.73 cfs which is based on the pro-rated share of the total ditch diversion rate minus the 9.8% carriage loss.
3. South Dakota Codified Law, SDCL 46-5-34.1 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", so if this application is approved, it will retain the May 3, 1880 priority date established by the South Side Ditch vested water right and will not be eligible for any new water appropriation from any source.
4. The amount of water requested to be transferred has an annual volume limitation of 277.4 acre-feet if diverted at the city's water treatment plants and infiltration galleries or 138.7 acre-feet if stored in Pactola Reservoir.
5. The total monthly diversion shall not exceed the amount listed in the following table:

Monthly Volume Limitation (acre-feet)

Month	City Intakes	Pactola
April	32.5	16.2
May	25.9	13.0
June	39.4	19.7
July	47.2	23.6
Aug	59.8	29.9
Sept	39.4	19.7
Oct	33.2	16.6
Total	277.4	138.7

6. If application No. 2676-2 is approved, the authorized diversion rate and acreage of Water Right No. 2040-2 should be decreased by 1.73 cfs and 154 acres.
7. If approved the water permit should contain the following qualification:

The permit holder shall permanently render inoperable the structural means of diverting water to lands which is no longer subject to Vested Water Right No. 2040-2 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. The Water Management Board should retain jurisdiction in order to monitor the management and operation of the proposed transfer.
9. During certain dry periods in the past, natural flow water has not been available for Water Right No. 2040-2, so approval of this application does not guarantee that natural flow water will be available every year.



Aaron R. Tieman
Natural Resources Project Engineer II

Approved by



Mark D. Rath
Natural Resources Engineering Specialist III

BIBLIOGRAPHY

RESPEC Consulting & Services, April 2014. Topical Report RSI-2222 – City of Rapid City Water Rights Transfer.

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