



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

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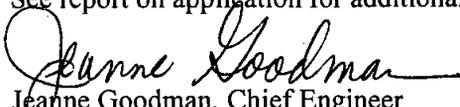
**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT  
APPLICATION NO. 8195-3, Chad Anderson**

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. 8195-3, Chad Anderson, 47866 244<sup>th</sup> Street, Dell Rapids SD 57022.

The Chief Engineer is recommending APPROVAL of Application No. 8195-3 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) it is in the public interest with the following qualifications:

1. Low flows as needed for downstream domestic use, including livestock water and prior rights must be bypassed. This permit does not authorize diversion of water from the Big Sioux River unless at least 43 cfs is flowing when pumping at the Dell Rapids USGS gaging station No. 06481000, or unless written orders have been issued by the Chief Engineer. Diversion under this permit shall be in accordance with any written orders by the Chief Engineer.
2. The City of Sioux Falls has senior priority rights to Big Sioux River flows under Future Use Permit Nos. 3981-3 and 3981A-3. Future diversion under Permit No 8195-3 will be subject to these prior rights and an increased by-pass may be required if and when the City of Sioux Falls develops the water reserved by Future Use Permit Nos. 3981-3 and 3981A-3.
3. The Water Management Board retains jurisdiction of Permit no 8195-3 in the event that the City of Sioux Falls develops the water reserved by their future use permit or additional information shows that a change needs to be made in the by-pass requirement.
4. This Permit is approved subject to the irrigation water use questionnaire being submitted each year.

See report on application for additional information.

  
Jeanne Goodman, Chief Engineer  
February 23, 2016

REPORT ON WATER PERMIT APPLICATION NO. 8195-3  
CHAD ANDERSON  
FEBRUARY 9, 2016

Application No. 8195-3, Chad Anderson, proposes to appropriate 1.33 cubic feet of water per second from the Big Sioux River located in the SE 1/4 NE 1/4 Section 11 for irrigation of 120 acres located in the NE 1/4 Section 11; all in T105N-R49W. The water will be used for irrigation purposes. The proposed project is located approximately 10 miles southwest of Flandreau in Moody County.

Review of Existing Water Rights

There are 59 existing water rights/permits appropriating 159.81 cfs from the Big Sioux River from its headwaters to the confluence with the Missouri River in Union County. In addition, there are two water rights from the river appropriating 2000 cfs of flood flows only to maintain lake levels in Lake Poinsett and Dry Lake in Hamlin County. Downstream from this proposed project to the eastern edge of Sioux Falls there are 17 existing water rights/permits appropriating 103 cfs. The Big Sioux River downstream from Sioux Falls generally receives sufficient flow from tributary inflows and effluent discharge from the Sioux Falls waste water treatment plant to meet the needs of the water permit/right holders. The City of Sioux Falls also holds Future Use Permit Nos. 3981-3 and 3981A-3 for a total of 30,000 acre-feet of Big Sioux River water held in reserve for future development (Water Rights, 2016).

Review of the Proposed Water Source

The applicant proposes to pump water for irrigation from the Big Sioux River during the period May through September. The Big Sioux River is a prairie stream with headwaters located in the northern prairie coteau in southern Roberts, eastern Day and eastern Clark counties, in northeastern South Dakota. The river drains glacial till and outwash plains as it runs southward to its junction with the Missouri River near Sioux City, Iowa. The Big Sioux River physical geography is characterized by glaciated terrain and rolling plains. Rivers commonly follow the valleys formed by glacial lobes, which were glaciated as recently as 14,000 years ago. Drainages in this region formed after retreat of glaciers and are therefore poorly established in parts of the watershed. The poorly established drainage patterns are accompanied by numerous areas of internal drainages, or "potholes," and are commonly referred to as the "Prairie Pothole Region" (Hoogestrat and Stamm, 2015).

The USGS maintains several long term stream gaging stations on the Big Sioux River between the headwaters and the confluence with the Missouri River. Two of these gaging stations are located in this river reach immediately upstream and downstream of the proposed project (USGS, 2016). The gaging station located approximately 36 miles upstream having a 63 year period of record is the USGS Gaging Station No. 06480000 Big Sioux River near Brookings SD, Figure 1.

Percentile	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10%	2	1	12	70	44	31	17	8	5	9	12	4
25%	5	5	50	137	113	85	48	24	18	19	23	12
50%	16	17	191	387	310	261	144	67	52	63	56	37
75%	53	90	587	1211	815	815	453	257	165	168	179	113
90%	143	221	1685	2768	1767	1714	1064	735	480	442	363	208

Figure 1. USGS Gaging Station No. 06480000 Big Sioux River near Brookings SD. Flow in cubic feet per second. Period of Record - 1953 to 2016.

As is typical of prairie streams in South Dakota, the peak runoff occurs during the spring months due to plains snowpack melt and runoff from larger rain events. Runoff tends to decrease in the late summer months going in to fall and winter. At the 50th percentile, monthly flow values range from 310 cfs in May to 52 cfs in September.

The most recent water permit issued from the Big Sioux River in this reach is Water Permit No. 7110-3. This water permit is located immediately upstream from this proposed project. This permit was issued with the following qualifications to protect existing water rights, including City of Sioux Fall’s future use permits.

- Low flows as needed for downstream domestic use, including livestock water and prior rights must be bypassed. This permit does not authorize diversion of water from the Big Sioux River unless at least 43 cfs is flowing when pumping at the Dell Rapids USGS gaging station No. 06481000, or unless written orders have been issued by the Chief Engineer. Diversion under this permit shall be in accordance with any written orders by the Chief Engineer.
- The City of Sioux Falls has senior priority rights to Big Sioux River flows under Future Use Permit Nos. 3981-3 and 3981A-3. Future diversion under Permit No 7110-3 will be subject to these prior rights and an increased by-pass may be required if and when the City of Sioux Falls develops the water reserved by Future Use Permit Nos. 3981-3 and 3981A-3.
- The Water Management Board retains jurisdiction of Permit no 7110-3 in the event that the City of Sioux Falls develops the water reserved by their future use permit or additional information shows that a change needs to be made in the by-pass requirement.

The second nearby stream gaging station is the USGS Gaging Station No. 06481000 Big Sioux River near Dell Rapids located approximately 16 miles downstream and has a 68 year period of record, Figure 2.

Percentile	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10%	5	4	29	108	70	46	30	16	12	14	18	11
25%	11	12	83	197	176	133	73	41	32	33	36	21
50%	25	29	291	569	454	391	233	110	82	88	79	54
75%	86	131	857	1696	1095	981	636	352	232	216	246	146
90%	174	319	2041	4296	2153	2106	1383	901	553	525	480	307

Figure 2. USGS Gaging Station No. 06481000 Big Sioux River near Dell Rapids SD. Flow in cubic feet per second. Period of Record - 1948 to 2016.

If this application is approved, with similar qualifications as No. 7110-3, including requiring a 43 cfs bypass at the Dell Rapid gaging station, there should be sufficient water available to satisfy this permit the majority of the time. At the 25th percentile level, even if a 43 cfs by pass is required, the data indicates water should be available during the irrigation season from May into August before the cutoff limit is reached. During drier climatic conditions, particularly during the latter part of the irrigation season, the applicant may not be able to pump due to low flows in the river.

If at a future date the City of Sioux Falls develops water appropriations under their future use permits, or if a review of water availability increases due to increased runoff or a decrease in the use of water by existing rights, the bypass qualification may need to be amended by the Water Management Board.

### Conclusions

1. This application proposes to appropriate 1.33 cubic feet of water per second (cfs) from the Big Sioux River for irrigation of 120 acres.
2. If this application is approved it should contain the following qualifications:
  - Low flows as needed for downstream domestic use, including livestock water and prior rights must be bypassed. This permit does not authorize diversion of water from the Big Sioux River unless at least 43 cfs is flowing when pumping at the Dell Rapids USGS gaging station No. 06481000, or unless written orders have been issued by the Chief Engineer. Diversion under this permit shall be in accordance with any written orders by the Chief Engineer.
  - The City of Sioux Falls has senior priority rights to Big Sioux River flows under Future Use Permit Nos. 3981-3 and 3981A-3. Future diversion under Permit No 8195-3 will be subject to these prior rights and an increased by-pass may be required if and when the City of Sioux Falls develops the water reserved by Future Use Permit Nos. 3981-3 and 3981A-3.
  - The Water Management Board retains jurisdiction of Permit No 8195-3 in the event that the City of Sioux Falls develops the water reserved by their future use permit or additional information shows that a change needs to be made in the by-pass requirement.
3. If this application is approved with the proposed qualifications there should be sufficient water available to satisfy this permit the majority of the time. Although during drier climatic conditions, particularly during the later summer months, the applicant may not be able to pump due to low flows in the river.

4. If at a future date the City of Sioux Falls develops water appropriations under their future use permits, or if a review of water availability increases due to increased runoff or a decrease in the use of water by existing rights, the bypass qualification may need to be amended by the Water Management Board.



Mark D. Rath  
Natural Resources Engineer III

#### References

Hoogestraat, G.K. and J. F. Stamm, 2015. Climate and Streamflow Characteristics for Selected Streamgages in Eastern South Dakota, Water Years 1945–2013. USGS Scientific Investigations Report 2015-5146.

USGS. 2016. United States Geological Survey, National Water Information System – Stream Gaging Station Network for South Dakota.

Water Rights. 2016. Water Right/Permit Files. SD DENR-Water Rights Program, Joe Foss Bldg., Pierre, SD.