

*ESCHERICHIA COLI (E. coli)* ADDENDUM TO THE FECAL COLIFORM BACTERIA  
TOTAL MAXIMUM DAILY LOAD (TMDL) FOR RAPID CREEK SEGMENT 03,  
PENNINGTON COUNTY, SOUTH DAKOTA



Watershed Protection Program  
Division of Resource Conservation and Forestry  
South Dakota Department of Agriculture and Natural Resources

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## INTRODUCTION

The South Dakota Department of Agriculture and Natural Resources (SDDANR) adopted a conversion process to translate existing fecal coliform TMDLs and allocations to *E. coli* to satisfy Clean Water Act section 303(d) requirements. The 2020 bacteria TMDL translation included *E. coli* TMDLs for four impaired waterbodies. The conversion process and resulting *E. coli* TMDLs were formally approved by the United States Environmental Protection Agency (EPA) November 8, 2020, reissued following the correction of a minor clerical error on June 6, 2022 (SD DANR A, 2022).

Rapid Creek segment 03 (Canyon Lake to S15, T1N, R8E) or **SD-CH-R-RAPID\_03** is considered impaired for the designated immersion recreation use due to *E. coli* in South Dakota's most recent 303(d) list documented in the 2022 Integrated Report (IR) and is considered a high priority for TMDL development (SD DANR B, 2022). Rapid Creek segment 03 was first listed for *E. coli* in 2018. The intent of this document is to convert the existing fecal coliform TMDL and allocations for Rapid Creek segment 03 to *E. coli* using the conversion process and rationale described in the 2020 bacteria TMDL translation. Hereby, this document serves as an addendum to the 2010 Rapid Creek fecal coliform TMDL (TMDL ID# 39426) by incorporating an *E. coli* TMDL and allocations for Rapid Creek segment 03 (SD DANR, 2010).

Several factors must be met to determine whether an existing fecal coliform TMDL can be converted to *E. coli* for a given waterbody in accordance with the methods and assumptions established in the 2020 bacteria TMDL translation:

- Waterbody must fall entirely within state jurisdiction,
- If jurisdiction is shared, TMDL only applies to portion of the water under South Dakota's jurisdiction,
- The TMDL will meet applicable water quality standards,
- Wastewater discharges to the stream are expected to meet effluent limits in accordance with an authorized NPDES permit, and
- The 2010 Rapid Creek fecal coliform TMDL assumptions (e.g., source contributions, loading capacity, etc.) are still valid.

These factors are all met for Rapid Creek segment 03 and will be discussed throughout this addendum. Appendix A of the 2010 fecal coliform TMDL contains the bacteria sample data used for analysis. Appendix B of this addendum contains *E. coli* data that has been sampled for Rapid Creek segment 03 since 2010, confirming that the waterbody is still consistently demonstrating impairment for *E. coli*.

## JURISDICTION

Rapid Creek segment 03 falls entirely within state jurisdiction (see Figures 1 and 2, 2010 Rapid Creek fecal coliform TMDL; SD DANR, 2010).

## WATER QUALITY STANDARDS AND TMDL TARGETS

South Dakota *E. coli* criteria for immersion ([ARSD 74:51:01:50](#)) and limited contact recreation ([ARSD 74:51:01:51](#)) consist of a single sample maximum (SSM) and a monthly geometric mean (GM) both of which include distinct numeric limits (South Dakota, 2023). The SSM requires that no single daily sample exceed the associated numeric limit. The monthly GM also must not be exceeded and is calculated based on a minimum of 5 samples collected during separate 24-hr periods over a 30-day period. Former fecal coliform SSM and GM criteria were similar for *E. coli*, however, numeric limits deviate between the bacteria indicators (Table 1).

Impaired waters require TMDL development based on the most protective criteria. Selecting the most protective numeric target for TMDL development ensures attainment with the water quality criteria. The 2010 fecal coliform TMDL for Rapid Creek segment 03 used the SSM as the TMDL target (Table 1). Appendix A of the 2020 bacteria TMDL translation outlines that the GM and SSM *E. coli* criteria are equally protective. As a result, the *E. coli* TMDL and allocations can be translated based on the SSM *E. coli* criterion consistent with the 2010 Rapid Creek fecal coliform TMDL. In addition to the daily load, the geometric mean criteria must be attained on a longer (i.e., monthly) basis. Developing a TMDL using the most protective numeric targets for *E. coli* ensures that the TMDL will meet the *E. coli* water quality standards.

Table 1. Designated recreation use and associated bacteria criteria designated to Rapid Creek segment 03.

Impaired Stream Segment AUID	Designated Recreation Use	Fecal coliform GM CFU/100mL	Fecal coliform SSM CFU/100mL	<i>E. coli</i> GM CFU/100mL	<i>E. coli</i> SSM CFU/100 mL
SD-CH-R-Rapid_03	Immersion	≤ 200	* ≤ 400	≤ 126	* ≤ 235

\*Refers to numeric criteria used for TMDL development

## SOURCE ASSESSMENT

### POINT SOURCES

All active permits within the Rapid Creek segment 03 drainage basin can be found in Appendix A. Permits 1-61 and 66-68 are permits that are covered under the General MS4 permit. They are required to submit a Notice of Intent (NOI) form 15 days prior to operational startup and are not permitted to discharge *E. coli*. Permits 62-65 have individual NPDES permits, none of which include *E. coli* as a permitted discharge. Thus all facilities listed in Appendix A are not permitted to discharge *E. coli* and are not included in the total waste load allocation (WLA) for this TMDL. In addition to these 68 permits, Rapid Creek segment 03 also flows through Rapid City (population ≈ 79,000) and is impacted by stormwater runoff that contributes *E. coli* loading to the creek. Rapid City is permitted under the Small Municipal Separate Storm Water System (MS4) general permit. The state-wide general permit became active on January 1, 2003. It has since been administratively continued and is still currently active today (SD DANR, 2003). Rapid City was granted coverage under the general permit on April 25, 2003. Rapid City maintains this permit by submitting an annual report to SD DANR. The most recent annual report was received in March of 2023 and states that all MS4 requirements are still being met.

Rapid City's MS4 permit (Permit # SDR41A007) requires the city to have an accurate, updated Stormwater Management Program (SWMP) that includes pollution prevention measures, treatment or removal techniques, monitoring, use of legal authority, and other appropriate measures to control the quality of storm water discharged to the storm drains. Rapid City's SWMP was last updated in 2019 and outlines pollutants of concern, including *E. coli*, and the city's plan for reducing those pollutant levels to the Maximum Extent Practicable (MEP) using Best Management Practices (BMP) (City of Rapid City, 2019). The 2010 Rapid Creek fecal coliform TMDL set a waste load allocation (WLA) of  $3.54 \times 10^{11}$  CFU/day for Rapid City. This WLA was set by treating all stormwater runoff to a depth of 0.5 inches based on the exponential distribution of all rainfall events and treatment to the MEP. Appendix B of the 2010 fecal coliform TMDL contains the full WLA calculation method. The area of Rapid City covered by the SWMP has not changed from the original TMDL to the 2019 SWMP. Average rainfall at Rapid City Regional Airport from the months of May-September including data from recent years is 11.19 inches,

with a yearly average rainfall of 17.03 (National Weather Service, 2023). This WLA is still accurate today because it is still recommended to follow the SWMP and use designed BMPs to treat the runoff from all rainfall events less than or equal to 0.5 inches. This will allow for the reduction of stormwater *E. coli* pollution to the MEP.

Rapid City Water Reclamation Facility (RC WRF) and Pennington County have permitted discharges into Rapid Creek located just downstream of segment 03 in Rapid Creek segment 04. The Rapid Creek segment 03 watershed is shared by both the Rapid City and Pennington County MS4s. However, Pennington County's MS4 only discharges into Rapid Creek just downstream of Rapid Creek segment 03 in Rapid Creek segment 04. RC WRF's permit (Permit # SD0023574) was issued June of 2017 and has been administratively continued. Pennington County is also permitted under the MS4 general permit (Permit # SDR41A004), has an updated SWMP, and their most recent annual report was submitted in May of 2023 (Pennington County, 2016). The WLA does not include these two permitted discharges because they do not discharge to Rapid Creek segment 03.

## NONPOINT SOURCES

The nonpoint source assessment for Rapid Creek segment 03 is documented in the 2010 Rapid Creek fecal coliform TMDL and the conclusions of that 2010 assessment are still accurate today. Fecal coliform source contributions are considered synonymous with *E. coli* based on the close statewide paired bacteria data relationship documented in the 2020 bacteria TMDL translation.

The exact land use percentages from the 2010 fecal coliform TMDL were not able to be replicated, so land use from the 2010 fecal coliform TMDL was compared to land use from 2008 and 2021. Land use from 2008 and 2021 were calculated using the Earth Resources Observation and Science's (EROS) National Land Cover Database (NLCD) to evaluate the two subwatersheds (12-digit hydrologic unit code) that surround Rapid Creek segment 03 (EROS Center, 2023). Land uses from the 2010 TMDL, 2008 land uses, and 2021 land uses differ by less than 7%. Between the 2010 fecal coliform TMDL land use and the 2021 land use there was a 6.3% increase in forest, 4.7% decrease in pastureland, and a 2.7% decrease in urban land. Thus, the land use in the Rapid Creek segment 03 watershed has changed only minimally.

With only minor changes in land use, bacteria production characteristics in the Rapid Creek segment 03 watershed are expected to be very similar to that of the 2010 Rapid Creek fecal coliform TMDL assessment. The primary nonpoint sources of fecal coliform within the Lower Rapid Creek watershed included human, agricultural runoff, and wildlife sources. Bacterial production estimations for Rapid Creek segment 03 included 89.8% urban, 10.1% pastureland/rangeland and 0.1% agriculture/cropland. Rapid City had a population increase of around 11,000 since 2010. However, the nonpoint source assessment included the urban land that is in the MS4 area when calculating the total bacteria production. Since the WLA from the MS4 area remains unchanged, the bacteria production estimation percentage for urban land remains consistent with the 2010 fecal coliform TMDL. Because there were only minor changes in land use and the WLA remains unchanged, the total bacteria production percentages for all sources are all consistent with the 2010 fecal coliform TMDL.

## TMDL AND ALLOCATIONS

A load duration curve framework was used to develop the 2010 fecal coliform TMDL for Rapid Creek segment 03. The criteria ratio approach was used to convert the existing fecal coliform TMDL and allocations to *E. coli* for each flow zone. The *E. coli* TMDL, WLA, load allocation (LA), and margin of safety (MOS) were calculated by multiplying the existing fecal coliform values by the ratio (EC:FC) for the SSM (Table 2). The *E. coli* TMDL allocations (TMDL=WLA+LA+MOS) were based on the same percent

contribution as established for the fecal coliform TMDL allocations in each flow zone. As stated in the 2010 fecal coliform TMDL for Rapid Creek segment 03, the current load for the low flow zone meets the current water quality standard and does not need a reduction.

The fecal coliform current load from the 2010 fecal coliform TMDL was also converted to *E. coli* using the ratio (EC:FC) for the SSM. The percent reduction was then calculated as the converted *E. coli* current load minus the *E. coli* converted TMDL divided by the converted *E. coli* current load. This calculation results in percent reductions equal to the 2010 fecal coliform TMDL.

Table 2. Applicable bacteria criteria and ratio for the immersion recreation use.

Fecal coliform criteria	<i>E. coli</i> criteria	EC:FC ratio
SSM 400	SSM 235	0.5875

The *E. coli* TMDL is protective of applicable criteria assigned to the immersion recreation use designated to Rapid Creek segment 03. The 2010 fecal coliform TMDL contains supporting information necessary to implement the *E. coli* TMDLs. The original fecal coliform and converted *E. coli* TMDL allocations and reductions are provided for Rapid Creek segment 03 in Tables 3 and 4, respectively (see below table 4 for table notes). In addition to the daily load, the geometric mean criteria must be attained on a longer (i.e., monthly) basis.

#### SD-CH-R-RAPID\_03

Table 3. Existing fecal coliform TMDL and allocations for Rapid Creek segment 03 based on the applicable bacteria criteria for immersion recreation from the 2010 fecal coliform TMDL.

Flow Zone	Fecal TMDL (CFU/day)	WLA <sup>^</sup> (CFU/day)	LA (CFU/day)	MOS (CFU/day)	Current Load (CFU/day)*	% Reduction
High	5.58E+12	3.54E+11	3.49E+12	1.73E+12	2.53E+13	78%
Moist	1.35E+12	3.54E+11	7.52E+11	2.45E+11	1.97E+13	93%
Mid-Range	7.63E+11	3.54E+11	3.31E+11	7.80E+10	5.93E+12	87%
Dry	5.87E+11	3.54E+11	1.35E+11	9.80E+10	1.20E+12	51%
Low	3.91E+11	-	3.03E+11	8.80E+10	9.90E+10	0%

Table 4. *E. coli* TMDL and Load allocations for Rapid Creek segment 03 based on the applicable bacteria criteria for immersion recreation.

Flow Zone	<i>E. coli</i> TMDL (CFU/day)	WLA <sup>^</sup> (CFU/day)	LA (CFU/day)	MOS (CFU/day)	Current Load (CFU/day)**	% Reduction
High	3.28E+12	2.08E+11	2.05E+12	1.02E+12	1.49E+13	78%
Moist	7.94E+11	2.08E+11	4.42E+11	1.44E+11	1.16E+13	93%
Mid-Range	4.48E+11	2.08E+11	1.94E+11	4.58E+10	3.48E+12	87%
Dry	3.45E+11	2.08E+11	7.93E+10	5.76E+10	7.06E+11	51%
Low	2.30E+11	-	1.78E+11	5.17E+10	5.82E+10	0%

\*Current load is the 95<sup>th</sup> percentile of observed fecal coliform bacteria loads for each flow zone.

\*\*Converted *E. coli* current load using the fecal coliform bacteria 95<sup>th</sup> percentile of observed loads for each flow zone.

^WLA associated with Rapid City's MS4 stormwater permit (Permit # SDR41A007). Calculations for this WLA can be seen in Appendix B of the 2010 fecal coliform TMDL.

## SUMMARY

The 2020 bacteria TMDL translation provided a framework to convert fecal coliform TMDLs and allocations to *E. coli* to address impaired streams with recreation uses in South Dakota. This framework was used to convert the existing fecal coliform TMDL, and allocations set forth in the 2010 fecal coliform TMDL for Rapid Creek segment 03 (**SD-CH-R-RAPID\_03**) to *E. coli*. Therefore, this document serves as an *E. coli* TMDL addendum to the 2010 fecal coliform TMDL for Rapid Creek segment 03 (TMDL # 39426).

The waterbody remains entirely within state jurisdiction as it was in the 2010 fecal coliform TMDL.

Developing a TMDL using the most protective numeric targets for *E. coli* ensures that the TMDL will meet the *E. coli* water quality standards. The numeric targets for *E. coli* for Rapid Creek segment 03 are a GM  $\leq$  126 CFU/mL and a SSM  $\leq$  235 CFU/100mL. These targets are consistent with the fecal coliform values used in the 2010 fecal coliform TMDL and are also the current, most stringent, *E. coli* standards for Rapid Creek segment 03.

The 68 permits listed in Appendix A are not permitted to discharge *E. coli* to Rapid Creek segment 03. Rapid City's MS4 permit remains unchanged from the 2010 fecal coliform TMDL. Rapid City maintains an updated SWMP for the stormwater discharges to Rapid Creek segment 03. The WLA for the MS4 permit remains unchanged as it is still recommended to follow the SWMP and use designated BMPs to treat the runoff from all rainfall events less than or equal to 0.5 inches. The MS4 area is the same as in the 2010 fecal coliform TMDL, and the average rainfall has only marginally increased since the 2010 fecal coliform TMDL. Nonpoint source *E. coli* contributions are also expected to remain the same as land use has only marginally changed since the 2010 fecal coliform TMDL, and the majority of bacteria production is still expected to be from the urban land use.

Bacteria current loads may have fluctuated since 2010; however, Rapid Creek segment 03 remains impaired on the most recent 303(d) list as documented in the 2022 Integrated Report. Thus, percent reduction in each flow zone remains consistent with the 2010 fecal coliform TMDL. Additionally, SDDANR is pursuing a Section 319 Implementation and Protection project in partnership with the West Dakota Water Development District (WDWDD) and the Pennington Conservation District. That potential project would include Rapid Creek segment 03.

The addended *E. coli* TMDL and allocations follow the assumptions of the 2010 fecal coliform TMDL. The fecal coliform and *E. coli* TMDLs for Rapid Creek segment 03 were developed in accordance with Section 303(d) of the federal Clean Water Act and guidance provided by the US EPA.

## PUBLIC COMMENT

This TMDL addendum was made available for public comment in accordance with section 303(d) requirements. A public notice letter was published in the Rapid City Journal and the Black Hills Pioneer to announce the availability of the addendum for public comment. The TMDL addendum document and comment process was made available on the South Dakota Department of Agriculture and Natural Resources webpage at <https://danr.sd.gov/public/default.aspx>. The public comment period began March 9, 2024 and ended April 10, 2024. Any comments received during the public notice period were be addressed in Appendix C.



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South Dakota, 2023. Administrative Rules. Surface Water Quality. 74:51

<https://sdlegislature.gov/Rules/Administrative/74:51>

## APPENDIX A: PERMITS

#	Permit Name	SourceID	RegistryID	Permit Type	Detailed Facility Report URL
1	2320 SOPHIA COURT	SDR10H615	110071321341	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10H615&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10H615&amp;sys=ICP</a>
2	2415 COMMERCE RD	SDR10K129	110071320696	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K129&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K129&amp;sys=ICP</a>
3	42-UNIT APARTMENT COMPLEX	SDR10K072	110071324880	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K072&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K072&amp;sys=ICP</a>
4	ADDISON AVENUE EXTENSION	SDR10J504	110071277509	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J504&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J504&amp;sys=ICP</a>
5	ANAMOSA STREET WATER MAIN EXTENSION	SDR10K485	110071321556	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K485&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K485&amp;sys=ICP</a>
6	BEN FRENCH TO LANGE	SDR10K705	110071323865	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K705&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K705&amp;sys=ICP</a>
7	BH SPEEDWAY PARKING LOT PLAN	SDR10J459	110071280249	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J459&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J459&amp;sys=ICP</a>
8	BIG SKY SUBDIVISION AVENUE A	SDR10J579	110071274862	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J579&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J579&amp;sys=ICP</a>
9	BOULDER CREEK APARTMENTS	SDR10J713	110071278563	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J713&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J713&amp;sys=ICP</a>
10	BUTLER MACHINERY DRAINAGE	SDR10H077	110007839937	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10H077&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10H077&amp;sys=ICP</a>
11	CATRON VILLAGE APARTMENTS, LLC	SDR10G520	110071322521	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10G520&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10G520&amp;sys=ICP</a>
12	COPPERFIELD VISTAS SUBDIVISION PHASES 3, 4 & 5	SDR10I382	110071323331	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10I382&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10I382&amp;sys=ICP</a>
13	CREEK DRIVE STORAGE UNITS	SDR10K416	110071322467	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K416&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K416&amp;sys=ICP</a>
14	DEADWOOD AVENUE RECONSTRUCTION PHASE 1	SDR10K701	110071324227	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K701&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K701&amp;sys=ICP</a>
15	DIAMOND RIDGE	SDR10J236	110071279372	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J236&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J236&amp;sys=ICP</a>
16	E ANAMOSA STREET EXTENSION	SDR10K761	110071322644	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K761&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K761&amp;sys=ICP</a>
17	E MAIN STREET N - BRIDGE PRESERVATION	SDR10K777	110071321172	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K777&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K777&amp;sys=ICP</a>
18	ELKS CROSSING PHASE 4 - GRADING PLAN	SDR10H106	110071321213	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10H106&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10H106&amp;sys=ICP</a>
19	FOREST EDGE SUBDIVISION	SDR10G338	110071321414	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10G338&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10G338&amp;sys=ICP</a>
20	GLO ACCESS ROAD	SDR10I473	110071321144	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10I473&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10I473&amp;sys=ICP</a>
21	GRADING IMPROVEMENTS	SDR10K766	110071319500	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K766&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K766&amp;sys=ICP</a>

#	Permit Name	SourceID	RegistryID	Permit Type	Detailed Facility Report URL
22	HEARTLAND HEIGHTS APARTMENTS	SDR10K668	110071322449	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K668&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K668&amp;sys=ICP</a>
23	HILLSVIEW ESTATES SUBDIVISION	SDR10K333	110071322194	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K333&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K333&amp;sys=ICP</a>
24	HOLIDAY STATION STORES	SDR10K139	110071319965	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K139&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K139&amp;sys=ICP</a>
25	HOMESTEAD STREET CONNECTION	SDR10K500	110071321735	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K500&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K500&amp;sys=ICP</a>
26	HOMESTEAD SUB PHASE 5	SDR10J567	110071280281	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J567&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J567&amp;sys=ICP</a>
27	IHS RAPID CITY HEALTH CENTER	SDR10J957	110071278881	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J957&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J957&amp;sys=ICP</a>
28	JOHNSON RANCH APARTMENTS	SDR10K402	110071321317	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K402&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K402&amp;sys=ICP</a>
29	JOHNSON RANCH DOWNSTREAM CHANNEL & PONDS	SDR10K035	110071322624	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K035&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K035&amp;sys=ICP</a>
30	JOHNSON RANCH PHASE 2	SDR10J133	110071279449	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J133&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J133&amp;sys=ICP</a>
31	KNOLLWOOD DRAINAGE BASIN - DETENTION ELEMENT 303	SDR10K623	110071319528	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K623&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K623&amp;sys=ICP</a>
32	LANGE TO LOOKOUT 230KV	SDR10K168	110071323491	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K168&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K168&amp;sys=ICP</a>
33	LAZY P6 CONDOMINIUMS I AND II (PHASE 6)	SDR10G072	110071324763	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10G072&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10G072&amp;sys=ICP</a>
34	LOSTS X & Y SITE IMPROVEMENTS	SDR10K343	110071322728	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K343&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K343&amp;sys=ICP</a>
35	LOT 1 OF COUNTRY MEADOWS SUBDIVISION	SDR10H028	110071322522	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10H028&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10H028&amp;sys=ICP</a>
36	MILLWORK WAREHOUSE	SDR10K473	110071320808	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K473&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K473&amp;sys=ICP</a>
37	MOONLIGHT APTS & VALLEY DR WATER MAIN	SDR10K461	110071322902	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K461&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K461&amp;sys=ICP</a>
38	MT VIEW CEMETERY & MT CALVARY CEMETERY IMPROVEMENT	SDR10J130	110071275741	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J130&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J130&amp;sys=ICP</a>
39	MULTIPLE AGENCY LEASING OFFICE	SDR10K183	110071320032	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K183&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K183&amp;sys=ICP</a>
40	MURPHY RANCH PHASE 6	SDR10J298	110071322272	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J298&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J298&amp;sys=ICP</a>
41	NATIONAL AMERICAN UNIVERSITY - RAPID CITY CAMPUS R	SDR10F477	110071322544	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10F477&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10F477&amp;sys=ICP</a>
42	NE CORNER YARD IMPROVEMENT	SDR10F835	110071319526	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10F835&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10F835&amp;sys=ICP</a>
43	NH 0044(167)44 / P0231(13)79 / P 0445(00)74	SDR10J733	110071321693	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J733&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J733&amp;sys=ICP</a>

#	Permit Name	SourceID	RegistryID	Permit Type	Detailed Facility Report URL
44	NH 0044(220)46	SDR10P189	110071323731	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10P189&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10P189&amp;sys=ICP</a>
45	PARK HILLS SUBDIVISION NO 7	SDR10K634	110071323105	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K634&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K634&amp;sys=ICP</a>
46	PDR AUTO BODY	SDR10K102	110071323490	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K102&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K102&amp;sys=ICP</a>
47	PHASE 6B-2 - LANE EXTENSIONS	SDR10K401	110071324449	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K401&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K401&amp;sys=ICP</a>
48	RAPID CITY GSA-VA OUTPATIENT CLINIC	SDR10K472	110071324516	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K472&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K472&amp;sys=ICP</a>
49	RAPID CITY REGIONAL HOSPITAL-BUILDING & PARKING AD	SDR10H688	110001676366	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10H688&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10H688&amp;sys=ICP</a>
50	RED ROCK APARTMENTS	SDR10J868	110071280637	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J868&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J868&amp;sys=ICP</a>
51	REHABILITATION & CRITICAL CARE HOSPITAL	SDR10K508	110071324177	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K508&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K508&amp;sys=ICP</a>
52	SCOTLAND HILLS SOUTH PH 2	SDR10K700	110071322920	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K700&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K700&amp;sys=ICP</a>
53	SHEPHERD HILLS EAST & WEST	SDR10J628	110071280606	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J628&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J628&amp;sys=ICP</a>
54	SHEPHERD HILLS SOUTH PHASE 1	SDR10K587	110071323685	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K587&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K587&amp;sys=ICP</a>
55	SHEPHERD MEADOWS MOBILE HOME COMMUNITY	SDR10J760	110071276888	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10J760&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10J760&amp;sys=ICP</a>
56	SOUTH MIDDLE SCHOOL NEW FACILITY	SDR10K661	110020963377	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K661&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K661&amp;sys=ICP</a>
57	ST CLOUD RECONSTRUCTION	SDR10K635	110071322916	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K635&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K635&amp;sys=ICP</a>
58	ST CLOUD RECONSTRUCTION	SDR10K778	110071320173	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K778&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K778&amp;sys=ICP</a>
59	STONE CREEK RESERVE	SDR10K480	110071320214	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10K480&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10K480&amp;sys=ICP</a>
60	STUMER ROAD APARTMENTS	SDR10H856	110071324733	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10H856&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10H856&amp;sys=ICP</a>
61	TRAILWOOD VILLAGE SUBDIVISION PHASE 15	SDR10G680	110071323257	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDR10G680&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDR10G680&amp;sys=ICP</a>
62	<b>BLACK HILLS CORP LCTF</b>	SD0027871	110009115484	NPDES Individual Permit	<a href="https://echo.epa.gov/detailed-facility-report?fid=SD0027871&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SD0027871&amp;sys=ICP</a>
63	<b>GCC DACOTAH</b>	SD0000027	110012173272	NPDES Individual Permit	<a href="https://echo.epa.gov/detailed-facility-report?fid=SD0000027&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SD0000027&amp;sys=ICP</a>
64	<b>PETE LIEN &amp; SONS, INC</b>	SD0000094	110004948647	NPDES Individual Permit	<a href="https://echo.epa.gov/detailed-facility-report?fid=SD0000094&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SD0000094&amp;sys=ICP</a>
65	<b>RAPID CITY REGIONAL RECYCLING AND LANDFILL</b>	SD0027685	110009790672	NPDES Individual Permit	<a href="https://echo.epa.gov/detailed-facility-report?fid=SD0027685&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SD0027685&amp;sys=ICP</a>

#	Permit Name	SourceID	RegistryID	Permit Type	Detailed Facility Report URL
66	RAPID CITY, CITY OF (WTP)	SDG860020	110041923112	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDG860020&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDG860020&amp;sys=ICP</a>
67	RAPID VALLEY SANITARY DISTRICT (WTP)	SDG860007	110013001321	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDG860007&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDG860007&amp;sys=ICP</a>
68	SD ARMY NATIONAL GUARD (WTP)	SDG860061	110009790592	General Permit Covered Facility	<a href="https://echo.epa.gov/detailed-facility-report?fid=SDG860061&amp;sys=ICP">https://echo.epa.gov/detailed-facility-report?fid=SDG860061&amp;sys=ICP</a>

^^Facility Type Codes: Municipality (CTG), Federal Facility (FDF), Municipal or Water District (MWD), Privately Owned Facility (POF),

## APPENDIX B: E. COLI DATA

Table B1. E. coli data collected since 2010. Station 460173 is halfway through segment 03, station MNRC4H is 1/3 of the way through segment 03, and station 6413200 is at the beginning of segment 03.

Sample Date	StationID	E. coli (CFU/100mL)
05/09/2011	460173	33
06/01/2011	460173	60
07/11/2011	460173	64
08/09/2011	460173	1200
09/20/2011	460173	114
05/07/2012	460173	28
06/05/2012	460173	80
07/10/2012	460173	64
08/07/2012	460173	59
09/05/2012	460173	44
05/07/2013	460173	8
06/11/2013	460173	64
07/10/2013	460173	260
08/12/2013	460173	60
09/03/2013	460173	46
05/07/2014	460173	86
06/11/2014	460173	81
07/01/2014	460173	63
08/12/2014	460173	119
09/03/2014	460173	91
05/19/2015	460173	141.4
06/09/2015	460173	24.9
07/08/2015	460173	86
08/05/2015	460173	16
09/09/2015	460173	32.8
05/10/2016	460173	81.6
06/08/2016	460173	326
07/06/2016	460173	365
08/10/2016	460173	345
09/14/2016	460173	25.3
05/10/2017	460173	548
06/12/2017	460173	144
07/10/2017	460173	59.8
08/07/2017	460173	2420
09/11/2017	460173	127
10/11/2017	6413200	1
12/12/2017	6413200	14
03/20/2018	6413200	4
05/08/2018	6413200	5
05/23/2018	460173	179
06/13/2018	460173	49.6
06/26/2018	6413200	49
07/23/2018	460173	190
08/13/2018	6413200	12

Sample Date	StationID	E. coli (CFU/100mL)
08/16/2018	460173	88.6
09/20/2018	460173	> 2420
10/16/2018	6413200	1
05/15/2019	6413200	< 5
05/23/2019	460173	155
06/12/2019	6413200	4
06/12/2019	460173	21.8
07/16/2019	460173	106
08/07/2019	460173	30.9
09/04/2019	460173	34.1
05/05/2020	460173	22.6
06/04/2020	460173	146
07/07/2020	460173	167
08/10/2020	460173	66.3
09/15/2020	460173	30.9
05/05/2021	460173	5.2
06/08/2021	460173	70.8
07/06/2021	460173	1200
08/10/2021	460173	13.2
09/07/2021	460173	38.9
05/02/2022	460173	11
06/01/2022	460173	71.7
06/07/2022	460173	435
06/13/2022	460173	172
06/28/2022	MNRC4H	93.3
07/06/2022	460173	308
07/06/2022	460173	172
07/18/2022	460173	93.3
07/28/2022	MNRC4H	93.2
08/03/2022	460173	80.1
08/29/2022	460173	95.9
09/20/2022	460173	63.1
09/28/2022	460173	34.5
10/31/2022	MNRC4H	49.6
05/16/2023	460173	59.1
05/23/2023	460173	77.6
06/06/2023	460173	50.4
06/12/2023	460173	173
07/19/2023	460173	222
07/31/2023	460173	29.8
08/10/2023	460173	14.6
08/16/2023	460173	65.7
09/12/2023	460173	37.3
09/18/2023	460173	50.4

Table B2. *E. coli* averages, maximums, counts, and counts  $\geq 235$  CFU/100mL by year using only values measured during the growing season (May – September) for all stations along Rapid Creek segment 03.

<b>Year</b>	<b>Avg (CFU/100mL)</b>	<b>Max (CFU/100mL)</b>	<b>Count</b>	<b>Exceedance Count</b>
2011	294.2	1200	5	1
2012	55.0	80	5	0
2013	87.6	260	5	1
2014	88.0	119	5	0
2015	60.2	141	5	0
2016	228.6	365	5	3
2017	659.8	2420	5	2
2018	374.2	2420	8	1
2019	50.6	155	7	0
2020	86.6	167	5	0
2021	265.6	1200	5	1
2022	132.5	435	13	2
2023	78.0	222	10	0

## APPENDIX C: EPA APPROVAL LETTER AND DECISION DOCUMENT