2016 Addendum to the South Dakota Mercury TMDL

1.0 Introduction

The South Dakota Department of Environment and Natural Resources (SDDENR) adopted the Statewide Mercury total maximum daily load (TMDL) that included 90 waterbodies (70 Assessment Units) in January 2016. The TMDL was formally approved by the United States Environmental Protection Agency (EPA) in March 2016. South Dakota, through this addendum, formally seeks coverage for five more waterbodies under the original mercury TMDL in accordance with Section 303(d) of the Clean Water Act. This addendum document does not modify any aspect of the 2016 South Dakota Mercury TMDL, and the TMDL and allocations remain as presented in the original TMDL:

Annual Statewide Mercury TMDL Calculation
TMDL (595.32 kg/yr) = WLA (4.84 Kg/yr) + LA (590.48 Kg/yr) + MOS (implicit)

Refer to Section 10.0 of the original TMDL for more information on how this this annual load was calculated and how a daily load (3.21 Kg/day) was derived. This addendum includes information specific to five assessment units (AUs) in South Dakota. Figure 1 shows their locations. Fish tissue samples collected from these five AUs exhibited methyl mercury concentrations exceeding the 0.3 mg/Kg human health criteria identified in the Administrative Rules of South Dakota (ARSD) Chapter 74:51:01 Appendix B.

Sheridan and Stockade Lakes were included as part of the original AUs included with the statewide mercury TMDL. However, issues with legacy mining as a potential localized mercury source were raised by EPA during the TMDL public comment period and final approval process. EPA took "no action" until additional information and data analysis confirms that atmospheric loadings were the primary source of mercury for these two lakes.

Sheriff Dam, Clubhouse Lake, and Segment of 8 of the James River are also included in this addendum because these waterbodies were not part of the original South Dakota Mercury TMDL list subject to public comment. EPA also took "no action" on these waterbodies. To ensure these three waterbodies are fully vetted with regards to their inclusion under the original TMDL they will be public noticed with this addendum. Segment 4 of the Belle Fourche River (AU: SD-BF-R-BELLE_FOURCHE_04) was initially included with this group. Further data review has determined that this river segment was incorrectly characterized as impaired by mercury in the original TMDL, thus TMDL coverage is no longer sought.

Refer to the original, approved TMDL document for details related to the overall methods and assumptions used in establishing the South Dakota Mercury TMDL. For the South Dakota Mercury TMDL to be applicable to a waterbody, the following conditions need to be met:

- It falls entirely within state jurisdiction,
- If jurisdiction is shared, it may only be applied to those portions of the water under South Dakotas' jurisdiction,
- The standard length fish (SLF) tissue methylmercury concentrations from the water does not exceed 0.878 mg/Kg,
- There are no potential impacts from current or historic gold mining processes,

- If it is a river or stream, NPDES discharges do not exceed permitted limits,
- The TMDL will meet the water quality standards in the proposed water, and
- The original TMDL assumptions (e.g., source contributions, loading capacity, etc.) are still valid.

This addendum demonstrates that these conditions are met for each of the five waterbodies described above, and thus all five are appropriate for coverage under the original South Dakota mercury TMDL.

Waterbodies added to the South Dakota Mercury TMDL:

Assessment Unit ID	Common Name-County	Acres/Miles as reported in EPA ADB
SD-BA-L-SHERIFF_01	Sheriff Dam – Jones County	20.6
SD-JA-L-CLUBHOUSE_01	Clubhouse Lake - Marshall County	208.1
SD-JA-R-JAMES_08	James River - Beadle County	39.0
SD-CH-L-STOCKADE_01	Stockade Lake-Custer County	125.4
SD-CH-L-SHERIDAN_01	Sheridan Lake-Pennington County	367.9

2.0 Jurisdiction

Both Stockade and Sheridan Lake are under the jurisdiction of the State of South Dakota with regards to the water quality standards and the Clean Water Act. Stockade Lake is a 125 acre lake created by the Civilian Conservation Corps (CCC) during the Great Depression (circa 1935). It is owned by the State and managed by the SD Game, Fish, and Parks (SDGFP) as part of Custer State Park (Figure 1).

Sheridan Lake is a 368 acre lake located in the Black Hills National Forest (Figure 1). Its campgrounds and most of its watershed are owned and managed by the United States Forest Service (USFS) although the fishery is managed by the SDGFP. This lake was also created by the CCC during the Great Depression.

The remaining waterbodies and their watersheds, Clubhouse Lake, Sheriff Lake, and Segment 8 of the James River, all fall within the jurisdiction of the State of South Dakota. Figure 1 shows the locations of the waterbodies with respect to tribal reservations and state boundaries.

3.0 Comparable Existing Conditions

To determine the applicability of the South Dakota Mercury TMDL for additional waterbodies, including the five presented in this addendum, a review of existing conditions must be completed. This review should discuss fisheries and water quality data, loadings analysis, and potential sources, both point and nonpoint, that were similarly discussed within the original TMDL.

3.1. Fishery

Figures 2 through 12 present the distribution of mercury concentrations in fish species sampled from each of the five waterbodies included in this addendum. Table 1 shows the fish collected from each of the five waterbodies that exceeded the water quality standard of 0.3 mg/Kg (ARSD Chapter 74:51:01 Appendix B). Table 1 can be found at the end of the document.

The following section compares fish tissue mercury concentrations collected from these five addendum waterbodies to the dataset used in the original TMDL. If this evaluation demonstrates sufficiently similar concentrations, SDDENR expects to satisfy the third and sixth bulleted conditions listed above. Or stated more simply, as long as the fish populations in these five lakes do not exhibit notably higher

concentrations of mercury, the original TMDL and loading reductions will lead to water quality standards attainment in the five addendum waters. Direct comparisons, however, are complicated by differences in fish species. The original South Dakota mercury TMDL used walleye to derive TMDL reduction targets but not every waterbody in the state supports a walleye population. Walleye were only collected from Clubhouse Lake and Segment 8 of the James River. In the absence of Walleye from Sheridan, Stockade, and Sheriff Dam, other species were used to show mercury trends in fish flesh for these three waterbodies. The figures also show how the data compares to the statewide walleye data used to calculate the SLF concentration.

3.1.1. Sheridan and Stockade Lake

Sheridan and Stockade were initially managed as cold water fisheries focusing on trout populations. Through the years, unintended or accidental fish introductions not supported by the SD Game, Fish and Parks, i.e. Northern Pike, Yellow Perch and Rock Bass, have established naturally-reproducing populations in many locations throughout the Black Hills Forest Management Area (Davis 2012).

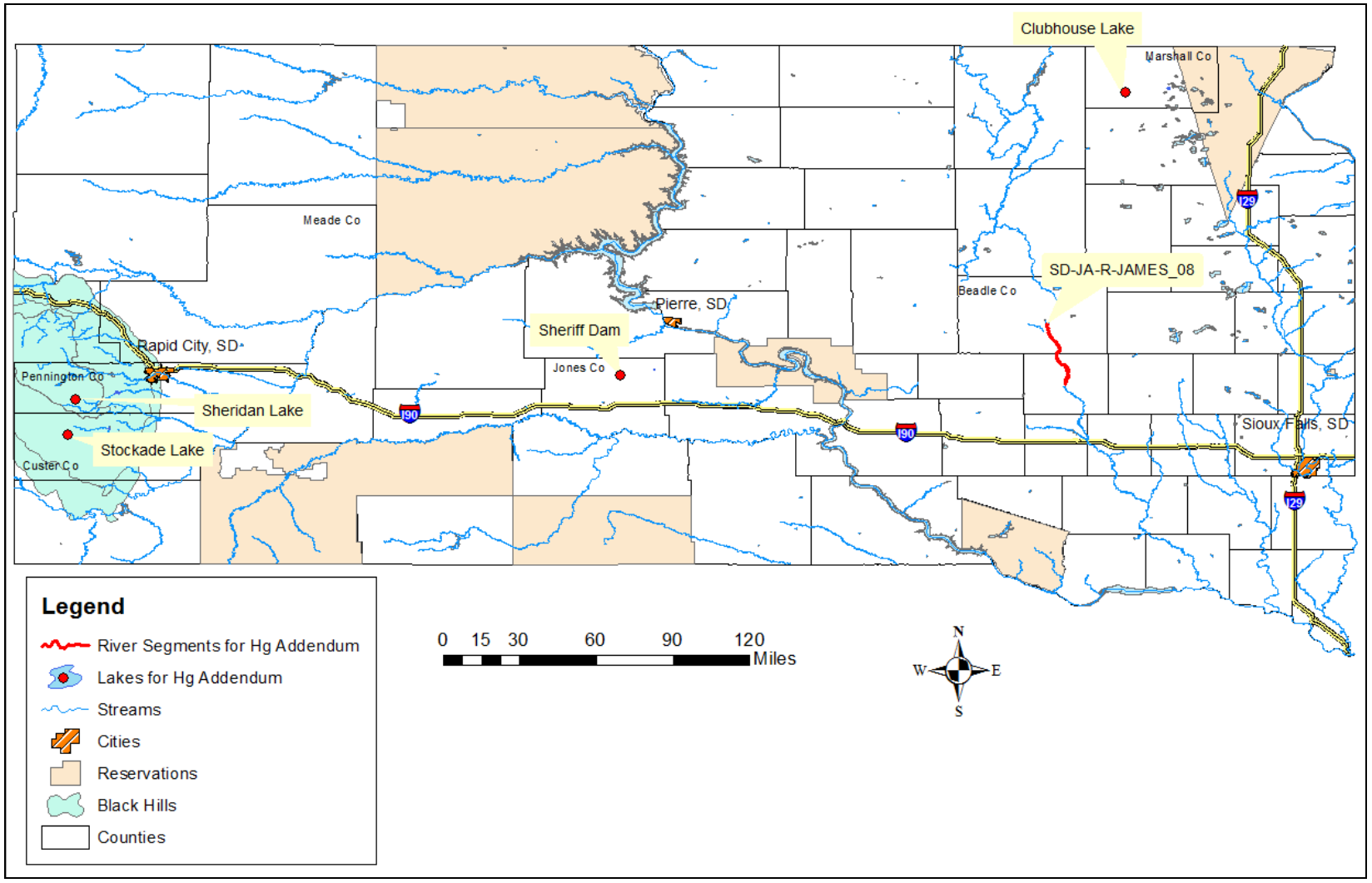

Figure 1. Locations of Five Waterbodies to be added to the South Dakota Mercury TMDL 2016.

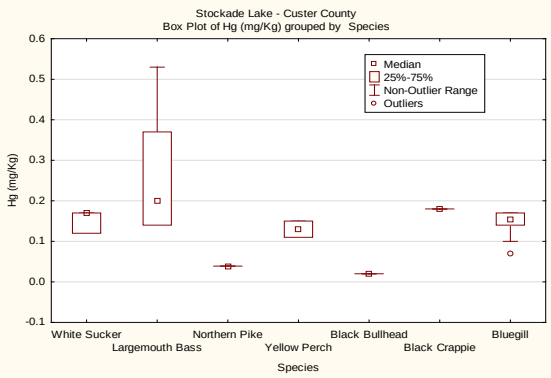

Figure 2. Stockade Lake Mercury Concentrations by Species.

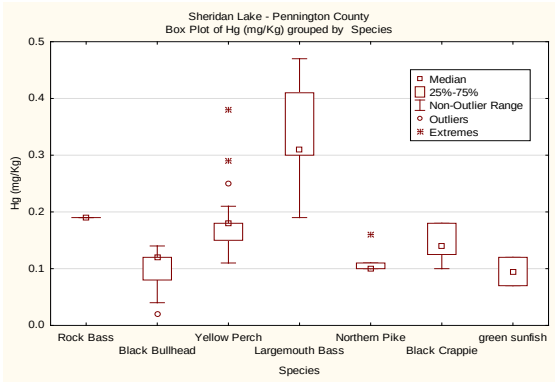

Figure 3. Sheridan Lake Mercury Concentrations by Species.

Although not initially desired, current management practices for both of these lakes have shifted focus to more warmwater species, especially largemouth bass and yellow perch. More details on the management of these reservoirs may be found in the Fisheries Management Plan for Black Hills Reservoirs 2015-2019. Management objectives for a warmwater dominant species are of particular concern with respect to fish tissue methylmercury concentrations. Dominant cold-water species (salmonids) such as trout tend to have lower concentrations of mercury. In fact the maximum concentration observed in 121 samples collected from salmonids in South Dakota was 0.11 mg/Kg. Changing the management focus to a trout dominant fishery may result in full attainment of the mercury standard prior to achieving all of the atmospheric reductions outlined in the original TMDL. Regardless, reestablishing a viable salmonid fishery can be challenging and costly, and South Dakota must consider the current fishery while assessing the risk to human health.

Figures 2 and 3 clearly show largemouth bass (*Micropterus salmoides*) as the species most susceptible to increased concentrations of methylmercury for both Stockade and Sheridan Lakes. The only other species found to have fish flesh concentrations over the 0.3 mg/Kg threshold was a single yellow perch (*Perca flavescens*) collected from Sheridan Lake.

For the period of 1998-2015, a total of sixty one (61) individual fish samples were collected from Stockade Lake of which a total of five (5) largemouth bass exceeded the threshold (Table 1). Of the 65 total fish sampled from Sheridan Lake for the period of 2003-2015, eight (8) largemouth bass and one yellow perch (previously mentioned) were above the threshold. Table 1 presents the individual fish samples including length, year caught, and mercury concentration for fish over the 0.3 mg/Kg threshold and Figures 2 and 3 graphically display each Lakes' fish tissue datasets organized by species. Concentrations in the fish which exceeded the 0.3 mg/Kg threshold ranged from 0.31 mg/Kg to as high as 0.53 mg/Kg. Note that all fish exceeding the 0.3 threshold were collected during the 2012 and 2015 field season.

To determine individual waterbody support status for the 2016 Integrated Report (IR) with respect to mercury in fish tissue, a minimum of 10 fish tissue samples must have been collected between January 2006 through September 2015. For an impairment designation a minimum of one of two scenarios needs to be satisfied: 1) the 95th percentile of this data for each individual lake needs to exceed 0.3 mg/Kg or 2) a fish consumption advisory has been issued. Thirty-six (36) samples were collected within the required time period from Stockade Lake resulting in a 95th percentile of the all species dataset of 0.47 mg/Kg (> 0.3 mg/Kg). Stockade Lake was subsequently classified as impaired by mercury.

Forty (40) samples were collected from Sheridan during the same period exhibiting a 95th percentile of 0.41 mg/Kg, which also exceeds the 0.3 mg/Kg threshold. Sheridan Lake was also classified as impaired by mercury.

While South Dakota's mercury assessment method (described above) evaluates data from all available fish species, the original mercury TMDL analysis primarily focused on walleye (*Sander vitreus)*. Walleye typically exhibited higher concentrations than similarly aged fish from other species and are the most popular fish for the angling public in South Dakota. However, walleye have not been found in either water body. Although northern pike (*Esox lucius*) were also considered in the TMDL they were found in small numbers in the Sheridan (n=7) and Stockade (n=5) datasets with none exceeding the threshold.

Figure 4 compares northern pike samples collected from Sheridan and Stockade to samples collected from all other waterbodies in South Dakota. Similarly, Figure 5 compares largemouth bass in Sheridan and Stockade to statewide concentrations for the same species. Concentrations in northern pike caught in Stockade and Sheridan Lakes were considerably lower (<25th percentile) than concentrations found in the remainder of the State and were lower than the distribution of walleye data collected statewide. Figure 5 shows a similar a similar situation for largemouth bass.

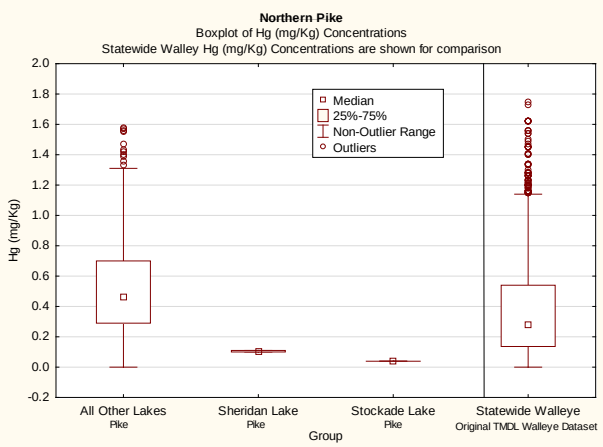

Figure 4. Mercury Concentrations in Northern Pike.

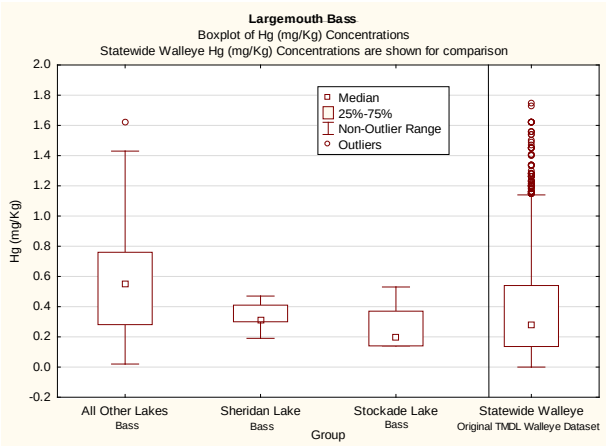

Figure 5. Mercury Concentrations in Largemouth Bass.

In the absence of walleye in the two lakes largemouth bass, because they were the species exhibiting the highest concentrations of mercury and those concentrations fell within the data distribution of the statewide walleye concentrations, were chosen as a surrogate representative species for establishing the existing condition. Figure 6 presents length to concentration for each of the lakes as well as a statewide average. The trend lines represent an approximate accumulation rate as the fish age. Each of the Black Hills waters showed signs of lower or slower bioaccumulation rates in comparison to the statewide average. This would suggest either lower ambient mercury concentrations or, because of lower productivity rates within these lakes, there is a reduction in the methylation rates. Both of these conditions can lead to slower accumulation rates in the bass.

Largemouth bass and northern pike were also addressed in the original South Dakota Mercury TMDL in Section 3.4.6.1 which has been included here as part of this discussion.

"3.4.6.1 Methylation Rate Data

Fish tissue methylmercury data was standardized and analyzed according to the Standard Size Predator Fish section. Included in the data set were all standard length fish calculations for walleye, northern pike, and largemouth bass. These species are all considered top predator fish and are likely to have higher methylmercury concentrations relative to other fish species. To provide for the largest dataset and include as many water bodies as possible, MeHg concentrations in these three species were compared at their standard lengths, which were calculated as the mean length for the species population sampled. Due to low numbers of waters with adequate paired samples for a correlation between largemouth bass and walleye, comparisons were only drawn between northern pike and walleye as well as northern pike and largemouth bass. Correlations between northern pike and walleye were strongest (n=27, r^2=0.6805, p=0.0000). Northern pike to largemouth bass exhibited a slightly lower correlation (n=11, r^2=.5059, p=0.0141)."

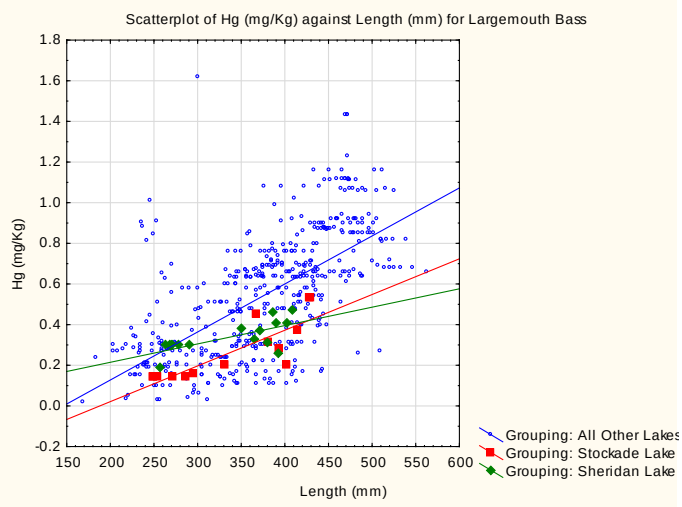

Figure 6. Methylmercury Accumulation Comparison for Largemouth Bass.

3.1.2. Sheriff Dam (Jones County)

Walleye data from Sheriff Dam were unavailable. In the absence of walleye other species were used as evidence to support the inclusion of Sheriff Dam under the South Dakota Mercury TMDL.

Sheriff Dam is a small 21 acre impoundment located on the Fort Pierre National Grasslands in Jones County South Dakota (Figure 1). The SD Game, Fish, and Parks manages this small dam as a largemouth bass/bluegill fishery although, according to the most recent fishery survey, the catch per unit effort (CPUE) for bass was below the three year mean.

There has been only one fish collection event for mercury analysis associated with Sheriff Dam. In 2015 36 fish were collected; 15 black bullhead (*Ameiurus melas*), 15 bluegill (*Lepomis macrochirus*), and 6 black crappie (*Pomoxis nigromaculatus*). The average concentrations for these three species were 0.049, 0.370, and 0.184 mg/Kg, respectively. The 95th percentile of the data was 0.40 mg/Kg exceeding the Integrated Report (IR) 2016 assessment criteria resulting in an impairment designation for the 2016 IR.

Black crappie were the only species of the three mid-trophic level predators sampled from Sheriff Dam that exceeded the 0.3 mg/Kg (4 out of 6 total black crappies sampled) (Figure 7). The resulting concentrations fall within the bounds of the statewide walleye data distribution used to calculate the SLF in the original TMDL. Figure 8 shows this comparison along with the distribution of the larger pool of black crappies collected statewide. Both figures show the utility of black crappie as the surrogate

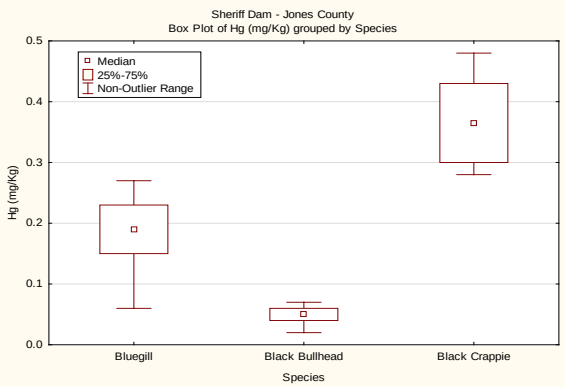

Figure 7. Sheriff Dam Mercury Concentrations by species.

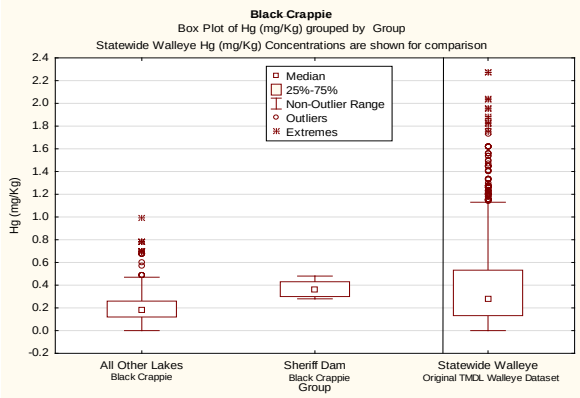

Figure 8. Mercury Concentrations in Black Crappie (Sheriff).

species needed to establish the existing impairment condition for the waterbody. Table 1 shows those fish collected from Sheriff Dam exceeding the 0.3 mg/Kg mercury fish flesh standard. The concentrations from the six black crappies from Sheriff Dam were slightly higher than those observed in statewide sample population for black crappie. This is explained by the small number sampled (n=6) and the fact that they are all from the same length class ranging from 244mm to 262mm (Figure 9). The average back-calculated lengths (mm) for each age class of black crappie sampled from Sherriff Dam suggest that these were relatively old fish possibly exceeding six years old (SDGFP, 2012).

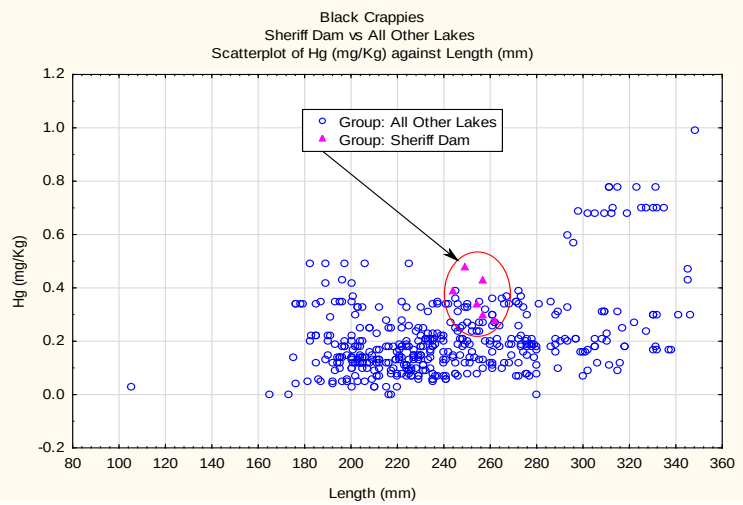

Figure 9. Black Crappie Hg (mg/Kg) vs Length (Sheriff Dam vs Statewide).

3.1.3. Clubhouse Lake and Segment 8 of the James River

Walleye were both collected from these waterbodies. Figures 10 and 11 show the concentrations observed from the various species collected. Average mercury values observed in the walleye were 0.33 mg/Kg and 0.52 mg/Kg for Clubhouse Lake and the James River, respectively. The 95th percentile for each of these waterbodies exceeded the 0.3 mg/Kg value (Clubhouse Lake = 0.36 mg/Kg and James River = 0.90 mg/Kg) triggering the impairment designation in the 2016 IR.

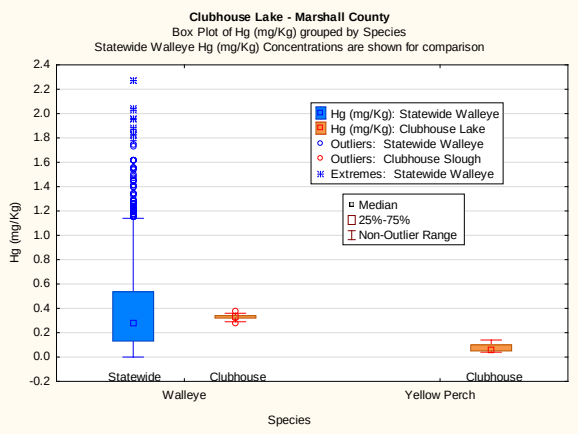

Figure 10. Clubhouse Lake Mercury Concentrations by Species.

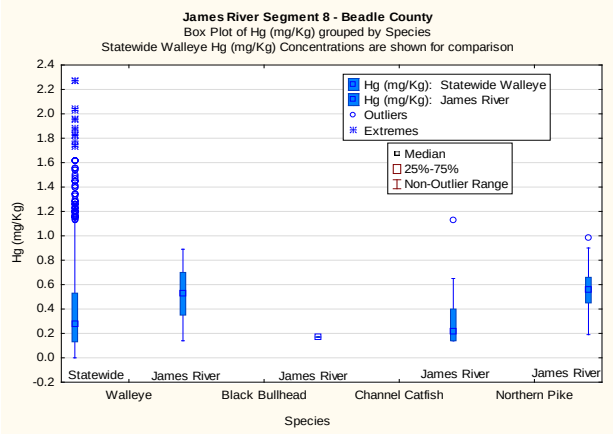

Figure 11. James River - Segment 8 Mercury Concentrations by Species.

Although there were multiple species collected from both waterbodies Figures 10 and 11 show walleye as the species exhibiting the higher concentrations. Walleye were also used to develop the statewide SLF concentration in the original mercury TMDL. One of the stipulations for including additional waterbodies to the original TMDL is that the SLF tissue methylmercury concentrations from these waterbodies should not exceed 0.878 mg/Kg with the caveat that walleye are present in the water. In these two cases walleye data were available so the SLF concentration could be calculated.

Nine walleye were collected from Clubhouse Lake in 2015. In the original TMDL (Section 3.0), analysis on the statewide Walleye dataset indicated a standard length fish (Walleye) was 384 mm long. Plugging

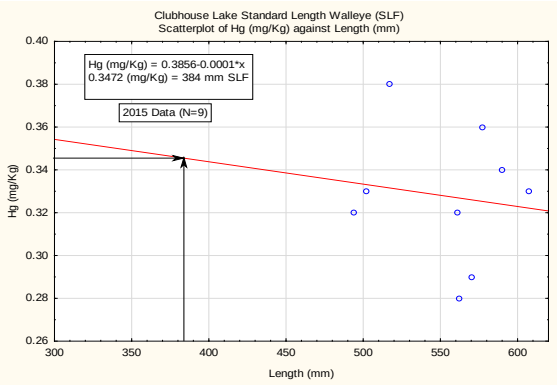

Figure 12. 2015 Clubhouse Lake Mercury Concentrations (mg/Kg) vs. length of Walleye (mm) (N = 9).

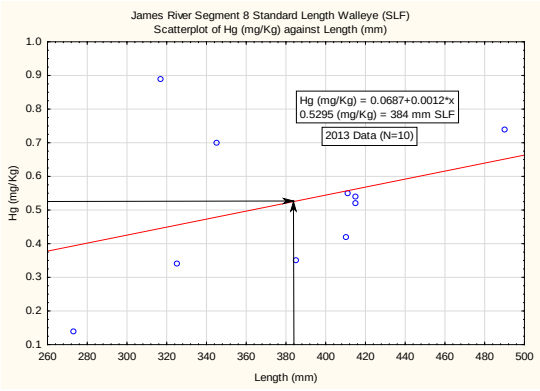

Figure 13. 2013 James River - Segment 8 Mercury Concentrations (mg/Kg) vs. length of Walleye (mm) (N=10).

this into the equation derived for Clubhouse Lake, which is shown Figure 12, a 384 mm walleye would exhibit a mercury concentration of 0.347 mg/Kg.

Ten walleye were collected from Segment 8 of the James River in 2013. Using the mercury concentration vs length equation shown in Figure 13, a 384 mm Walleye collected from the James River would exhibit a mercury concentration of 0.530 mg/Kg.

The SLF concentrations for both Clubhouse Lake and the James River fall well below the statewide SLF concentration of 0.878 mg/Kg. All of the waterbodies included in this addendum (Sheridan, Stockade, Sheriff, Clubhouse, and Segment 8 of the James Rivers) meet this specific fisheries condition for including them as part of the South Dakota Mercury TMDL.

3.2. Mining

Sheridan and Stockade lakes meet all of the conditions stipulated in the original TMDL with the exception of the presence of historic gold mining within their watersheds. The Black Hills have an extensive history of mining activities which started near present day Stockade Lake with the discovery of a small amount of gold in 1874. Larger gold deposits found in the northern hills around the Lead and Deadwood areas drove the gold rush of 1875-1876. Gold mining is of particular interest to this TMDL effort because mercury was historically used in mills and placer sites to amalgamate gold-ore into a purer product. Elevated levels of mercury in the environment have been linked to legacy gold mining in other places. In 1938 Allsman completed a review of historic mine operations located throughout the Black Hills. He documented many small claims in what would eventually become the Sheridan and Stockade Lake watersheds. These were very small with a very short window of operation. Most of the mining in these watersheds took place circa 1890-1910 with one or two that started up again in the 1930s but was worked only for 1-2 years. All of these mines lacked any consistent resource recovery and operations became unsustainable. Their historical presence warranted a more in depth review of available data to verify that current mercury impairments were not mining related. They can and will be addressed via the atmospheric reductions discussed in the original TMDL. Section 3.1.1 of this addendum has shown that fish tissue mercury concentrations in Sheridan and Stockade Lakes are comparable to other lakes in South Dakota that have no history of mining. The following section reviews available water chemistry data from these two lakes to determine whether mercury is elevated in other media (i.e., water or lakebed sediments) due to historic mining activities but for unknown reasons, exceedances may not be getting captured in the fish tissue dataset.

Mining issues, either historical or current, were not a concern with the other three waterbodies included with this addendum. The effects of historical mine tailings and current mining operations on mercury in fish flesh were presented in the Section 4.0 of the original SD Mercury TMDL.

3.2.1. Water Chemistry

Only a small number of mercury measurements were available from Sheridan and Stockade lake (both inlake and tributary). The SD water quality criteria for water column mercury as it applies to the coldwater fishery beneficial uses assigned to Sheridan and Stockade is currently set at 0.051µg/L. Reviewing the data collected within a 3 mile radius of Sheridan Lake resulted in 16 individual mercury analyses. The SD State Health Lab and the United States Geological Survey (USGS) Lab completed 14 and 2 of the analysis, respectively. The detection limit for the SD Health Lab was <0.01 µg/L whereas the USGS lab reported a detection limit of <0.1 µg/L. Expanding the search to other contaminants associated with mine wastes, including cadmium, lead, and cyanide, did not yield any result above the individual contaminates detection limit. The majority of this data were derived from elutriate samples collected from both Mitchell Lake and Lake Sheridan in 2003. Mitchell Lake is a small ≈10 acre impoundment located upstream of Sheridan on Spring Creek (Figure 14). Elutriate samples usually

consist of two or three individual samples: 1) a mixture of 50% sediment 50% lake water, 2) receiving water, which is 100% lake water collected near the sediment/lake water interface, and 3) a sediment sample (note that receiving water in this instance has no NPDES implications). The receiving water refers to the water that would be exposed to the sediment should the sediment be disturbed. The USGS samples were collected by USGS personnel from USGS gage 06406920 in 1991 and 1992. Figure 14 shows the location of the USGS gage with respect to Sheridan Lake. In all 16 mercury samples collected within the Sheridan Creek/Spring Creek area the labs reported either "no detection" or "present below quantification limit".

Conducting a similar data search for Stockade Lake yielded six elutriate samples collected from two Stockade Lake sites (Figure 15). These samples were part of a SDGFP lake restoration project (1986 to 1989) undertaken to improve the water quality and recreational value of the Stockade lake. Nutrient laden sediment removal, shoreline stabilization, renovations to the spillway and dam, and complete restoration of the fishery were all completed by 1989. Analysis of the elutriate samples yielded concentrations of mercury ranging from <0.2 µg/L, which was the detection limit for Travis Laboratories (Rapid City SD) to 3.2 µg/L collected from Stockade Lake Site 2. The highest concentrations were observed in the sediment samples. Over 200,000 cubic yards of sediment was removed as part of this lake restoration project. An estimated 1,480 tons of phosphorus was also removed from the lake as part of the sediment load.

In a separate project the city of Custer, SD proposed to remove sediment from a small city pond located along French Creek (Figure 15). This small pond was created by a partial dam across French Creek which is the primary source of water for Stockade Lake. Although the project was discontinued before sediment removal took place two elutriate samples were collected from the pond in 2010. The SD Health Lab did the analysis on the sample which resulted in nondetects for all parameters including mercury. The mercury detection limit for the SD Health Lab was <0.01 µg/L. Additional mercury samples were collected by the USGS in 1990-1994. Water quality samples were collected from two USGS gages located on French Creek (Gage 06402990 and 06402995) (Figure 15). None of the samples exhibited any detectable level of mercury (USGS lab detection limit of <0.1 µg/L) or any of the other contaminates, i.e. cadmium, lead, and cyanide. An absence of detectable levels of contaminants commonly associated with mining wastes within the Custer City Pond and the various instream water quality measurements collected by the USGS implies that impacts resulting from mining activities was/is negligible. If any mercury was present in Stockade Lake it has since been removed as part of the dredging activities conducted in the late 1980s.

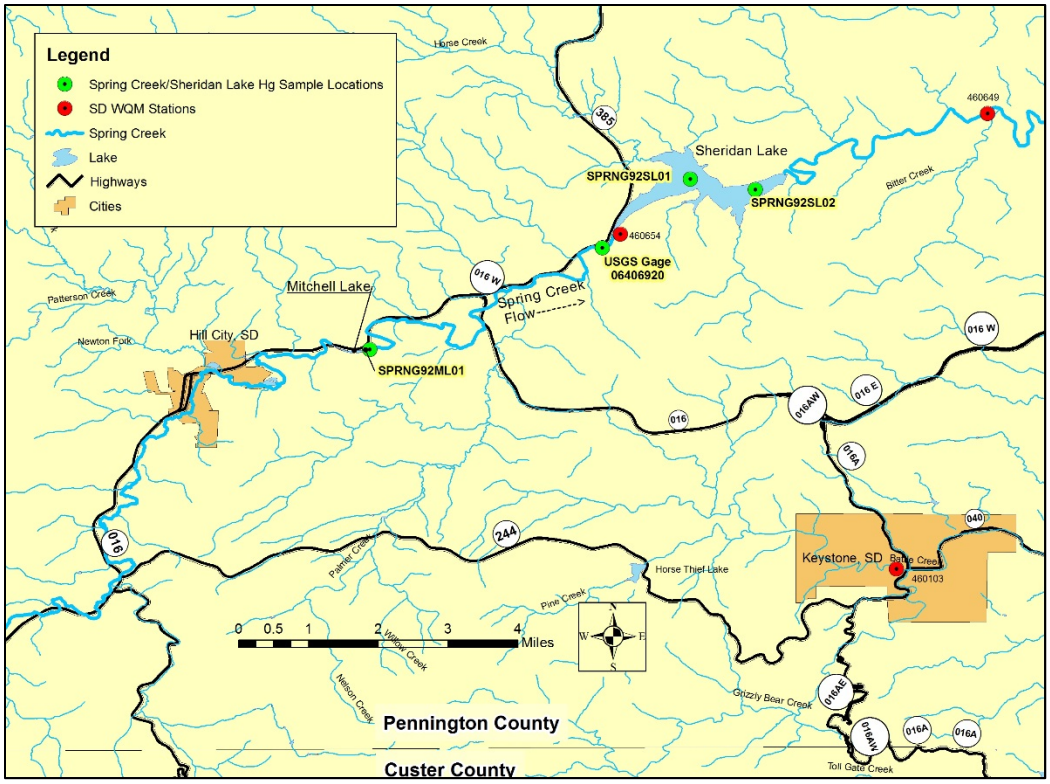

Figure 14. Sheridan Lake Watershed.

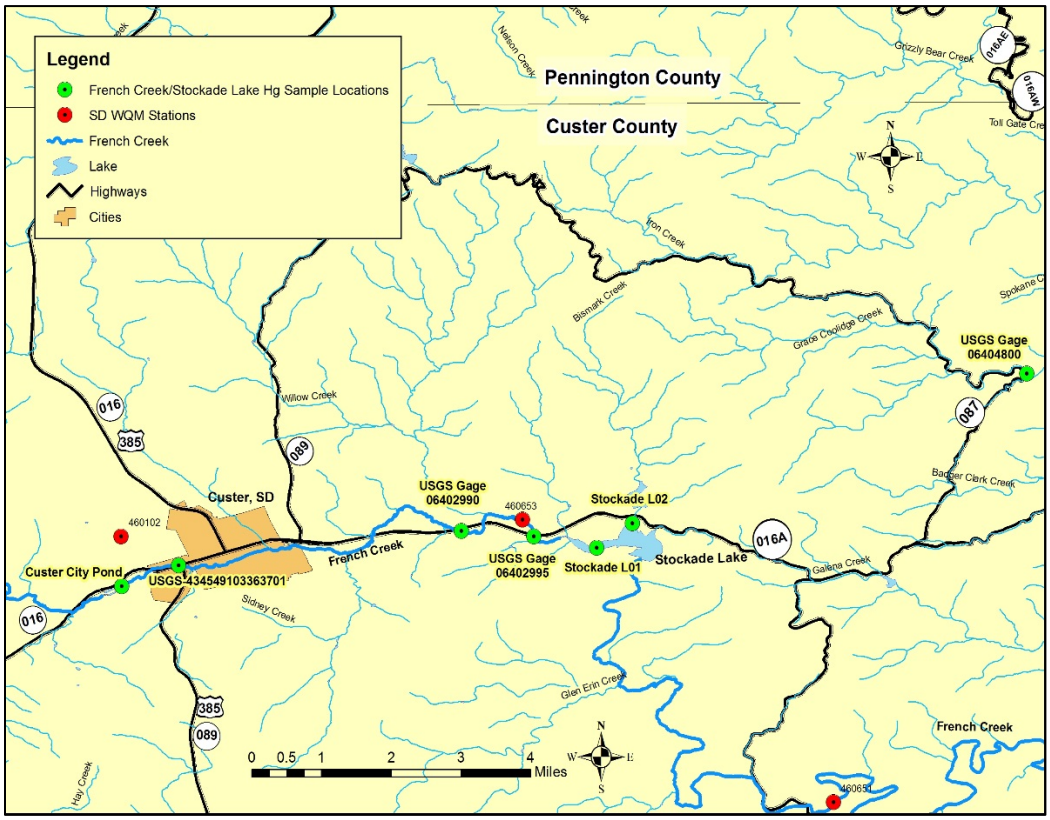

Figure 15. Stockade Lake Watershed.

4.0 NPDES Permitted Sources

SD Administrative Rule 74:51:01:27 states that point sources discharging directly into lakes must meet water quality standards at the point of discharge and are not allowed a mixing zone. This addendum, and the original TMDL, assumes that point sources are being controlled under this regulation through NPDES permit requirements and are not causing localized water quality standard exceedances of mercury in lakes. The only waterbody in this addendum not covered by this lake-specific regulation is Segment 8 of the James River, thus this section further characterizes point sources in the James River watershed in order to satisfy the fifth bulleted condition for TMDL applicability listed above.

Section 4.3 in the original TMDL addressed any non-stormwater NPDES permitted Sources. The NPDES data review for this segment indicates three small rural communities that discharge into wetlands/tributaries that eventually drain into the James River. One additional small community NPDES permittee (Wolsey) operates a zero discharge facility. Each of these communities have almost no manufacturing base and are currently meeting all of their permitting requirements. Metals sampling are not required as part of their permit because of the lack of any potential sources within their city limits. The final NPDES Permit holder for this segment is the WWTF for the city of Huron, SD. This WWTF is permitted to intermittently discharge into Segment 8. However, they have a large holding capacity with wetlands and stabilization ponds and so the facility rarely discharges to the river. The 2013 U.S. Census Bureau population estimates and NPDES permit numbers with a brief operational history are shown below. Figure 15 shows the location of the river segment relative to these communities.

Town of Alpena (pop. 285) – SD0025887

- This WWTF was a no discharge facility. As of April 1, 2016 their new permit allows them to intermittently discharge.
- During the current permit cycle (7/1/2008 – March 31, 2016), the town has reported 2 emergency discharges:
    - 1 in September 2013 needed for construction; and
    - 1 in July 2010 due to flooding.
- Total Mercury effluent data were not available.

City of Cavour (pop. 118) – SD0021806

- This WWTF discharges to an unnamed wetland.
- The facility has reported discharging during 12 months of the current permit cycle (1/1/2008 – present).
- Of these 12 discharges, there were 2 months with effluent violations:
    - Violations of daily maximum pH, 30-day average TSS, and maximum 7-day average TSS in April 2009;
    - A violation of 30-day average BOD5 in April 2010.
      Recent discharges have been in compliance with all effluent limits.
- Total Mercury effluent data were not available.

City of Iroquois (pop. 266) – SD0022438

- This WWTF discharges to the South Fork of Pearl Creek.

- The facility has reported discharging during 23 months of the current permit cycle (1/1/2008 – present).
- Of these 23 discharges, there were 2 months with effluent violations:
    - A violation of 30-day average BOD5 in March 2010.
    - Violations of 30-day average and maximum 7-day average BOD5 in March 2011. *Recent discharges have been in compliance with all effluent limits.*
- Total Mercury effluent data were not available.

City of Wolsey (pop. 393) – SDG820249

- This WWTF is a no discharge facility.
- No emergency discharges have been reported during the current permit cycle (10/1/2011 – present).
- Total Mercury effluent data were not available.

City of Huron (pop. 13,097) – SD0023434

- This WWTF is permitted to intermittently discharge to the James River.
- No effluent violations have been reported during the current permit cycle (4/1/2013 – present).
- The facility reported discharges in June 2013 and November 2015.
- Influent and Effluent Total Mercury samples from the current permit cycle have been below detection or non-detect (ND). The November 2015 discharge effluent and influent Total Mercury have not yet been submitted.

Date	Monitoring	Effluent / Influent	Total Hg Conc. (µg/L)	Detection Limit (µg/L)
06/05/2013	2013 - 1st	Effluent	**ND**	0.1 – Energy Labs
06/05/2013	2013 - 1st	Influent	**ND**	0.1 – Energy Labs
12/26/2013	2013 - 2nd	Influent	**ND**	0.1 – Energy Labs
06/09/2014	2014 - 1st	Influent	**ND**	0.1 – Energy Labs
10/29/2014	2014 - 2nd	Influent	**ND**	0.1 – Energy Labs
03/26/2015	2015 - 1st	Influent	**<0.2**	0.2 – AET

The city of Huron is the only "potential" source of mercury for the Segment 8 with its small manufacturing base. However, during the discharge events reported in 2013 both influent and effluent sampling have indicated no detectable levels of mercury. All influent sampling has shown no detectable levels of mercury as well. The most recent instream sampling available from this segment was conducted by the USGS from their gage located on the 3rd St. Bridge in the city of Huron (Figure 15). During the period from 1985 through 1990, 38 dissolved mercury samples were collected. Six samples slightly exceeded the detection limit as shown in

USGS Site 06476000 3rd St. Bridge on James River in Huron, SD Surface Water Mercury Sample Results	
USGS Detection Limit (µg/L)	0.1
Number of Nondetect Samples	32
Detections @ 0.1 µg/L	3
Detections @ 0.2 µg/L	3
All Available Samples collected between 1985 and 1990	38

the table below. Over 84% of the samples were non-detect.

Based on the following sources of information, SDDNER does not believe NPDES permitted point sources are causing or contributing to the mercury impairment on Section 8 of the James River:

- All point sources in the watershed are small, minimally discharging wastewater facilities with no known sources of mercury in their distribution systems.
- Effluent and influent data from the largest point source, while limited and collected using detection limits unsuitable for direct comparison to South Dakota's water column mercury criterion (0.050 µg/L), indicate that concentrations are no greater than two times the criterion.
- Available water column data of the James river, while dated and also collected using unsuitable detection limits, may have been collected before clean sampling procedures were followed but still show that mercury was not detected in the vast majority of samples.

If future monitoring indicates point sources are causing or contributing to a mercury impairment for a waterbody covered by the statewide mercury TMDL in a way that is inconsistent with the current allocations, SDDENR may revise the TMDL for that particular waterbody.

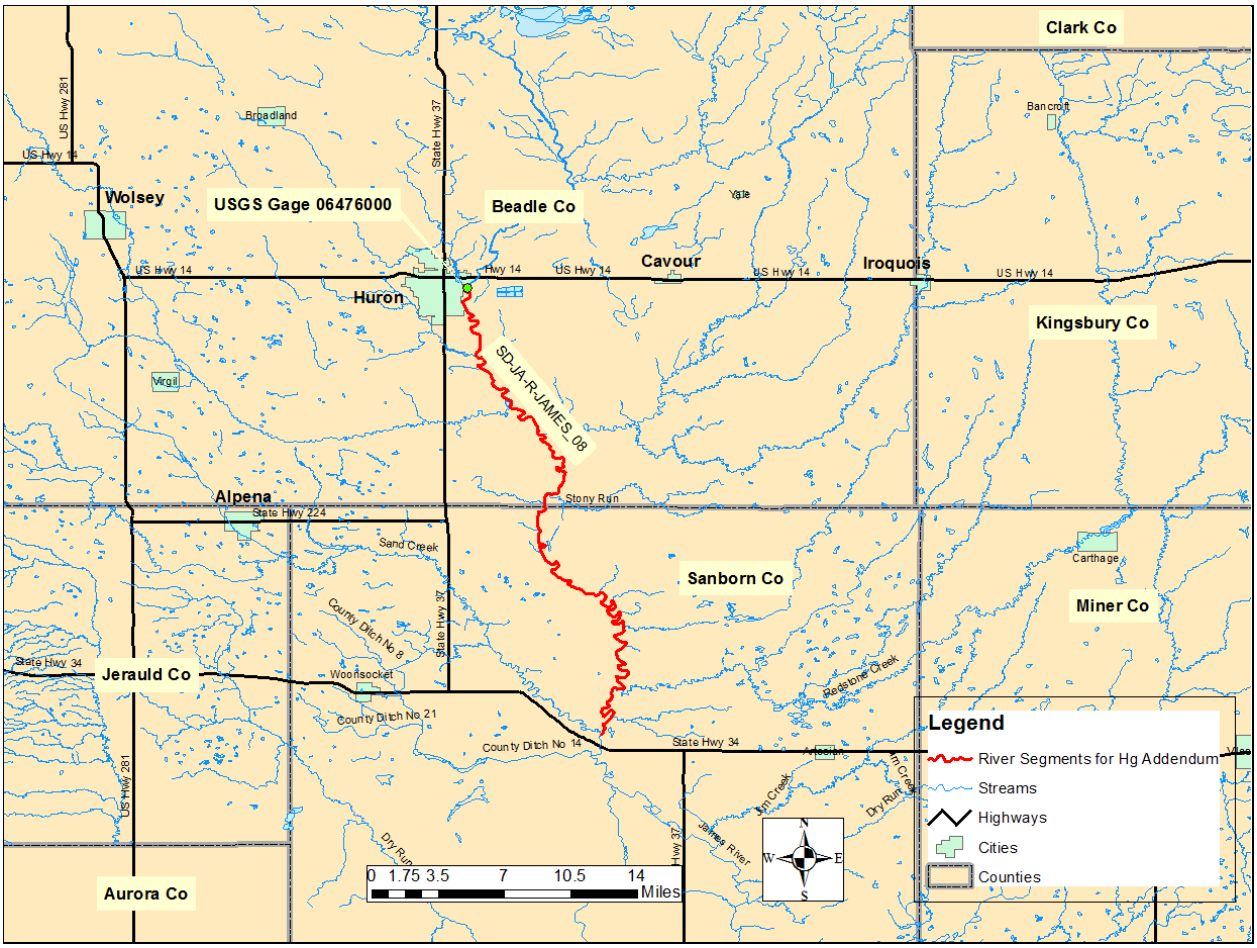

Figure 15. Segment 8 of the James River and Surrounding Area.

5.0 Water Quality Standards

All waters (both lakes and streams) are assigned the beneficial use of fish and wildlife propagation, recreation, and stock watering. All streams are assigned the beneficial use of irrigation. Additional uses are assigned by the state based on a beneficial use analysis of each water body. Each beneficial use has a set of water quality standards to protect those uses. The Administrative Rules of South Dakota (ARSD) contain the water quality standards in Chapter 74:51. South Dakota water quality standards specifically address mercury concentrations in the water column designed to address both human health as well as aquatic health. The more restrictive mercury concentrations are for human health. The following table shows the beneficial use classifications in South Dakota and the numeric criteria assigned to those uses. All criteria are reported in the total recoverable mercury or total methylmercury (for fish tissue) fraction.

Use Classification	Use Description	Human Health		Aquatic Life	
		Water Column	Fish Tissue	Acute (CMC)	Chronic (CCC
		µg/L	mg/Kg	µg/L	µg/L
(1)	Domestic water supply waters	0.050			
(2)	Coldwater permanent fish life propagation waters	0.051	0.3	1.4	0.77
(3)	Coldwater marginal fish life propagation waters	0.051	0.3	1.4	0.77
(4)	Warmwater permanent fish life propagation waters	0.051	0.3	1.4	0.77
(5)	Warmwater semipermanent fish life propagation waters	0.051	0.3	1.4	0.77
(6)	Warmwater marginal fish life propagation waters	0.051	0.3	1.4	0.77
(7)	Immersion recreation waters				
(8)	Limited contact recreation waters				
(9)	Fish and wildlife propagation, recreation, and stock watering waters	0.051	0.3	1.4	0.77
(10)	Irrigation waters				
(11)	Commerce and industry waters				

Additional water quality regulations which apply to mercury impairments include the biological integrity of waters. Elevated levels of mercury may impair biological integrity, such as through reduced reproductive success of walleye (Selch 2008). ARSD Section 74:51:01:12 states that all waters of the state must be free from substances, whether attributable to human-induced point source discharges or nonpoint source activities, in concentrations or combinations which will adversely impact the structure and function of indigenous or intentionally introduced aquatic communities. Additionally, ARSD Section 74:51:01:55 also states that toxic pollutants (including mercury) may not exist at levels which are or may become injurious to public health, safety, or welfare. Protection of these narrative criteria is best accomplished by meeting the most stringent numeric water column criteria 0.050 µg/L of total mercury.

As a part of the 2014 triennial review, SDDENR proposed and the Water Management Board adopted into the states Surface Water Quality Standards a fish flesh methyl mercury (MeHg) standard of 0.3 mg/Kg. This concentration is the EPA recommended human health criterion and applicable to beneficial uses 2, 3, 4, 5, 6, and 9.

The waterbodies included with addendum and their beneficial uses are shown in the table below.

Common Name-County	Beneficial Uses
Sheriff Dam – Jones County	9,10
Clubhouse Lake - Marshall County	9,10
James River - Beadle County	5,8,9,10
Stockade Lake-Custer County	3,7,8,9,10
Sheridan Lake-Pennington County	2,7,8,9,10

The original TMDL identified a target of 0.3 mg/Kg based on the soon to be approved EPA human health criterion (and approved by the State of SD). This fish flesh concentration standard and target required a linkage to ensure protection of the existing mercury water column standards. This linkage was accomplished through application of a bioaccumulation factor (BAF) discussed in Section 2.0 of the original TMDL. Bioaccumulation refers to the uptake and retention of a chemical by an aquatic organism from all surrounding media including water, sediment, and the foods it consumes. Assuming that the fish tissue criterion will be approved by EPA, the TMDL used a BAF to verify that the target and human health criterion of 0.3 mg/Kg would translate back to total mercury levels in the water column below the most stringent South Dakota water quality standards (0.050 µg/L). For more detail on these calculations please refer to Section 2.0 in the original TMDL.

The existing conditions explained in Section 3.0 of this addendum show that fish tissue concentrations in these five waterbodies are comparable to those used in the original TMDL (Figure 2-12). This applies to both lentic (Sheridan, Stockade, Clubhouse, and Sheriff) and lotic (Segment 8 – James River) systems.

The original TMDL used 0.669 mg/Kg (the existing condition) as the value from which to calculate reductions. These numbers were based on the SLF calculation process outlined in Section 3.0 of the TMDL. The reduction factor (RF) was based on this existing condition and the fish tissue standard of 0.3 mg/Kg. WE38 in the following equation refers to a SLF (walleye) 38.4 cm long.

$$RF = (WE38 – 0.3)/WE38$$

$$55.2\%=(0.669-0.3)/0.669$$

Reducing the methylmercury in fish flesh in these five waters by 55.2% will meet all appropriate water quality standards.

6.0 Public Participation

A number of things were done to gain public education, review, and comment during development of the TMDL and included:

Public Notice sent to:

Sioux Falls Argus Leader – published April 20, 2016
Native Sun News in Rapid City – published April 20-26, 2016
Custer County Chronicle – published April 20, 2016
Pierre Capitol Journal – published April 20, 2016
Aberdeen American News – published April 18, 2016

The formal 30-day period went from April 20, 2016 to May 20, 2016.

Other organizations receiving the Public Notice included:

East Dakota Water Development District
James River Water Development District
South Central Water Development District
Central Plains Water Development District
Vermillion Basin Water Development District
West River Water Development District
West Dakota Water Development District
U.S. Bureau of Reclamation
U.S. Forest Service
U.S. Geological Survey
South Dakota Department of Agriculture
South Dakota Department of Game, Fish & Parks
South Dakota Wildlife Federation

The Public Notice was also placed on DENR's Website for the April 20 to May 20, 2016 Public Notice comment period. No comments were received from those organizations sent the Public Notice nor were any comments received from those seeing the Public Notice and Addendums on DENR's Website.

7.0 Conclusions

The presence of historical mining in both the Sheridan and Stockade Lake watersheds and public notice concerns for Sheriff Dam, Clubhouse Lake, and Segment 8 of the James River necessitated additional information and discussions before these five waterbodies could be added to the South Dakota Mercury TMDL. After further review of the fisheries, fish flesh, and water quality data, as well as NPDES and jurisdictional information, adding them to the TMDL was determined to be appropriate.

For Sheridan and Stockade Lake, the majority of fish flesh samples over the 0.3 mg/Kg methylmercury threshold came from largemouth bass as walleye are not found within these two lakes. Comparing bass collected from both Sheridan and Stockade to bass collected throughout the state, a lower accumulation rate for methylmercury in the fish tissue was evident (Figure 6). The highest concentrations were measured in two bass collected during 2015 from Stockade Lake. At 0.53 mg/Kg, they were equal to the median concentration for largemouth bass statewide (Figure 5). The largemouth bass data fall between the 25th and 75th percentile of the statewide walleye data set used to calculate the SLF concentration.

Black crappies were the species that exhibited the highest concentrations of fish species from Sheriff Dam. Again, walleye are not found within this waterbody. The black crappie concentrations also fall within the 25th and 75th percentile for of the statewide walleye data set (Figure 8).

With walleye present in both Clubhouse Lake and Segment 8 of the James River SLF concentrations could be calculated resulting in 0.347 mg/Kg and 0.530 mg/Kg, respectively. These fall well below the statewide SLF concentration of 0.878 mg/Kg. All of the waterbodies included in this addendum (Sheridan, Stockade, Sheriff, Clubhouse, and Segment 8 of the James Rivers) meet the specific fisheries condition for including them as part of the South Dakota Mercury TMDL.

Mercury and other contaminants frequently associated with mining wastes were not detected in any sample collected from Sheridan Lake. Mercury concentrations slightly above the laboratory detection

limit were found in sediment samples collected from Stockade Lake in 1986. Subsequent sediment and water column samples collected from French Creek and other tributaries to Stockade Lake exhibited non-detect concentrations.

A review of the NPDES information for all five waterbodies identified only one permitted continuous discharger draining to Segment 8 of the James River. No other NPDES potential contributors of mercury were identified for any of the other waterbodies. Laboratory analysis revealed that both influent and effluent mercury concentrations were below the detection limit.

The South Dakota Mercury TMDL calls for an aggregate reduction in mercury of 55.2%. Applying the principle of proportionality as described in Section 3.3 of the original TMDL (pg 37), the Stockade Lake largemouth bass concentration of 0.53 mg/Kg would be reduced to 0.24 mg/Kg. A 55.2% reduction applied to the rest of the fish tissue dataset for both Stockade and Sheridan would result in a fish flesh concentrations less than 0.24 mg/Kg. When this same principle is applied to the other three waterbodies fish flesh concentrations will be significantly lower than the 0.3 mg/Kg target and water quality criterion. This should provide an additional margin of safety.

Works Cited

Allsman, Paul T., 1938, “Reconnaissance of Gold-Mining Districts in The Black Hills, South Dakota.” Bulletin 427, United States Department of the Interior Burearu of Mines.

Davis, J. L., 2012, “Contribution of naturally reproduced rainbow trout tot he fishery in Deerfield Reservoir.” M.S. Thesis, South Dakota State University, Brookings.

SD Game, Fish, and Parks, 2012, “South Dakota Statewide Fisheries Survey for Sheriff Dam, Jones County”. 2102-F-21-R-45.

Table 1. Individual Fish Collected from Six Waterbodies to be added to the South Dakota Mercury TMDL in 2016 that exceed 0.3 mg/Kg.

Site	Species	Length (mm)	Sample Year	Mercury (mg/Kg)
Sheriff Dam	Black Crappie	249	2015	0.48
Sheriff Dam	Black Crappie	257	2015	0.43
Sheriff Dam	Black Crappie	244	2015	0.39
Sheriff Dam	Black Crappie	254	2015	0.34
Sheriff Dam	Black Crappie	257	2015	0.3
Sheridan Lake	Largemouth Bass	408	2012	0.47
Sheridan Lake	Largemouth Bass	386	2012	0.46
Sheridan Lake	Largemouth Bass	390	2012	0.41
Sheridan Lake	Largemouth Bass	403	2012	0.41
Sheridan Lake	Largemouth Bass	350	2012	0.38
Sheridan Lake	Yellow Perch	293	2012	0.38
Sheridan Lake	Largemouth Bass	371	2012	0.37
Sheridan Lake	Largemouth Bass	365	2012	0.33
Sheridan Lake	Largemouth Bass	380	2012	0.31
Sheridan Lake	Largemouth Bass	263	2003	0.3
Sheridan Lake	Largemouth Bass	268	2003	0.3
Sheridan Lake	Largemouth Bass	270	2003	0.3
Sheridan Lake	Largemouth Bass	278	2003	0.3
Sheridan Lake	Largemouth Bass	291	2003	0.3
Stockade Lake	Largemouth Bass	428	2015	0.53
Stockade Lake	Largemouth Bass	430	2015	0.53
Stockade Lake	Largemouth Bass	368	2015	0.45
Stockade Lake	Largemouth Bass	415	2015	0.37
Stockade Lake	Largemouth Bass	381	2015	0.31
Clubhouse Slough	Walleye	517	2015	0.38
Clubhouse Slough	Walleye	577	2015	0.36
Clubhouse Slough	Walleye	590	2015	0.34
Clubhouse Slough	Walleye	502	2015	0.33
Clubhouse Slough	Walleye	607	2015	0.33
Clubhouse Slough	Walleye	494	2015	0.32
Clubhouse Slough	Walleye	561	2015	0.32
James River	Channel Catfish	680	2013	1.13

Site	Species	Length (mm)	Sample Year	Mercury (ppm)
James River	Northern Pike	718	2013	0.99
James River	Northern Pike	645	2013	0.9
James River	Walleye	317	2013	0.89
James River	Walleye	490	2013	0.74
James River	Walleye	345	2013	0.7
James River	Northern Pike	625	2013	0.66
James River	Channel Catfish	465	2013	0.65
James River	Channel Catfish	516	2013	0.59
James River	Northern Pike	500	2013	0.58
James River	Northern Pike	715	2013	0.56
James River	Walleye	411	2013	0.55
James River	Walleye	415	2013	0.54
James River	Walleye	415	2013	0.52
James River	Northern Pike	486	2013	0.51
James River	Channel Catfish	555	2013	0.48
James River	Northern Pike	575	2013	0.45
James River	Walleye	410	2013	0.42
James River	Channel Catfish	475	2013	0.4
James River	Northern Pike	621	2013	0.37
James River	Channel Catfish	530	2013	0.35
James River	Walleye	385	2013	0.35
James River	Walleye	325	2013	0.34

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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AUG 18 2016

Ref: 8EPR-EP

Mr. Steven M. Pirner
Secretary
South Dakota Department of Environment & Natural Resources
Joe Foss Building
523 East Capitol Ave
Pierre, South Dakota 57501-3181

Re: Approval of 2016 Addendum to the South Dakota Mercury TMDL

Dear Mr. Pirner,

The U.S. Environmental Protection Agency (EPA) has completed review of the total maximum daily loads (TMDLs) submitted by your office on August 1, 2016. In accordance with the Clean Water Act (33 U.S.C. §1251 *et. seq.*), the EPA approves all aspects of the TMDLs referenced in the attached summary table developed for water quality limited segments as described in Section 303(d)(1). Based on our review, the EPA finds the separate elements of the TMDLs listed in the enclosed summary table adequately address the mercury impairments, taking into consideration seasonal variation and a margin of safety. The Addendum addresses five new assessment units not approved as part of the original South Dakota Mercury TMDL on March 1, 2016 and brings the total number of assessment units addressed by the statewide TMDL to 75. The EPA understands that the original TMDL remains in effect unchanged. A full discussion of the EPA's decision is contained in the Enclosure 2, decision document.

The EPA's action today to approve TMDLs does not extend to waters that are located within Indian Country, as defined in 18 U.S.C. §1151. The EPA is taking no action to approve or disapprove TMDLs with respect to those waters at this time. The EPA, or eligible Indian Tribes, as appropriate, retain responsibilities under Section 303(d) for waters located within Indian country, as defined in 18 U.S.C. §1151. Thank you for submitting these TMDLs for our review and approval. If you have any questions, please contact Peter Brumm on my staff at (406) 457-5029.

Sincerely,

Martin Hestmark
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

Enclosures

1. 2016 Addendum to the South Dakota Mercury TMDL, Summary Table and Complete List
2. 2016 Addendum to the South Dakota Mercury TMDL, Review Form and Decision Document

2016 Addendum to the South Dakota Mercury TMDL Summary Table

Waterbody Description	Assessment Unit ID	Cause of Impairment[1]	Pollutant Addressed by Total Maximum Daily Load (TMDL)	EPA Action	TMDL End Point		Wasteload Allocation (WLA)[2]		Load Allocation (LA)[3]		Margin of Safety	TMDL (kg/yr)
					Indicator	Threshold Value	WLA Source	WLA (kg/yr)	LA Source	LA (kg/yr)		
Sheriff Dam – Jones County	SD-BA-L-SHERIFF_01	Mercury	Mercury	TMDL Approved	Fish Tissue Total Mercury Concentration	< 0.3 mg/kg	NPDES Non-Stormwater	2.53	Composite Statewide LA	590.48	Implicit	595.32
							MS4 Stormwater	2.31				
Clubhouse Lake – Marshall County	SD-JA-L-CLUBHOUSE_01	Mercury	Mercury	TMDL Approved	Fish Tissue Total Mercury Concentration	< 0.3 mg/kg	NPDES Non-Stormwater	2.53	Composite Statewide LA	590.48	Implicit	595.32
							MS4 Stormwater	2.31				
James River – Beadle County	SD-JA-R-JAMES_08	Mercury	Mercury	TMDL Approved	Fish Tissue Total Mercury Concentration	< 0.3 mg/kg	NPDES Non-Stormwater	2.53	Composite Statewide LA	590.48	Implicit	595.32
							MS4 Stormwater	2.31				
		Total Suspended Solids	NA	No Action (Proposed Delisting)	NA	NA	NA	NA	NA	NA	NA	NA
Stockade Lake – Custer County	SD-CH-L-STOCKADE_01	Mercury	Mercury	TMDL Approved	Fish Tissue Total Mercury Concentration	< 0.3 mg/kg	NPDES Non-Stormwater	2.53	Composite Statewide LA	590.48	Implicit	595.32
							MS4 Stormwater	2.31				
Sheridan Lake – Pennington County	SD-CH-L-SHERIDAN_01	Mercury	Mercury	TMDL Approved	Fish Tissue Total Mercury Concentration	< 0.3 mg/kg	NPDES Non-Stormwater	2.53	Composite Statewide LA	590.48	Implicit	595.32
							MS4 Stormwater	2.31				
		Trophic State Index	NA	No Action (Previous TMDL Project)	NA	NA	NA	NA	NA	NA	NA	NA
		Water Temperature	NA	No Action (Future TMDL Project)	NA	NA	NA	NA	NA	NA	NA	NA
		Dissolved Oxygen	NA	No Action (Future TMDL Project)	NA	NA	NA	NA	NA	NA	NA	NA

[1]Identified from South Dakota's 2014 Integrated Report, expect for Mercury causes which were identified in 2016
[2]DENR established statewide aggregated WLAs separately for permitted Municipal Separate Storm Sewer Systems (MS4s) and all non-stormwater National Pollutant Discharge Elimination System (NPDES) permitted point sources
[3]DENR established a single, aggregate, statewide LA to address all nonpoint sources including atmospheric deposition and natural background

Complete List of Waterbodies Addressed by the South Dakota Mercury TMDL and Approved by EPA

Waterbody Description	Assessment Unit ID	Associated Document
Sheriff Dam - Jones County	SD-BA-L-SHERIFF_01	2016 Addendum
Sheridan Lake - Pennington County	SD-CH-L-SHERIDAN_01	2016 Addendum
Stockade Lake - Custer County	SD-CH-L-STOCKADE_01	2016 Addendum
Clubhouse Lake - Marshall County	SD-JA-L-CLUBHOUSE_01	2016 Addendum
James River - Beadle County	SD-JA-R-JAMES_08	2016 Addendum
Hayes Lake - Stanley County	SD-BA-L-HAYES_01	Original TMDL
Murdo Dam - Jones County	SD-BA-L-MURDO_01	Original TMDL
Newell Lake - Butte County	SD-BF-L-NEWELL_01	Original TMDL
Belle Fourche Reservoir - Butte County	SD-BF-L-ORMAN_01	Original TMDL
Lake Albert - Kingsbury County	SD-BS-L-ALBERT_01	Original TMDL
Antelope Lake - Day County	SD-BS-L-ANTELOPE_01	Original TMDL
Bitter Lake - Day County	SD-BS-L-BITTER_01	Original TMDL
Brush Lake - Brookings County	SD-BS-L-BRUSH_01	Original TMDL
Clear Lake - Hamlin County	SD-BS-L-CLEAR_H_01	Original TMDL
Diamond Lake - Minnehaha County	SD-BS-L-DIAMOND_01	Original TMDL
Dry Lake - Codington County	SD-BS-L-DRY_01	Original TMDL
Dry Lake # 2 - Clark County	SD-BS-L-DRY_NO2_013	Original TMDL
Enemy Swim Lake - Day County	SD-BS-L-ENEMY_SWIM_01	Original TMDL
Goldsmith Lake - Brookings County	SD-BS-L-GOLDSMITH_01	Original TMDL
Goose Lake - Codington County	SD-BS-L-GOOSE_01	Original TMDL
Lake Herman - Lake County	SD-BS-L-HERMAN_01	Original TMDL
North Island Lake - Minnehaha/McCook Counties	SD-BS-L-ISLAND_N_01	Original TMDL
Lake Kampeska - Codington County	SD-BS-L-KAMPESKA_01	Original TMDL
Lardy Lake - Day County	SD-BS-L-LARDY_01	Original TMDL
Long Lake - Codington County	SD-BS-L-LONG_COD_01	Original TMDL
Middle Lynn Lake - Day County	SD-BS-L-MID_LYNN_01	Original TMDL
Minnewasta Lake - Day County	SD-BS-L-MINNEWASTA_01	Original TMDL
Opitz Lake - Day County	SD-BS-L-OPITZ_01	Original TMDL
Lake Poinsett - Hamlin County	SD-BS-L-POINSETT_01	Original TMDL
Reid Lake - Clark County	SD-BS-L-REID_01	Original TMDL
Rush Lake - Day County	SD-BS-L-RUSH_01	Original TMDL
Lake Sinai - Brookings County	SD-BS-L-SINAI_01	Original TMDL
Swan Lake - Clark County	SD-BS-L-SWAN_01	Original TMDL
Twin Lakes/W. Hwy 81 - Kingsbury County	SD-BS-L-TWIN_01	Original TMDL
Twin Lakes - Minnehaha County	SD-BS-L-TWIN_02	Original TMDL
Waubay Lake - Day County	SD-BS-L-WAUBAY_01	Original TMDL
Big Sioux River - Moody County	SD-BS-R-BIG_SIOUX_07	Original TMDL
Curlew Lake - Meade County	SD-CH-L-CURLEW_01	Original TMDL
Shadehill Reservoir - Perkins County	SD-GR-L-SHADEHILL_01	Original TMDL
Amsden Dam - Day County	SD-JA-L-AMSDEN_01	Original TMDL
Lake Carthage - Miner County	SD-JA-L-CARTHAGE_01	Original TMDL
Cattail Lake - Marshall County	SD-JA-L-CATTAIL_01	Original TMDL
Cavour Lake - Beadle County	SD-JA-L-CAVOUR_01	Original TMDL
Cottonwood Lake - Spink County	SD-JA-L-COTTONWOOD_01	Original TMDL
Elm Lake - Brown County	SD-JA-L-ELM_01	Original TMDL
Lake Faulkton - Faulk County	SD-JA-L-FAULKTON_01	Original TMDL
Lake Hanson - Hanson County	SD-JA-L-HANSON_01	Original TMDL
Hazeldon Lake - Day County	SD-JA-L-HAZELDON_01	Original TMDL
Lake Henry - Bon Homme County	SD-JA-L-HENRY_01	Original TMDL
Horseshoe Lake - Day County	SD-JA-L-HORSESHOE_01	Original TMDL
Lily GPA - Day County	SD-JA-L-LILY_01	Original TMDL
Lake Louise - Hand County	SD-JA-L-LOUISE_01	Original TMDL
Lynn Lake - Day County	SD-JA-L-LYNN_01	Original TMDL
Mina Lake (Lake Parmley) - Edmunds County	SD-JA-L-MINA_01	Original TMDL
Ravine Lake - Beadle County	SD-JA-L-RAVINE_01	Original TMDL
Reetz Lake - Day County	SD-JA-L-REETZ_01	Original TMDL
Richmond Lake - Brown County	SD-JA-L-RICHMOND_01	Original TMDL
Buffalo Lake, South - Marshall County	SD-JA-L-SOUTH_BUFFALO_01	Original TMDL
Staum Dam - Beadle County	SD-JA-L-STAUM_01	Original TMDL
Wilmarth Lake - Aurora County	SD-JA-L-WILMARTH_01	Original TMDL
Little Missouri River - Harding County	SD-LM-R-LITTLE_MISSOURI_01	Original TMDL
Brakke Dam - Lyman County	SD-MI-L-BRAKKE_01	Original TMDL
Cottonwood Lake - Sully County	SD-MI-L-COTTONWOOD_01	Original TMDL
Fate Dam - Lyman County	SD-MI-L-FATE_01	Original TMDL
Lake Hurley - Potter County	SD-MI-L-HURLEY_01	Original TMDL
Roosevelt Lake - Tripp County	SD-MI-L-ROOSEVELT_01	Original TMDL
Lake Oahe	SD-MI-R-OAHE_01	Original TMDL
Lake Alice - Deuel County	SD-MN-L-ALICE_01	Original TMDL
Summit Lake - Grant County	SD-MN-L-SUMMIT_01	Original TMDL
Coal Springs Reservoir - Perkins County	SD-MU-L-COAL_SPRINGS_01	Original TMDL
Little Moreau Lake #1 - Dewey County	SD-MU-L-LITTLE_MOREAU_NO1_01	Original TMDL
Vermillion Lake - McCook County	SD-VM-L-E_VERMILLION_01	Original TMDL
Lake Henry - Kingsbury County	SD-VM-L-HENRY_01	Original TMDL
Lake Thompson - Kingsbury County	SD-VM-L-THOMPSON_01	Original TMDL
Whitewood Lake - Kingsbury County	SD-VM-L-WHITEWOOD_01	Original TMDL

ENCLOSURE 2

EPA REGION 8 TMDL REVIEW FORM AND DECISION DOCUMENT

TMDL Document Info:

Document Name:	2016 Addendum to the South Dakota Mercury Total Maximum Daily Load
Submitted by:	South Dakota Department of Environment and Natural Resources
Date Received:	August 1, 2016
Review Date:	August 2, 2016
Reviewer:	Peter Brumm
Rough Draft / Public Notice / Final Draft?	Final
Notes:	

Reviewers Final Recommendation(s) to EPA Administrator (used for final draft review only):

- ☒ Approve
- ☐ Partial Approval
- ☐ Disapprove
- ☐ Insufficient Information

Approval Notes to the Administrator: *Based on the review presented below, I recommend approval of the five mercury TMDLs submitted in this document. DENR adequately demonstrated each water is appropriate for coverage under the Statewide Mercury TMDL following the revision process previously established. The original TMDL addressing mercury impairments for other state waters, approved on March 1, 2016, remains in effect unchanged.*

This document provides a standard format for EPA Region 8 to provide comments to state TMDL programs on TMDL documents submitted to EPA for either formal or informal review. All TMDL documents are evaluated against the TMDL review elements identified in the following 8 sections:

1. Problem Description
   - 1.1. TMDL Document Submittal
   - 1.2. Identification of the Waterbody, Impairments, and Study Boundaries
   - 1.3. Water Quality Standards
2. Water Quality Target
3. Pollutant Source Analysis
4. TMDL Technical Analysis
   - 4.1. Data Set Description
   - 4.2. Waste Load Allocations (WLA)
   - 4.3. Load Allocations (LA)
   - 4.4. Margin of Safety (MOS)
   - 4.5. Seasonality and variations in assimilative capacity
5. Public Participation
6. Monitoring Strategy

7. Restoration Strategy
8. Daily Loading Expression

Under Section 303(d) of the Clean Water Act, waterbodies that are not attaining one or more water quality standard (WQS) are considered "impaired." When the cause of the impairment is determined to be a pollutant, a TMDL analysis is required to assess the appropriate maximum allowable pollutant loading rate. A TMDL document consists of a technical analysis conducted to: (1) assess the maximum pollutant loading rate that a waterbody is able to assimilate while maintaining water quality standards; and (2) allocate that assimilative capacity among the known sources of that pollutant. A well written TMDL document will describe a path forward that may be used by those who implement the TMDL recommendations to attain and maintain WQS.

Each of the following eight sections describes the factors that EPA Region 8 staff considers when reviewing TMDL documents. Also included in each section is a list of EPA's review elements relative to that section, a brief summary of the EPA reviewer's findings, and the reviewer's comments and/or suggestions. Use of the verb "must" in this review form denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable.

This review form is intended to ensure compliance with the Clean Water Act and that the reviewed documents are technically sound and the conclusions are technically defensible.

1. Problem Description

A TMDL document needs to provide a clear explanation of the problem it is intended to address. Included in that description should be a definitive portrayal of the physical boundaries to which the TMDL applies, as well as a clear description of the impairments that the TMDL intends to address and the associated pollutant(s) causing those impairments. While the existence of one or more impairment and stressor may be known, it is important that a comprehensive evaluation of the water quality be conducted prior to development of the TMDL to ensure that all water quality problems and associated stressors are identified. Typically, this step is conducted prior to the 303(d) listing of a waterbody through the monitoring and assessment program. The designated uses and water quality criteria for the waterbody should be examined against available data to provide an evaluation of the water quality relative to all applicable water quality standards. If, as part of this exercise, additional WQS problems are discovered and additional stressor pollutants are identified, consideration should be given to concurrently evaluating TMDLs for those additional pollutants. If it is determined that insufficient data is available to make such an evaluation, this should be noted in the TMDL document.

1.1 TMDL Document Submittal

When a TMDL document is submitted to EPA requesting review or approval, the submittal package should include a notification identifying the document being submitted and the purpose of the submission.

Review Elements:

☒ Each TMDL document submitted to EPA should include a notification of the document status (e.g., pre-public notice, public notice, final), and a request for EPA review.

☒ Each TMDL document submitted to EPA for final review and approval should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter should contain such identifying information as the name and location of the waterbody and the pollutant(s) of concern, which matches similar identifying information in the TMDL document for which a review is being requested.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: The South Dakota Department of Environment and Natural Resources (DENR) submitted the *2016 Addendum to the South Dakota Mercury TMDL* (Addendum) to EPA via email on May 26, 2016. An accompanying submittal letter clearly requested EPA approval of the final TMDLs under Section 303(d) of the Clean Water Act. The May 26th version erroneously omitted a summary of the public participation procedures DENR followed while developing these TMDLs. DENR resent the Addendum for final EPA review and approval on August 1, 2016 updated with all relevant information included in the Public Participation Section 6.0. The Addendum addresses five new assessment units not approved as part of the original *South Dakota Mercury TMDL* on March 1, 2016, also referred to as the Statewide Mercury TMDL.

Comments: None.

1.2 Identification of the Waterbody, Impairments, and Study Boundaries

The TMDL document should provide an unambiguous description of the waterbody to which the TMDL is intended to apply and the impairments the TMDL is intended to address. The document should also clearly delineate the physical boundaries of the waterbody and the geographical extent of the watershed area studied. Any additional information needed to tie the TMDL document back to a current 303(d) listing should also be included.

Review Elements:

☒ The TMDL document should clearly identify the pollutant and waterbody segment(s) for which the TMDL is being established. If the TMDL document is submitted to fulfill a TMDL development requirement for a waterbody on the state's current EPA approved 303(d) list, the TMDL document submittal should clearly identify the waterbody and associated impairment(s) as they appear on the State's/Tribe's current EPA approved 303(d) list, including a full waterbody description, assessment unit/waterbody ID, and the priority ranking of the waterbody. This information is necessary to ensure that the administrative record and the national TMDL tracking database properly link the TMDL document to the 303(d) listed waterbody and impairment(s).

☒ One or more maps should be included in the TMDL document showing the general location of the waterbody and, to the maximum extent practical, any other features necessary and/or relevant to the understanding of the TMDL analysis, including but not limited to: watershed boundaries, locations of major pollutant sources, major tributaries included in the analysis, location of sampling points, location of discharge gauges, land use patterns, and the location of nearby waterbodies used to provide surrogate information or reference conditions. Clear and concise descriptions of all key features and their relationship to the waterbody and water quality data should be provided for all key and/or relevant features not represented on the map

☒ If information is available, the waterbody segment to which the TMDL applies should be identified/geo-referenced using the National Hydrography Dataset (NHD). If the boundaries of the TMDL do not correspond to the Waterbody ID(s) (WBID), Entity_ID information or reach code (RCH_Code) information should be provided. If NHD data is not available for the waterbody, an alternative geographical referencing system that unambiguously identifies the physical boundaries to which the TMDL applies may be substituted.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: EPA's review of the Addendum finds DENR adequately demonstrated each of the following five assessment units (subsequently referred to as addendum waters) are appropriate for coverage under the Statewide Mercury TMDL:

Table DD-1. Addendum Waters Addressed by the Statewide Mercury TMDL

Assessment Unit ID	Waterbody Description	Impairment Cause
SD-BA-L-SHERIFF_01	Sheriff Dam - Jones County	Mercury in Fish Tissue
SD-JA-L-CLUBHOUSE_01	Clubhouse Lake - Marshall County	Mercury in Fish Tissue
SD-JA-R-JAMES_08	James River - Beadle County	Mercury in Fish Tissue
SD-CH-L-STOCKADE_01	Stockade Lake - Custer County	Mercury in Fish Tissue

Table DD-1. Addendum Waters Addressed by the Statewide Mercury TMDL

Assessment Unit ID	Waterbody Description	Impairment Cause
SD-CH-L-SHERIDAN_01	Sheridan Lake - Pennington County	Mercury in Fish Tissue

Elevated concentrations of mercury found in fish tissue from these waters have caused the "fish and wildlife propagation, recreation, and stock watering waters" and respective fisheries designated uses to not be fully supported. DENR identified these mercury in fish tissue impairments in the draft 2016 Integrated Report using their framework assessment method that determines a waterbody is impaired if the 95th percentile of the fish tissue dataset is greater than 0.3 mg/kg total mercury. A waterbody can also be listed if a fish consumption advisory has been issued, however, none of the addendum waters currently have an individual advisory. Two of these waters have never been assessed previously by DENR and were assigned new assessment unit IDs in 2016 (Sheriff Lake and Clubhouse Lake).

The general location of these waterbodies is shown in Figure 1 of the Addendum which indicates no jurisdictional concerns. All five assessment units were submitted as part of the original Statewide Mercury TMDL but excluded from EPA's approval action because proper public notice and comment procedures were not followed (Sheriff Dam, Clubhouse Lake, James River, Stockade Lake) or because the analysis provided was insufficient to conclude legacy mining practices were not contributing a unique source of mercury (Stockade Lake, Sheridan Lake). In response DENR wrote and public noticed the Addendum to demonstrate that all seven conditions outlined in the Statewide Mercury TMDL's revision process (see Section 1.3) are met for each waterbody included in Table DD-1 and to announce DENR's intention to consider them addressed by the Statewide Mercury TMDL. The seven conditions, or applicability criteria, are used to reconfirm that the assumptions and calculations of original TMDL are still valid and demonstrate that the new assessment units are within South Dakota's jurisdiction, exhibit comparable conditions to the original waters, and are expected to meet water quality standards when the Statewide Mercury TMDL and targets are met. DENR determined in the original Statewide Mercury TDML that a statewide approach was appropriate given that atmospheric deposition is the primary source of mercury and considering the relatively uniform pattern of deposition and fish tissue concentrations observed throughout South Dakota.

Comments: None.

1.3 Water Quality Standards

TMDL documents should provide a complete description of the water quality standards for the waterbodies addressed, including a listing of the designated uses and an indication of whether the uses are being met, not being met, or not assessed. If a designated use was not assessed as part of the TMDL analysis (or not otherwise recently assessed), the documents should provide a reason for the lack of assessment (e.g., sufficient data was not available at this time to assess whether or not this designated use was being met).

Water quality criteria (WQC) are established as a component of water quality standard at levels considered necessary to protect the designated uses assigned to that waterbody. WQC identify quantifiable targets and/or qualitative water quality goals which, if attained and maintained, are intended to ensure that the designated uses for the waterbody are protected. TMDLs result in maintaining and attaining water quality standards by determining the appropriate maximum pollutant loading rate to meet water quality criteria, either directly, or through a surrogate measurable target. The TMDL document

should include a description of all applicable water quality criteria for the impaired designated uses and address whether or not the criteria are being attained, not attained, or not evaluated as part of the analysis. If the criteria were not evaluated as part of the analysis, a reason should be cited (e.g. insufficient data were available to determine if this water quality criterion is being attained).

Review Elements:

☒ The TMDL must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the anti-degradation policy. (40 C.F.R. §130.7(c)(1)).

☒ The purpose of a TMDL analysis is to determine the assimilative capacity of the waterbody that corresponds to the existing water quality standards for that waterbody, and to allocate that assimilative capacity between the identified sources. Therefore, all TMDL documents must be written to meet the existing water quality standards for that waterbody (CWA §303(d)(1)(C)). *Note: In some circumstances, the load reductions determined to be necessary by the TMDL analysis may prove to be infeasible and may possibly indicate that the existing water quality standards and/or assessment methodologies may be erroneous. However, the TMDL must still be determined based on existing water quality standards. Adjustments to water quality standards and/or assessment methodologies may be evaluated separately, from the TMDL.*

☒ The TMDL document should describe the relationship between the pollutant of concern and the water quality standard the pollutant load is intended to meet. This information is necessary for EPA to evaluate whether or not attainment of the prescribed pollutant loadings will result in attainment of the water quality standard in question.

☒ If a standard includes multiple criteria for the pollutant of concern, the document should demonstrate that the TMDL value will result in attainment of all related criteria for the pollutant. For example, both acute and chronic values (if present in the WQS) should be addressed in the document, including consideration of magnitude, frequency and duration requirements.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: Section 5.0 of the Addendum and Section 2.0 of the original Statewide Mercury TMDL contain a full discussion of water quality standards with references to state regulations that establish beneficial uses and criteria in South Dakota (ARSD 74:51). The Addendum clearly links the beneficial uses assigned to each of the five addendum waters to numeric and narrative mercury criteria. On June 17, 2016, after the original Statewide Mercury TMDL was finalized and the Addendum was drafted, EPA approved DENR's request to recognize 0.3 mg/kg total methylmercury in fish tissue as a new water quality criterion for Clean Water Act purposes assigned to designated use categories 2, 3, 4, 5, 6, and 9. South Dakota retained existing numeric criteria for mercury as measured in the water column for human health and aquatic life designated use categories. Use of the methylmercury criterion prior to EPA approval of the water quality standards revision for the Statewide Mercury TMDL target required a comparison to the existing water column criteria, which DENR completed in Section 2.0 of the original Statewide Mercury TMDL using a bioaccumulation factor to convert the fish tissue value into a water column value. While the methylmercury TMDL target is now an EPA approved water quality standard, this conversion analysis is still used to verify that the methylmercury criterion is the most stringent criteria. Consequently, establishing the TMDL to meet the methylmercury criterion will result in the protection all other mercury related criteria and uses.

The majority of the Addendum is devoted to comparing mercury concentrations of fish tissue collected from the five addendum waters to the original dataset used to calculate the Statewide Mercury TMDL. One of the seven conditions of the revision process for broadening coverage of the Statewide Mercury TMDL to additional waters, as listed in Section 1.0 of the Addendum, requires that fish tissue concentrations from the new waters not exceed a measure representative of the dataset used to develop the original TMDL (i.e., the standard length fish tissue methylmercury concentration must not exceed 0.878 mg/kg). This condition ensures that the original TMDL and load reduction factor will be sufficient to meet water quality standards in addendum waters. The original Statewide Mercury TMDL accounted for variability in mercury concentrations from fish of different age and length by using the standard length fish (SLF) concept. DENR defined the SLF as a 384 mm walleye and then estimated the mercury concentration of the SLF for each waterbody and year data were available using linear regression equations derived from monitoring data that compared fish length vs. tissue concentration. The 90th percentile of these SLF tissue concentrations was used to estimate existing conditions statewide and develop a load reduction factor from which the TMDL is based. A direct SLF comparison to the ceiling value of 0.878 mg/kg is complicated by the fact that not all lakes in South Dakota contain walleye. For addendum waters with walleye data (Clubhouse Lake and James River Segment 8) this direct comparison was possible, however, for the remaining addendum waters (Stockade, Sheridan, and Sheriff Lakes) DENR compared data from other species to make this determination. The Addendum Figures 2-13 and associated discussion indicate that methylmercury concentrations from all five addendum waters are similar enough to the original dataset that the original Statewide Mercury TMDL and load reduction factor should result in attainment of all mercury related water quality standards in the addendum waters.

Comments: None.

2. Water Quality Targets

TMDL analyses establish numeric targets that are used to determine whether water quality standards are being achieved. Quantified water quality targets or endpoints should be provided to evaluate each listed pollutant/water body combination addressed by the TMDL, and should represent achievement of applicable water quality standards and support of associated beneficial uses. For pollutants with numeric water quality standards, the numeric criteria are generally used as the water quality target. For pollutants with narrative standards, the narrative standard should be translated into a measurable value. At a minimum, one target is required for each pollutant/water body combination. It is generally desirable, however, to include several targets that represent achievement of the standard and support of beneficial uses (e.g., for a sediment impairment issue it may be appropriate to include a variety of targets representing water column sediment such as TSS, embeddedness, stream morphology, up-slope conditions and a measure of biota).

Review Elements:

☒ The TMDL should identify a numeric water quality target(s) for each waterbody pollutant combination. The TMDL target is a quantitative value used to measure whether or not the applicable water quality standard is attained. *Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. Occasionally, the pollutant of concern is different from the parameter that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as a numerical dissolved oxygen criterion). In such cases, the TMDL should explain the linkage between*

the pollutant(s) of concern, and express the quantitative relationship between the TMDL target and pollutant of concern. In all cases, TMDL targets must represent the attainment of current water quality standards.

☐ When a numeric TMDL target is established to ensure the attainment of a narrative water quality criterion, the numeric target, the methodology used to determine the numeric target, and the link between the pollutant of concern and the narrative water quality criterion should all be described in the TMDL document. Any additional information supporting the numeric target and linkage should also be included in the document.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: As discussed in Section 1.3 of this review form, the Statewide Mercury TMDL and Addendum directly used South Dakota's numeric water quality criterion of 0.3 mg/kg total methylmercury in fish tissue as the TMDL target. This criterion was recently approved as a water quality standard revision by EPA. The Statewide Mercury TMDL and Addendum assume steady-state conditions and rely on the principle of proportionality to determine the load reduction factor needed to meet the fish tissue TMDL target, which EPA recognizes as a reasonable assumption. As explained in Section 3.3 of the Statewide Mercury TMDL, DENR expects that, according to the principle of proportionality, a reduction in mercury emissions will result in a proportional reduction in deposition, mercury loading to waterways, and fish tissue methylmercury concentrations. Following this logic, DENR calculated that existing fish tissue methylmercury concentrations statewide require a 55.2% reduction to meet the 0.3 mg/kg criterion and then applied that same reduction factor to the existing total source load to derive the TMDL.

Comments: None.

3. Pollutant Source Analysis

A TMDL analysis is conducted when a pollutant load is known or suspected to be exceeding the loading capacity of the waterbody. Logically then, a TMDL analysis should consider all sources of the pollutant of concern in some manner. The detail provided in the source assessment step drives the rigor of the pollutant load allocation. In other words, it is only possible to specifically allocate quantifiable loads or load reductions to each identified source (or source category) when the relative load contribution from each source has been estimated. Therefore, the pollutant load from each identified source (or source category) should be specified and quantified. This may be accomplished using site-specific monitoring data, modeling, or application of other assessment techniques. If insufficient time or resources are available to accomplish this step, a phased/adaptive management approach may be appropriate. The approach should be clearly defined in the document.

Review Elements:

☒ The TMDL should include an identification of the point and nonpoint sources of the pollutant of concern, including the geographical location of the source(s) and the quantity of the loading, e.g., lbs/per day. This information is necessary for EPA to evaluate the WLA, LA and MOS components of the TMDL.

☒ The level of detail provided in the source assessment should be commensurate with the nature of the watershed and the nature of the pollutant being studied. Where it is possible to separate natural

background from nonpoint sources, the TMDL should include a description of both the natural background loads and the nonpoint source loads.

☒ Natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g. measured in stream) unless it can be demonstrated that the anthropogenic sources of the pollutant of concern have been identified, characterized, and quantified.

☒ The sampling data relied upon to discover, characterize, and quantify the pollutant sources should be included in the document (e.g. a data appendix) along with a description of how the data were analyzed to characterize and quantify the pollutant sources. A discussion of the known deficiencies and/or gaps in the data set and their potential implications should also be included.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: The Addendum built upon the pollutant source analysis completed in the Statewide Mercury TMDL. As described in the original TMDL and EPA decision document, DENR investigated nonpoint sources of mercury by monitoring and modeling atmospheric deposition rates. This information was used to understand geographical and seasonal patterns of mercury deposition and derive annual loading rates. Monitoring results can be found in Appendix B of the Statewide Mercury TMDL and REMSAD model results are summarized in Figures 21-22 and Table 21. Modeling runs were conducted by EPA and provided to DENR for TMDL analysis. The results clearly indicated that statewide, the largest (93%) source of mercury either originates from outside the modeling domain (continental U.S. plus parts of Canada and Mexico) or originates within the modeling domain but is transported outside to become part of the global pool. In-state emission sources were shown to account for only 0.12% of South Dakota's total atmospheric mercury deposition. DENR assumed that 30% of the total atmospheric mercury deposition is non-anthropogenic in origin and represents natural background conditions which is in line with other statewide mercury TMDLs and scientific literature.

The statewide analysis of point sources conducted in Section 4 of the original Statewide Mercury TMDL found that permitted point sources account for 0.36% of the total existing statewide load ([2.53+2.31]/1,328.83) and 0.81% of the total allowable load ([2.53+2.31]/595.32). The Addendum expands upon this analysis by providing a more detailed review of the potential contribution from abandoned mines and point sources specific to the five addendum waters. Section 3.2 of the Addendum more thoroughly discusses the history of mining within the Sheridan and Stockade Lake watersheds, summarizes existing water column and lakebed sediment samples, and describes management actions that may have affected mercury concentrations, before determining the impact of mining activities to be negligible in terms of mercury loading to these waters. DENR also assumed that permitted point sources are not causing localized mercury impairments to lakes because state permitting requirements (ARSD 74:51:01:27) mandate that water quality standards be met at the point of discharge (i.e., no mixing zone allowed) if the point source discharges to a lake. Consequently, Section 4.0 of the Addendum provides a focused investigation into the only non-lake waterbody included in the Addendum, Segment 8 of the James River. For this river segment DENR characterized the discharge from five public wastewater facilities and found no known source of mercury within their distribution systems. DENR's conclusion that mining activities and point sources are not causing localized mercury impairments is supported by the fish tissue comparison completed in Section 3.1 of the Addendum that shows fish tissue mercury concentrations in the five addendum waters are similar to the statewide dataset used in the original TMDL, thereby suggesting similar sources of mercury for all waters.

Comments: EPA expects DENR to ensure permitted point source discharges do not have a reasonable potential to cause or contribute to an exceedance of water quality standards and stresses that collecting effluent data with sufficiently low detection limits is essential for making these determinations. Please analyze all future surface water samples using detection limits lower than South Dakota's lowest applicable water quality criteria of 0.050 µg/L total recoverable mercury. Additionally, EPA agrees with the addendum statement "If future monitoring indicates point sources are causing or contributing to a mercury impairment for a waterbody covered by the statewide mercury TMDL in a way that is inconsistent with the current allocations, SDDENR may revise the TMDL for that particular waterbody." EPA understands this statement hold true for addendums to the original Statewide Mercury TMDL as well.

4. TMDL Technical Analysis

TMDL determinations should be supported by an analysis of the available data, discussion of the known deficiencies and/or gaps in the data set, and an appropriate level of technical analysis. This applies to **all** of the components of a TMDL document. It is vitally important that the technical basis for **all** conclusions be articulated in a manner that is easily understandable and readily apparent to the reader.

A TMDL analysis determines the maximum pollutant loading rate that may be allowed to a waterbody without violating water quality standards. The TMDL analysis should demonstrate an understanding of the relationship between the rate of pollutant loading into the waterbody and the resultant water quality impacts. This stressor → response relationship between the pollutant and impairment and between the selected targets, sources, TMDLs, and load allocations needs to be clearly articulated and supported by an appropriate level of technical analysis. Every effort should be made to be as detailed as possible, and to base all conclusions on the best available scientific principles.

The pollutant loading allocation is at the heart of the TMDL analysis. TMDLs apportion responsibility for taking actions by allocating the available assimilative capacity among the various point, nonpoint, and natural pollutant sources. Allocations may be expressed in a variety of ways, such as by individual discharger, by tributary watershed, by source or land use category, by land parcel, or other appropriate scale or division of responsibility.

The pollutant loading allocation that will result in achievement of the water quality target is expressed in the form of the standard TMDL equation:

$$TMDL = \sum WLAs + \sum LAs + MOS$$

Where:

TMDL	=	Total Maximum Daily Load (also called the Loading Capacity)
LAs	=	Load Allocations
WLAs	=	Wasteload Allocations
MOS	=	Margin Of Safety

Review Elements:

☒ A TMDL must identify the loading capacity of a waterbody for the applicable pollutant, taking into consideration temporal variations in that capacity. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

☒ The total loading capacity of the waterbody should be clearly demonstrated to equate back to the pollutant load allocations through a balanced TMDL equation. In instances where numerous LA, WLA and seasonal TMDL capacities make expression in the form of an equation cumbersome, a table may be substituted as long as it is clear that the total TMDL capacity equates to the sum of the allocations.

☒ The TMDL document should describe the methodology and technical analysis used to establish and quantify the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

☒ It is necessary for EPA staff to be aware of any assumptions used in the technical analysis to understand and evaluate the methodology used to derive the TMDL value and associated loading allocations. Therefore, the TMDL document should contain a description of any important assumptions (including the basis for those assumptions) made in developing the TMDL, including but not limited to:

- the spatial extent of the watershed in which the impaired waterbody is located and the spatial extent of the TMDL technical analysis;
- the distribution of land use in the watershed (e.g., urban, forested, agriculture);
- a presentation of relevant information affecting the characterization of the pollutant of concern and its allocation to sources such as population characteristics, wildlife resources, industrial activities etc…;
- present and future growth trends, if taken into consideration in determining the TMDL and preparing the TMDL document (e.g., the TMDL could include the design capacity of an existing or planned wastewater treatment facility);
- an explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

☒ The TMDL document should contain documentation supporting the TMDL analysis, including an inventory of the data set used, a description of the methodology used to analyze the data, a discussion of strengths and weaknesses in the analytical process, and the results from any water quality modeling used. This information is necessary for EPA to review the loading capacity determination, and the associated load, wasteload, and margin of safety allocations.

☒ TMDLs must take critical conditions (e.g., steam flow, loading, and water quality parameters, seasonality, etc…) into account as part of the analysis of loading capacity (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable critical conditions and describe the approach used to determine both point and nonpoint source loadings under such critical conditions. In particular, the document should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

☒ Where both nonpoint sources and NPDES permitted point sources are included in the TMDL loading allocation, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document must include a demonstration that nonpoint source loading reductions needed to implement the load allocations are actually practicable [40 CFR 130.2(i) and 122.44(d)].

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: The Addendum relies largely on the technical analysis completed and documented in the original Statewide Mercury TMDL. In summary, even though DENR developed the loading capacity at a statewide scale, the TMDL is still written to meet water quality standards in individual waters. DENR demonstrated this by relating the loading capacity back to numeric water quality criteria that apply statewide (i.e., there are no unique, basin-specific mercury criteria). Conservative decisions made throughout the process, such as selecting the 90th percentile SLF tissue concentration to represent existing conditions, result in a statewide TMDL that may be more protective than necessary to meet water quality standards in some waters. The TMDL loading capacity clearly equates to the sum of the allocations and can be simplified as: Implicit MOS (0 kg/yr) + WLA (4.84 kg/yr) + LA (590.48 kg/yr) = TMDL (595.32 kg/yr). This balanced TMDL equation, additional source category breakouts, and derivation steps are included in Section 10.0 of the original Statewide Mercury TMDL.

The Addendum demonstrates that all seven conditions outlined in the Statewide Mercury TMDL's revision process are met for each addendum water individually, and thus all five waters are appropriate for coverage under the Statewide Mercury TMDL. The seven conditions, or applicability criteria, are used to reconfirm that the assumptions and calculations of original TMDL are still valid and demonstrate that the new assessment units are within South Dakota's jurisdiction, exhibit comparable conditions to the original waters, and are expected to meet water quality standards when the Statewide Mercury TMDL and targets are met. The majority of the Addendum is devoted to comparing mercury concentrations of fish tissue collected from the five addendum waters to the original dataset used to calculate the Statewide Mercury TMDL. This technical analysis involved reviewing bioaccumulation rates and boxplots depicting tissue concentration datasets across various fish species and lakes. DENR determined that the datasets are similar enough to reasonably conclude the original TMDL and load reduction factor will be sufficient to meet water quality standards in addendum waters.

Comments: None.

4.1 Data Set Description

TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis. An inventory of the data used for the TMDL analysis should be provided to document, for the record, the data used in decision making. This also provides the reader with the opportunity to independently review the data. The TMDL analysis should make use of all readily available data for the waterbody under analysis unless the TMDL writer determines that the data are not relevant or appropriate. For relevant data that were known but rejected, an explanation of why the data were not utilized should be provided (e.g., samples exceeded holding times, data collected prior to a specific date were not considered timely, etc…).

Review Elements:

☒ TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis such that the water quality impairments are clearly defined and linked to the impaired beneficial uses and appropriate water quality criteria.

☒ The TMDL document submitted should be accompanied by the data set utilized during the TMDL analysis. If possible, it is preferred that the data set be provided in an electronic format and referenced in the document. If electronic submission of the data is not possible, the data set may be included as an appendix to the document.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: Table 1 of the Addendum provides a list of fish tissue samples that exceed the methylmercury criterion collected from the five addendum waters. Appendices B, C, and D of the Statewide Mercury TMDL contain fish tissue and atmospheric deposition datasets used to develop the original TMDL. Raw datasets are available from DENR upon request.

Comments: None.

4.2 Waste Load Allocations (WLA):

Waste Load Allocations represent point source pollutant loads to the waterbody. Point source loads are typically better understood and more easily monitored and quantified than nonpoint source loads. Whenever practical, each point source should be given a separate waste load allocation. All NPDES permitted dischargers that discharge the pollutant under analysis directly to the waterbody should be identified and given separate waste load allocations. The finalized WLAs are required to be incorporated into future NPDES permit renewals.

Review Elements:

☒ EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit. If no allocations are to be made to point sources, then the TMDL should include a value of zero for the WLA.

☒ All NPDES permitted dischargers given WLA as part of the TMDL should be identified in the TMDL, including the specific NPDES permit numbers, their geographical locations, and their associated waste load allocations.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: DENR expanded upon the point source analysis conducted in Section 4 of the original Statewide Mercury TMDL, which calculated the allowable stormwater and non-stormwater WLAs, by providing in the Addendum a more detailed review of the potential contribution from abandoned mines and point sources specific to the five addendum waters. These investigations, contained in Section 3.2 and 4.0 of the Addendum, found that point sources are not causing localized mercury impairments to

addendum waters and therefore the WLAs derived in the original Statewide Mercury TMDL are appropriate to apply to the addendum waters.

In the original Statewide Mercury TMDL, DENR characterized the existing NPDES-regulated Municipal Separate Storm Sewer System (MS4) load based on the percentage of the South Dakota's land surface falling within MS4 boundaries relative to the atmospheric mercury deposition for the entire state. Using this method, DENR estimated that MS4s contribute a total of 2.31 kg of mercury per year to state waterways. This existing load estimate was directly applied as the aggregate allocation for all MS4s in the state, as identified in Table 17 of the original Statewide Mercury TMDL, without applying a reduction factor. The decision to not require a reduction from this source category as part of the TMDL was based on DENR's assumption that atmospheric deposition is the only source of mercury in regulated stormwater, therefore, the reductions required from atmospheric deposition in the nonpoint source LA component of the TMDL are expected to be sufficient to control mercury loading from MS4s. However, as stated on page 56 of the original Statewide Mercury TMDL, if new data indicates a non-atmospheric source of mercury to the State's stormwater, MS4 permits will be subject to control practices necessary to reduce mercury. The MS4 WLA accounts for a small percentage of the TMDL loading capacity (0.39%).

DENR characterized the existing non-stormwater, NPDES-permitted, point source load in the original Statewide Mercury TMDL by using the average annual combined flow of all facilities in South Dakota (43 billion gallons) and the 90th percentile effluent mercury concentration (0.01536 µg/L) of an Association of Metropolitan Sewerage Agencies dataset composed of data from six other states (see Section 4.3 of the original Statewide Mercury TMDL). DENR chose not to use in-state effluent concentration data due to data quality concerns with sampling techniques, reporting errors, and detection level issues. The analysis attributed 2.53 kg of mercury per year to non-stormwater point sources. DENR established an aggregate, non-stormwater, NPDES-permitted WLA that caps the statewide load at existing conditions, equivalent to 0.43% of the TMDL loading capacity, as described in Section 6.0 of the original Statewide Mercury TMDL. DENR made clear that the WLA "is not an allowance for increased discharges of mercury, nor does it provide exemption from further efforts to reduce mercury from these sources" (pg. 72 of the original Statewide Mercury TMDL). Finally, Appendix E of the original Statewide Mercury TMDL lists all the non-stormwater NPDES-permitted facilities in South Dakota included within the aggregate WLA along with permit numbers and geographical locations.

Comments: EPA recognizes that aggregated WLAs are reasonable for this TMDL. Although the total contribution from permitted point sources appears to be very small, EPA expects that while implementing the statewide WLAs, DENR will ensure that permitted point source discharges do not have a reasonable potential to cause or contribute to an exceedance of water quality standards.

4.3 Load Allocations (LA):

Load allocations include the nonpoint source, natural, and background loads. These types of loads are typically more difficult to quantify than point source loads, and may include a significant degree of uncertainty. Often it is necessary to group these loads into larger categories and estimate the loading rates based on limited monitoring data and/or modeling results. The background load represents a composite of all upstream pollutant loads into the waterbody. In addition to the upstream nonpoint and upstream natural load, the background load often includes upstream point source loads that are not given specific waste load allocations in this particular TMDL analysis. In instances where nonpoint source loading rates are particularly difficult to quantify, a performance-based allocation approach, in which a detailed monitoring plan and adaptive management strategy are employed for the application of BMPs, may be appropriate.

Review Elements:

☒ EPA regulations require that TMDL expressions include LAs which identify the portion of the loading capacity attributed to nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Load allocations may be included for both existing and future nonpoint source loads. Where possible, load allocations should be described separately for natural background and nonpoint sources.

☒ Load allocations assigned to natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g., measured in stream) unless it can be demonstrated that the anthropogenic sources of the pollutant of concern have been identified and given proper load or waste load allocations.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: As described in Section 3 of this review form, DENR identified and quantified sources of nonpoint source pollution through in-state atmospheric deposition monitoring and the REMSAD computer model in the original Statewide Mercury TMDL. Using this information, DENR estimated the state receives 1,326.3 kg of mercury per year from atmospheric nonpoint sources of pollution statewide (see Section 5.1.2 and Section 10.0 of the Statewide Mercury TMDL). After attributing 30% of this load to natural background, the remaining human-derived nonpoint source load requires a 79% reduction to meet the atmospheric deposition LA (590.48 kg/yr) and the final TMDL loading capacity (595.32 kg/yr). All reductions in the TMDL are applied to this aggregated statewide LA representing anthropogenic loading from atmospheric deposition and reductions are expected through the implementation of international (Minamata Convention) and national (Mercury Air Toxics Standards Rule) controls on mercury emissions, and unrelated operational adjustments to existing facilities in South Dakota.

Comments: None.

4.4 Margin of Safety (MOS):

Natural systems are inherently complex. Any mathematical relationship used to quantify the stressor → response relationship between pollutant loading rates and the resultant water quality impacts, no matter how rigorous, will include some level of uncertainty and error. To compensate for this uncertainty and ensure water quality standards will be attained, a margin of safety is required as a component of each TMDL. The MOS may take the form of an explicit load allocation (e.g., 10 lbs/day), or may be implicitly built into the TMDL analysis through the use of conservative assumptions and values for the various factors that determine the TMDL pollutant load → water quality effect relationship. Whether explicit or implicit, the MOS should be supported by an appropriate level of discussion that addresses the level of uncertainty in the various components of the TMDL technical analysis, the assumptions used in that analysis, and the relative effect of those assumptions on the final TMDL. The discussion should demonstrate that the MOS used is sufficient to ensure that the water quality standards would be attained if the TMDL pollutant loading rates are met. In cases where there is substantial uncertainty regarding the linkage between the proposed allocations and achievement of water quality standards, it may be necessary to employ a phased or adaptive management approach (e.g., establish a monitoring plan to determine if the proposed allocations are, in fact, leading to the desired water quality improvements).

Review Elements:

☒ TMDLs must include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d) (1) (C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit (i.e., incorporated into the TMDL through conservative assumptions in the analysis) or explicit (i.e., expressed in the TMDL as loadings set aside for the MOS).

☒ If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS should be identified and described. The document should discuss why the assumptions are considered conservative and the effect of the assumption on the final TMDL value determined.

☐ If the MOS is explicit, the loading set aside for the MOS should be identified. The document should discuss how the explicit MOS chosen is related to the uncertainty and/or potential error in the linkage analysis between the WQS, the TMDL target, and the TMDL loading rate.

☐ If, rather than an explicit or implicit MOS, the TMDL relies upon a phased approach to deal with large and/or unquantifiable uncertainties in the linkage analysis, the document should include a description of the planned phases for the TMDL as well as a monitoring plan and adaptive management strategy.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: As described in Section 8.0 of the original Statewide Mercury TMDL, the TMDL incorporated an implicit margin of safety by following conservative approaches at numerous steps during TMDL development such as:

- Resampling waters with elevated fish tissue methylmercury concentrations more frequently than other waters. This results in a statewide fish tissue dataset that is biased towards egregiously impaired waters and a load reduction factor that is potentially greater than necessary for many waters. The Addendum notes that fish tissue concentrations below, sometimes well below, the methylmercury criterion is expected for all five addendum waters once the loading reduction

factor is met. DENR considers the difference between the criterion and projected tissue concentrations to be an added margin of safety.

- Selecting the 90th percentile SLF tissue concentration to represent existing conditions. This also overestimates the loading reductions needed for many waters.
- Focusing target attainment within a top predator species (walleye) where methylmercury concentrations and bioaccumulation rates are highest. This protects humans consuming other fish species.
- Comparing fish tissue analyzed for total mercury concentration directly to the methylmercury TMDL target for listing decisions and TMDL calculations. This affords a level of protection because measurements of total mercury include other forms of mercury in addition to methylmercury.
- Setting allocations without accounting for reductions in sulfur emissions realized under the Clean Air Act which is expected to affect sulfate-reducing bacteria and lower methylation rates.

Comments: None.

4.5 Seasonality and variations in assimilative capacity:

The TMDL relationship is a factor of both the loading rate of the pollutant to the waterbody and the amount of pollutant the waterbody can assimilate and still attain water quality standards. Water quality standards often vary based on seasonal considerations. Therefore, it is appropriate that the TMDL analysis consider seasonal variations, such as critical flow periods (high flow, low flow), when establishing TMDLs, targets, and allocations.

Review Elements:

☒ The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variability as a factor. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: The Addendum relies on the critical conditions and seasonal variation discussion contained in Section 9.0 of the original Statewide Mercury TMDL. DENR supported a monitoring network of atmospheric mercury deposition stations across the state for multiple years to explore temporal and geospatial differences in mercury deposition. Results indicated a positive relationship between deposition and precipitation but overall DENR determined that deposition rates were sufficiently uniform to establish a single TMDL representative of the entire state. Sediment cores from ten lakes were also reviewed for insight into mercury loading trends but the results indicated that mercury concentrations in upper lakebed sediments was highly variable and no conclusions were drawn from the sediment cores. In addition to a daily load, the loading capacity is expressed as an annual load which incorporates seasonal variation of flow and weather. Lastly, DENR also stated that the use of a fish tissue TMDL target, representing the bioaccumulation of mercury throughout a fish's lifespan, inherently captures the variability of multiple seasons and critical conditions.

Comments: None.

5.0 Public Participation

EPA regulations require that the establishment of TMDLs be conducted in a process open to the public, and that the public be afforded an opportunity to participate. To meaningfully participate in the TMDL process it is necessary that stakeholders, including members of the general public, be able to understand the problem and the proposed solution. TMDL documents should include language that explains the issues to the general public in understandable terms, as well as provides additional detailed technical information for the scientific community. Notifications or solicitations for comments regarding the TMDL should be made available to the general public, widely circulated, and clearly identify the product as a TMDL and the fact that it will be submitted to EPA for review. When the final TMDL is submitted to EPA for approval, a copy of the comments received by the state and the state responses to those comments should be included with the document.

Review Elements:

☒ The TMDL must include a description of the public participation process used during the development of the TMDL (40 C.F.R. §130.7(c)(1)(ii)).

☒ TMDLs submitted to EPA for review and approval should include a summary of significant comments and the State's/Tribe's responses to those comments.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: The public participation process followed for the Addendum is summarized in the document. The *2016 Addendum to the South Dakota Mercury TMDL* was released for public comment from April 20, 2016 to May 20, 2016. The opportunity for public comment and review was posted on DENR's website and announced in five newspapers: Sioux Falls Argus Leader, Native Sun News in Rapid City, Custer County Chronicle, Pierre Capitol Journal, and Aberdeen American News. Additionally, DENR directly notified a number of stakeholders by email. No comments were received.

Comments: None.

6. Monitoring Strategy

TMDLs may have significant uncertainty associated with the selection of appropriate numeric targets and estimates of source loadings and assimilative capacity. In these cases, a phased TMDL approach may be necessary. For Phased TMDLs, it is EPA's expectation that a monitoring plan will be included as a component of the TMDL document to articulate the means by which the TMDL will be evaluated in the field, and to provide for future supplemental data that will address any uncertainties that may exist when the document is prepared.

Review Elements:

☒ When a TMDL involves both NPDES permitted point source(s) and nonpoint source(s) allocations, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring.

☐ Under certain circumstances, a phased TMDL approach may be utilized when limited existing data are relied upon to develop a TMDL, and the State believes that the use of additional data or data based on better analytical techniques would likely increase the accuracy of the TMDL load calculation and merit development of a second phase TMDL. EPA recommends that a phased TMDL document or its implementation plan include a monitoring plan and a scheduled timeframe for revision of the TMDL. These elements would not be an intrinsic part of the TMDL and would not be approved by EPA, but may be necessary to support a rationale for approving the TMDL.
http://www.epa.gov/owow/tmdl/tmdl_clarification_letter.pdf

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: The Addendum relies on the framework monitoring strategy outlined in Section 12.0 of the original Statewide Mercury TMDL. DENR identified three monitoring categories where future sampling efforts will focus to address data gaps and evaluate progress towards meeting the TMDL target. The three categories of mercury monitoring are atmospheric deposition, fish tissue, and water column.

Comments: See comment in Section 3 of this review form regarding sample detection limits.

7. Restoration Strategy

The overall purpose of the TMDL analysis is to determine what actions are necessary to ensure that the pollutant load in a waterbody does not result in water quality impairment. Adding additional detail regarding the proposed approach for the restoration of water quality is not currently a regulatory requirement, but is considered a value added component of a TMDL document. During the TMDL analytical process, information is often gained that may serve to point restoration efforts in the right direction and help ensure that resources are spent in the most efficient manner possible. For example, watershed models used to analyze the linkage between the pollutant loading rates and resultant water quality impacts might also be used to conduct "what if" scenarios to help direct BMP installations to locations that provide the greatest pollutant reductions. Once a TMDL has been written and approved, it is often the responsibility of other water quality programs to see that it is implemented. The level of quality and detail provided in the restoration strategy will greatly influence the future success in achieving the needed pollutant load reductions.

Review Elements:

☐ EPA is not required to and does not approve TMDL implementation plans. However, in cases where a WLA is dependent upon the achievement of a LA, "reasonable assurance" is required to demonstrate the necessary LA called for in the document is practicable). A discussion of the BMPs (or other load reduction measures) that are to be relied upon to achieve the LA(s), and programs and funding sources that will be relied upon to implement the load reductions called for in the document, may be included in the implementation/restoration section of the TMDL document to support a demonstration of "reasonable assurance".

Recommendation:
☐ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information ☒ N/A

Summary: DENR's framework restoration strategy is outlined in the original Statewide Mercury TMDL. Because the loading analysis showed that nonpoint sources outside of South Dakota account for over 99% of the mercury loading to state waterbodies, the TMDL requires all reductions to occur through the LA and stresses the importance of national and international regulatory controls on mercury emissions such as the U.S. Mercury Air Toxics Standards Rule and the United Nations Minamata Convention Agreement. DENR also highlighted recent emission reductions observed at two South Dakota coal power plants (Ben French and SDSU) and in-state efforts to recycle mercury-containing solid waste products and avoid releases of mercury from these products into the environment.

Comments: None.

8. Daily Loading Expression

The goal of a TMDL analysis is to determine what actions are necessary to attain and maintain WQS. The appropriate averaging period that corresponds to this goal will vary depending on the pollutant and the nature of the waterbody under analysis. When selecting an appropriate averaging period for a TMDL analysis, primary concern should be given to the nature of the pollutant in question and the achievement of the underlying WQS. However, recent federal appeals court decisions have pointed out that the title TMDL implies a "daily" loading rate. While the most appropriate averaging period to be used for developing a TMDL analysis may vary according to the pollutant, a daily loading rate can provide a more practical indication of whether or not the overall needed load reductions are being achieved. When limited monitoring resources are available, a daily loading target that takes into account the natural variability of the system can serve as a useful indicator for whether or not the overall load reductions are likely to be met. Therefore, a daily expression of the required pollutant loading rate is a required element in all TMDLs, in addition to any other load averaging periods that may have been used to conduct the TMDL analysis. The level of effort spent to develop the daily load indicator should be based on the overall utility it can provide as an indicator for the total load reductions needed.
Review Elements:

☒ The document should include an expression of the TMDL in terms of a daily load. However, the TMDL may also be expressed in temporal terms other than daily (e.g., an annual or monthly load). If the document expresses the TMDL in additional "non-daily" terms the document should explain why it is appropriate or advantageous to express the TMDL in the additional unit of measurement chosen.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: Section 1.0 of the Addendum presents the Statewide Mercury TMDL in both an annual and a daily loading expression and refers the reader to Section 10.0 of the original TMDL for more information. DENR first calculated an annual load and then used the TSD method, outlined in EPA's *Technical Support Document for Water Quality-Based Toxics Control* (USEPA, 2001), to derive a total maximum daily load. The Statewide Mercury TMDL states that an annual load is most appropriate due to characteristics of the pollutant (i.e., mercury levels in fish represent bioaccumulation over long periods of time, impairments are often long-term and persistent, etc.) and because setting loads at a yearly timescale incorporates the seasonal precipitation patterns shown to influence atmospheric mercury deposition.

Comments: None.