

Statement of Basis

PERMITTEE: **Merit Energy Company**

FACILITY: **Steamboat Butte Fields**

PERMIT NO: **WY-0033740**

RESPONSIBLE OFFICIAL: Michael A. Williams, P.G.
Regulatory and Government Affairs Professional
1501 Stampede Avenue, Unit 9019
Cody, Wyoming 82414

FACILITY CONTACT: Michael A. Williams, P.G.
Phone: (307) 527-2127
Email: mike.williams@meritenergy.com

PERMIT TYPE: Minor Industrial (Renewal)
Indian Country

FACILITY LOCATION: SW ¼ of Section 5 and NW ¼ of Section 8, Township 3 North,
Range 1 West in Fremont County, Wyoming

DISCHARGE POINT: Outfall 001, Latitude 43.260278°N, Longitude 108.904444°W
Outfall 002, Latitude 43.252222°N, Longitude 108.894444°W

Background Information

The U.S. Environmental Protection Agency (EPA) directly implements the Clean Water Act (CWA) NPDES program on Indian country lands within the State of Wyoming. This facility is located on “Indian country” land as defined at 18 U.S.C. § 1151. The EPA has not approved the Eastern Shoshone or Northern Arapaho Tribes or the State of Wyoming to implement the CWA NPDES program in Indian country.

This Permit authorizes discharges from the Merit Energy Company’s Steamboat Butte Fields oil production facility located in Fremont County, Wyoming. These discharges include the discharge of produced water from Outfall 001, and the discharge of overflows from the facility’s fresh water supply system from Outfall 002. Refer to Figure 1 for location map. This facility is located on Tribal trust land on the Wind River Indian Reservation. This Permit was transferred from Marathon Oil Company to Merit Energy Company effective December 1, 2016.

In 2012, Marathon Oil Company performed a Toxicity Reduction Evaluation of the water discharged at Outfall 001. They identified sulfide as the toxicant of concern and evaluated treatment techniques that will result in compliance with Whole Effluent Toxicity standards. Beginning in 2015, Marathon constructed and began operating a treatment system with aeration terraces and biological polishing processes to reduce sulfide levels of the produced water.

Prior to the sulfide treatment system, produced oil, water, and gas are separated in pressure vessels and skim tanks by gravity, heat and emulsion breaking chemicals. The water is discharged to a series of settling ponds where the remaining oil is removed by floatation and skimming and then goes to the sulfide treatment system. The sulfide treatment system uses a series of berms and water collection and distribution channels to manage flow over the terrace aeration cells. Biological polishing of the effluent occurs in the vegetative filter and retention pond. The design and operation of this system is based on two sulfide treatment technologies. The first is the oxidation of sulfide to sulfate, which will then precipitate from the solution. The second is metabolism of sulfide through biological activity, which occurs throughout the system to remove a significant portion of sulfide and polish the effluent prior to discharge to Outfall 001. A flow diagram of Outfall 001 is shown in Figure 2. Figure 2 also shows some of the produced water is being injected into the C-3 low pressure and E-5 high pressure injection plants. These injection points are not subject to this Permit and are permitted under the Underground Injection Control program.

Outfall 1 is located at approximately 43.260278°N, 108.904444°W. From that point, the discharge flows approximately 900 feet through a man-made wetland to a small, named pond (the “Upper Mission pond”). There is an outlet from the Upper Mission pond through which discharges flow about 1000 feet to another, larger pond (the “Lower Mission pond”) in an area called Mexican Flat. In its permit application, the Permittee requested that the permitted outfall be moved from its current location above Upper Mission pond to the outlet from the Upper Mission pond at approximately 43.256111°N, 108.905833°W. The Permittee asserted that the Upper Mission pond is a waste treatment system that is not waters of the United States. In response to this initial request, the EPA reviewed a variety of sources and concluded that the Upper Mission pond is not waters of the United States.

In making this determination, the EPA reviewed the following sources: USGS 1:24000 scale topographic maps of the site (Lookout Butte SW Quadrangle) from 1952, 1978, and 2017; aerial photographs of the area from 1994, 2006, 2013 and 2018 available from Google Earth; Google Earth elevation mapping; and the U.S. Fish and Wildlife Services National Wetlands Inventory (NWI).

The Upper Mission pond is geographically isolated from the Lower Mission pond and its natural water source. In both the 1952 and the 1978 maps, the Upper Mission pond is shown to be a dry depression approximately 0.5 acres in area. The Lower Mission pond in Mexican Flat is identified in all three USGS maps, as well as on the NWI, as an intermittent lake. On the 1952 and 1978 maps, the only source of water in the Lower Mission pond appears to be an identifiable stream channel running across Mexican Flat and into the lake from the northwest. Though none of the maps indicate the presence of water in that channel, the NWI states that the channel is seasonally flooded suggesting it may be an intermittent stream. The Upper Mission pond is separated from both the stream channel and the Lower Mission pond by a low, natural ridge. At its lowest point, the ridge is 7 feet higher than the stream channel and is generally 10-15 feet above the channel and the Lower Mission pond. The only connection between the Upper Mission pond and the Lower Mission pond, therefore, is through the outlet at 43.257222°N, 108.905833°W, which is located at a drop in the natural ridge 12 feet above the lower pond.

As noted above, the 1952 and 1978 USGS maps both indicate that the location of the Upper Mission pond was a dry depression. Aerial photographs from 1994 shows only dry ground in that location. There is no water or wetland where the Upper Mission pond is located, and the

Steamboat Butte facility and its outfall have not yet been built. The next available aerial photos date to 2006, and these show the facility, the outfall, and the wetlands and pond created by the flows from the outfall. Aerial photos from subsequent years, as well as the orthographic imagery on the 2017 USGS map, show the Upper Mission pond with the only differences being types of vegetation in the wetland below the permitted outfall and the volume of water in the pond. Thus, from this evidence, it appears that the Steamboat Butte facility is the sole source of water for the Upper Mission pond, and the Upper Mission pond itself was created between 1994 and 2006 with the construction of the permitted outfall.

Based on these facts, the EPA has concluded that the Upper Mission pond is not a water of the U.S. and is created by and used to help treat the flows from the Steamboat Butte facility. After the EPA public noticed this conclusion with the draft permit, the Permittee submitted comments on the draft permit in which it requested to keep Outfall 001 at the outlet of the final treatment pit for this Permit. The EPA has granted this second request, and as a result, Outfall 001 will remain located at 43.260278°N, 108.904444°W.

Outfall 002, located at 43.252222°N, 108.894444°W, only discharges fresh water that is overflow from the Steamboat Butte Field fresh water supply system. The water does not undergo treatment through a pressure vessel system or other treatment mechanism. However, the water flows through a settling pond prior to discharge to Lower Mission pond. A flow diagram of Outfall 002 is shown in Figure 3.

Figure 1. Merit Energy Company – Steamboat Butte Fields Map showing location of facility and discharge points (Outfall 001 and Outfall 002)

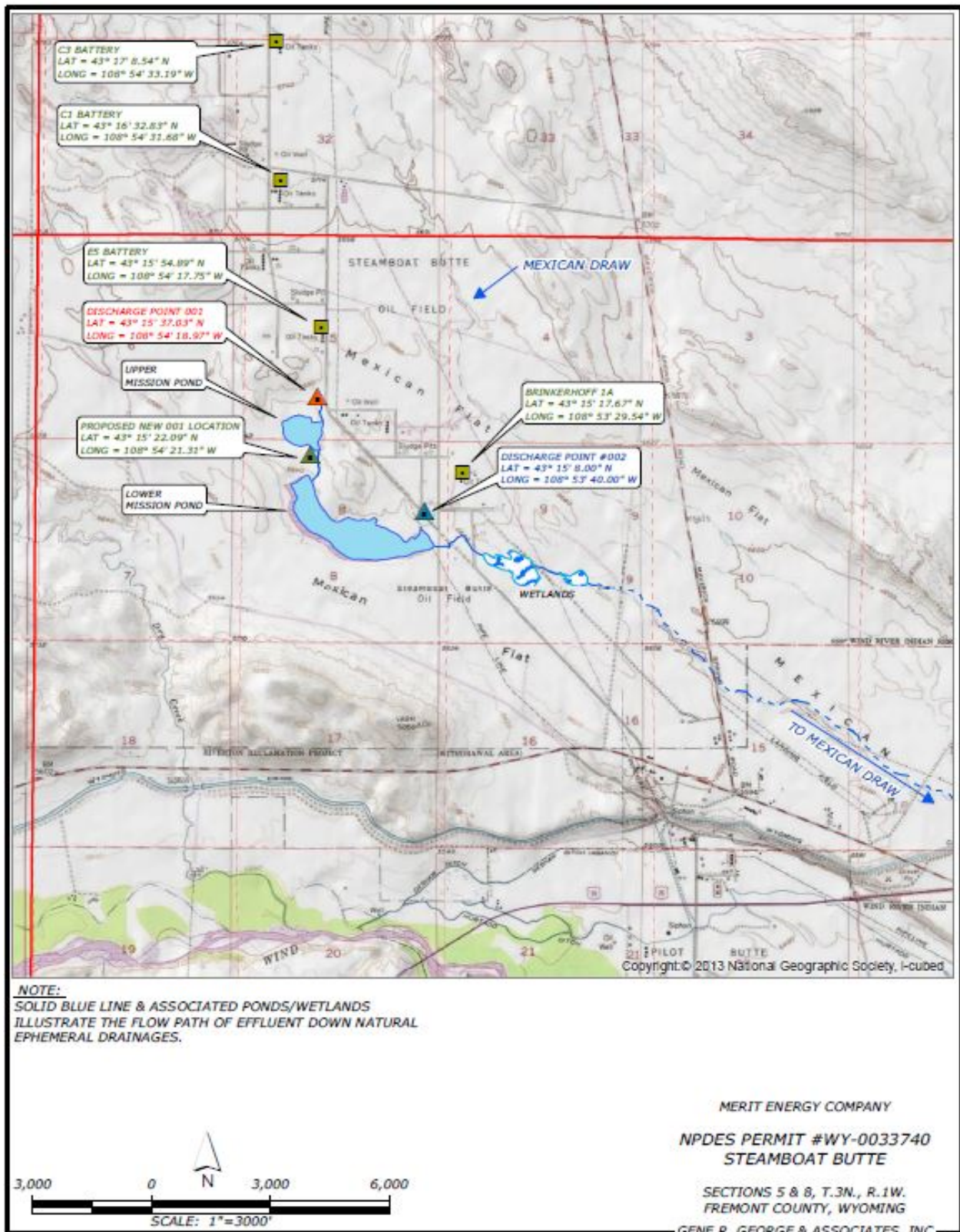


Figure 2. Merit Energy Company – Steamboat Butte Fields Flow Diagram for Outfall 001

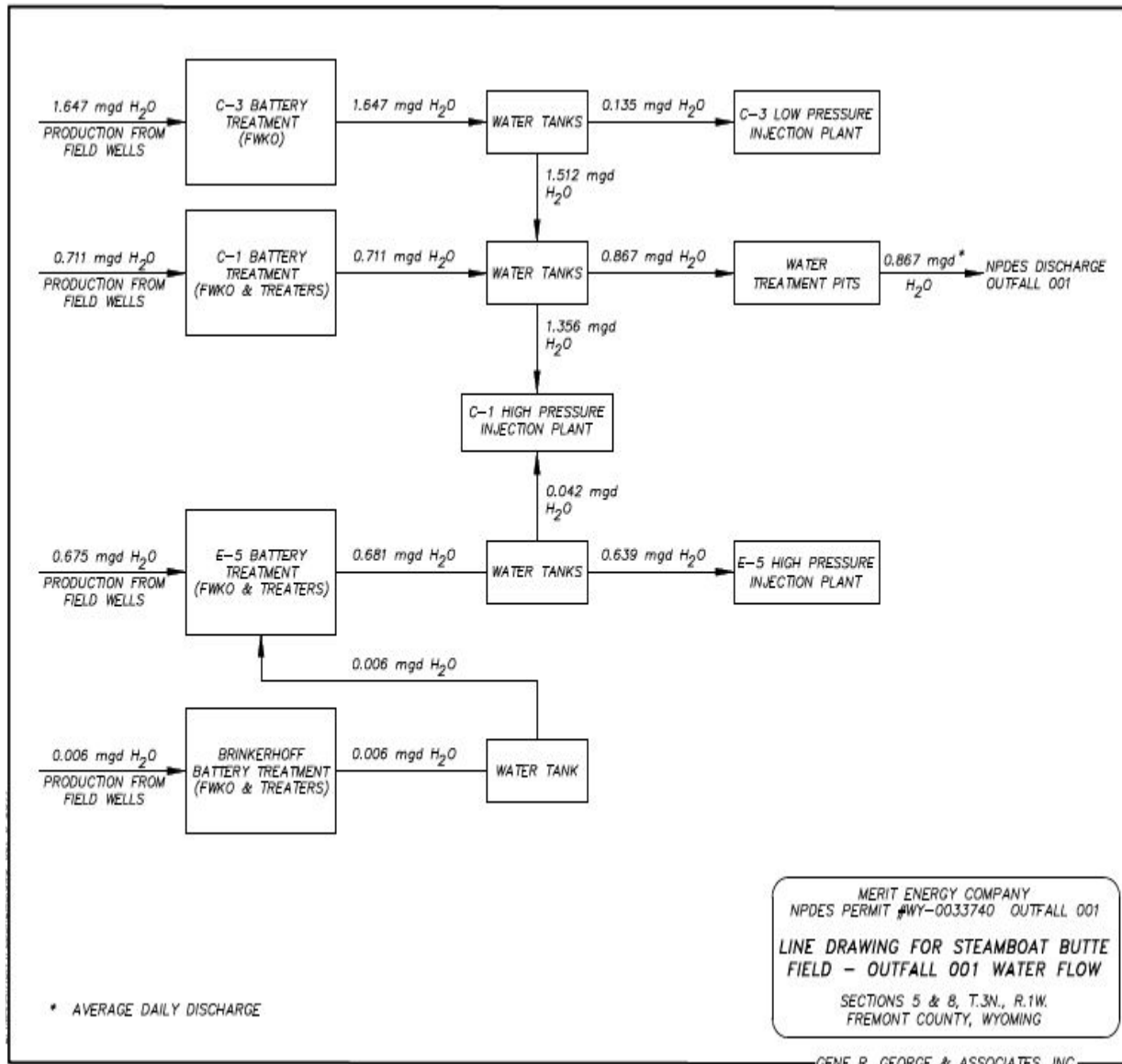
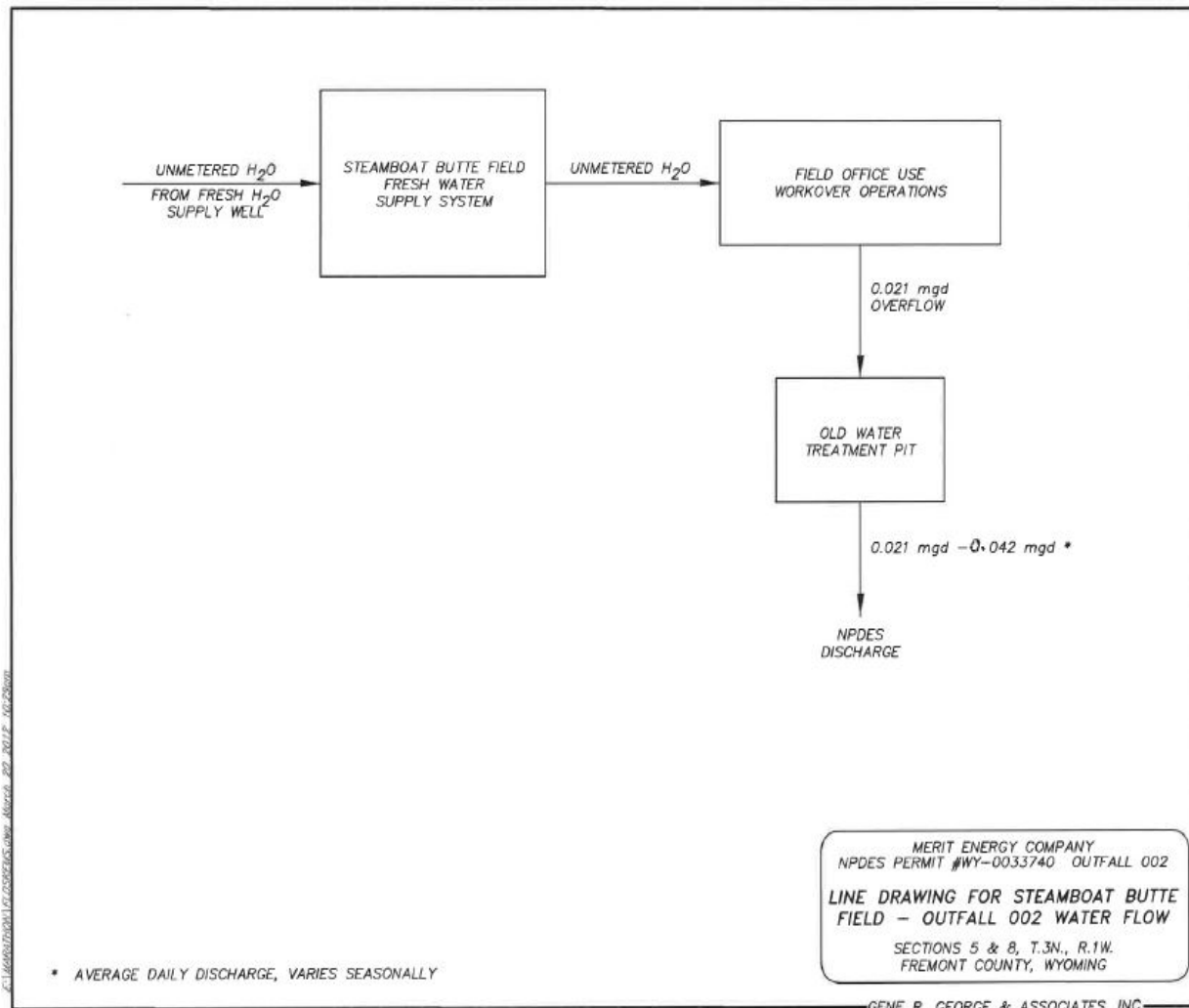


Figure 3. Merit Energy Company – Steamboat Butte Fields Flow Diagram for Outfall 002



Receiving Waters

The discharge from this facility from both permitted Outfalls will enter Lower Mission pond. As described in the previous section, Outfall 001 discharges to Upper Mission pond, which then flows to Lower Mission pond. Outfall 002 gravity flows directly to Lower Mission pond. The produced water discharged from Outfall 001 flows about 0.7 mile to the Lower Mission pond outlet (see Figure 1). From Lower Mission pond outlet, water flows through a man-made off channel marsh and two engineered wetlands on Mexican Flat. Once water leaves the lower wetland, it enters a mapped intermittent (ephemeral) drainage, which flows across Mexican Flat to a siphon that directs any flow under Wyoming Canal to Mission Creek. From there, the flow coalesces with seepage from the Wyoming Canal and other irrigation returns and flows for another 4.4 miles before reaching the Wind River. This portion of the Mexican Draw drainage between the Wyoming Canal and the Wind River are the first perennial waters encountered. The total distance from the Lower Mission pond outlet to the Wind River is about 9.1 stream miles.

In the Tribes’ water quality requirements, designated uses were established in which the Tribes classified Mission Creek (upstream from Wyoming Canal) as Class 2E. Class 2E waters are

those flows are primarily the result of authorized effluent discharges and are known to support or to have the potential to support game or nongame fish populations or spawning and nursery areas at least seasonally. Uses designated on Class 2E waters include game and nongame fisheries, aquatic life other than fish, secondary contact recreation, wildlife, industry, agriculture, cultural/traditional, and aesthetic uses.

Applicable Technology and Water Quality Considerations

Treatment technology standards establish a level of effluent quality that must be met by all facilities affected by the applicable category. The level of effluent quality established by the treatment standards may not be sufficient, however, to protect all water uses. As required by the CWA, the EPA must conduct an evaluation of the numeric water quality standards for the receiving stream. The results of this evaluation are used to establish permit limits to ensure the receiving stream quality and its existing and designated uses are protected. An evaluation of the narrative water quality standards that may be applicable to the permitted facility is performed to further protect the characteristics and water quality of the receiving stream.

Technology Based Effluent Limitations

Effluent Limitation Guidelines and Standards

The Steamboat Butte Fields is an onshore facility located landward of the inner boundary of the territorial seas. The facility is also located west of the 98th meridian and, therefore, 40 CFR Part 435, Oil and Gas Extraction Point Source Category, Subpart E - Agricultural and Wildlife Water Use Subcategory (hereafter, “Subpart E”) applies. Subpart E allows the discharge of produced water for which the produced water has a use in agricultural or wildlife propagation. The effluent guideline defines “use in agricultural or wildlife propagation” to mean “that the produced water is of good enough quality to be used for wildlife or livestock watering or other agricultural uses and that the produced water is actually put to such use during periods of discharge.” 40 CFR § 435.51(c).

The actual effluent limitation from Subpart E is found in 40 CFR §435.52, which provides:

- (a) There shall be no discharge of waste pollutants into navigable waters from any source (other than produced water) associated with production, field exploration, drilling, well completion, or well treatment (*i.e.*, drilling muds, drill cuttings, and produced sands).
- (b) Produced water discharges shall not exceed the following daily maximum limitation:
Oil and Grease: 35 mg/L.

The Permittee provided the EPA with documentation (letter dated March 28, 2012) that the discharge of produced water is actually put to use during periods of discharge by the lease holder for grazing. Correspondence from the U.S. Bureau of Indian Affairs (March 27, 2012) describes and supports the potential beneficial uses of the produced water from the facility. The beneficial uses include providing water and habitat for a variety of aquatic and terrestrial plant species, livestock, wildlife, birds, and fish, as well as supporting wetlands. Letters from ranchers, farmers, and individuals support this discharge of produced water for their beneficial uses.

Additional Technology Based Effluent Limitations

As described above, Subpart E requires that discharges of produced water must be of good enough quality to be used for wildlife or livestock watering or other agricultural uses. The EPA's previous permit included the following limitations to meet the requirements of Subpart E: total dissolved solids (TDS) of 5,000 mg/L, chloride of 2,000 mg/L, and sulfate of 3,000 mg/L. These limits were based on similar requirements for livestock protection imposed by the State of Wyoming on oil and gas production facilities on non-Reservation land in the State of Wyoming. For this renewal Permit, the TDS and chloride permit limitations are carrying over from the previous permit.

For the revised sulfate limitation of 2,500 mg/L, the EPA reviewed current information from literature and studies on livestock and wildlife consumption of the produced water discharge, as well as new information on livestock management practices occurring on the Wind River Indian Reservation. The EPA reviewed scientific literature indicated that sulfate in livestock water may cause adverse health effects (such as encephalitis) in cattle. The literature showed the highest risk of adverse effects from sulfur exposure occurs during the summer months when livestock drink larger quantities of water. During cooler periods, there is lower risk of adverse effects because cattle drink less water. Based on this literature, the EPA established an initial sulfate exposure threshold of 1,800 mg/L to protect livestock from adverse effects. This initial threshold was established by assuming that the source of water for the livestock on Range 38 was exclusively from the produced water discharge from this facility, and this water was consumed throughout the year.

Having established the initial sulfate exposure threshold, the EPA then considered additional information concerning actual livestock water practices on the Reservation provided by the Tribes and BIA. This additional information was contained in a letter that Bureau of Indian Affairs (BIA) sent to the Eastern Shoshone Tribe on January 21, 2016, and letters provided to the EPA by the Eastern Shoshone Tribe on January 26, 2016, and Northern Arapaho Tribe on January 25, 2016.

The supplemental information from BIA and the Tribes indicates that livestock on Range 38 that have access to the produced water discharge are managed in a manner in which additional fresh water sources with a much lower sulfate concentration are also available during the entire grazing season. The letter identifies multiple sources of fresh water on Range 38 that are available to livestock, including several perennial streams, two wells, several springs, and larger water bodies including the Little Wind River and the Wyoming Canal. BIA stated that the cattle use all the available water sources within the Range Unit, not just the produced water.

BIA also indicated that the cattle are usually present in lowland areas near the produced water discharges only during the coolest parts of the permitted 9-month grazing period, which extends from May through January. Typically, the cattle are present from approximately May 1 to June 15, and then from September until the end of the roundup in mid-Fall. During the hottest periods of the year from late June to September, the cattle are moved to higher elevations away from the produced water discharges.

In addition to domestic cattle, BIA also noted the presence of up to 1,000 feral horses on Range 38. These horses range freely and would have access to all the feed habitat and water resources available to the domestic cattle grazed on the range. As such, their sulfate intake and exposure

rates would be similar. The EPA has reviewed the available scientific literature on horses and sulfate, has determined that the risk analyses for horses and cattle are very similar.^{1,2}

The additional information from BIA thus makes clear that livestock on Range 38 are not relying solely on the discharge from this facility for drinking water, that they have access to multiple sources of fresh water, and that they are not drinking the discharge water during the hottest months of the year. As a result, the risk of adverse effects to the cattle and horses from sulfur exposure, particularly during the hottest months of the year, is anticipated to be minimal. This information supports deviating upwards from the initial exposure threshold to the daily maximum sulfate limit of 2,500 mg/L.

Water Quality Based Effluent Limitations

The Tribes adopted surface water quality requirements that apply to waters on the Wind River Indian Reservation. These water quality requirements were adopted into Tribal code as Water Quality Rules and Regulations effective September 25, 2007.

The water quality requirements were submitted to the EPA for review and returned to the Tribes with comments. The Tribal requirements have not yet been formally approved by the EPA; however, the Tribes have indicated that they expect dischargers on the Reservation to comply with their adopted rules. The EPA is considering these water quality requirements when determining reasonable potential (RP) and evaluating the need for any water quality based effluent limitations (WQBELs) in this renewal Permit. The EPA relied on CWA Section 301(b)(1)(C) and principles of tribal sovereignty in establishing WQBELs based on these tribally-adopted water quality requirements.

Numeric Water Quality Requirements

To ensure that any potential permit effluent limitations based on the Tribes' adopted water quality requirements are fully protective of the designated aquatic life use, a comparison of the Tribes' criteria with the EPA's published recommended CWA Section 304(a) criteria was performed. In most cases, the Tribes' criteria were equivalent to the EPA's published criteria. The tribal exceptions were for cadmium (acute – 19.12 µg/L; chronic – 6.22 µg/L) and silver (acute – 37.44 µg/L), which were higher than the EPA's criteria. Where the two sets of criteria varied, the EPA chose the more stringent of the two. The selected criteria used in evaluation of RP and setting permit effluent limitations are listed in Table 1.

1 M. F. Raisbeck, S. L. Riker, C. M. Tate, R. Jackson, M. A. Smith, K. J. Reddy and J. R. Zygmunt (2007): Water quality for Wyoming livestock and wildlife. A review of the literature pertaining to the health effects of inorganic contaminants. (UW AES bulletin B-1183). Available at <http://www.uwyo.edu/ces/pubs/b1183/> verified 23 February 2016.

2 2005. National Research Council. *Mineral Tolerance of Animals: Second Revised Edition*. Washington, DC: The National Academies Press, 2005 Available from http://www.nap.edu/catalog.php?record_id=11309 verified 23 February 2016.

Table 1 – Applicable Water Quality Criteria

Pollutant	More Stringent of EPA Water Quality Criteria and Adopted Wind River Tribal Water Quality Criteria	
	Aquatic Life	
	Acute (µg/L)	Chronic (µg/L)
Aluminum, Total	750	87
Arsenic, Total	340	150
Cadmium, Total	7.7 ⁽¹⁾	0.64 ⁽¹⁾
Chloride	860,000	230,000
Chromium (III)	1,773.3 ⁽¹⁾	230.7 ⁽¹⁾
Chromium (VI), Hexavalent	16	11
Copper, Total	49.6 ⁽¹⁾	29.3 ⁽¹⁾
Iron, Total	--	1,000
Lead, Total	280.8 ⁽¹⁾	10.9 ⁽¹⁾
Manganese, Total	9,033 ⁽¹⁾	3,105 ⁽¹⁾
Mercury, Total	1.4	0.77
Nickel, Total	1,513 ⁽¹⁾	168 ⁽¹⁾
Oil and Grease	Narrative, 10 mg/L	
pH	6.5 to 9.0	
Selenium, Total	--	5.0
Silver, Total	34.9 ⁽¹⁾	--
Sulfide (as H ₂ S)	--	2
Zinc, Total	379 ⁽¹⁾	382 ⁽¹⁾

⁽¹⁾ Criterion is hardness dependent. Table values adjusted for hardness using the recommended cap of 400 mg/L for waters having a hardness value greater than 400 mg/L.

The chloride limitations are based on the desired level of water quality for the receiving water as indicated by the clarifications provided by the Eastern Shoshone Tribe on January 26, 2016 and Northern Arapaho Tribe on January 25, 2016. In their letters, the Tribes explained that the aquatic life numeric criteria for chloride should not apply to waters dominated by effluent discharges from oil and gas operations. Both Tribes also expressed an interest in ensuring that discharges from these facilities be of good enough quality to protect wildlife and livestock water, and other agricultural uses; and both indicated 2,000 mg/L chloride would protect such uses. The EPA agrees that a single daily maximum limit of 2,000 mg/L chloride will ensure that the discharge is “of good enough quality” for wildlife and livestock watering, which is the threshold required by 40 CFR Part 435, Subpart E. The chloride limit, 2,000 mg/L, is identical to the limit used in the 2005 issuance of this Permit.

Narrative Water Quality Requirements

The narrative water quality requirements for the Wind River Indian Reservation were evaluated to determine if permit limits were necessary to protect the characteristics and uses of the receiving stream. The Tribes have adopted narrative requirements for toxic pollutants, settleable

solids and floating and suspended solids. The following are the Tribes' narrative water quality requirements:

Section 13 - Toxic Pollutants. Except for those substances referenced in Section 21 (e) and (f) of these regulations, toxic pollutants attributable to or influenced by human activities shall not be present in any Reservation surface water in concentrations or combinations which constitute pollution as defined herein.

Section 15 - Settleable Solids. In all Reservation waters, substances attributable to or influenced by human activities that will settle to form sludge, bank, or bottom deposits shall not be present in quantities which could result in significant aesthetic degradation, significant degradation of habitat for aquatic life or adversely affect public water supplies, agricultural or industrial water use, plant life or wildlife.

Section 16 - Floating and Suspended Solids. In all Reservation surface waters, floating and suspended solids attributable to or influenced by human activities shall not be present in quantities which could result in significant aesthetic degradation, significant degradation of habitat for aquatic life or adversely affect public water supplies, agricultural or industrial water use, plant life or wildlife.

Permit Limitations Based on Narrative Water Quality Requirements

Floating, Suspended and Settleable Solids

Permit requirements for implementing the narrative requirements for discharges of floating solids and oil which causes a visible sheen or deposits on the bank or bottom are included in the renewal Permit as effluent limitations:

The concentration of oil and grease shall not exceed 10 mg/L in any sample nor shall there be a visible sheen or cause a visible sheen in the receiving waters or deposits on the bottom or shoreline of the receiving waters.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Reasonable Potential (RP) Evaluation for Water Quality Based Effluent Limitations

Effluent Monitoring Data

The permit renewal application provided data for pollutants believed to be present as well as: biochemical oxygen demand, chemical oxygen demand, total organic carbon, ammonia, temperature, pH and actual flow. The EPA also reviewed the submitted data from discharge monitoring reports (DMRs) for the period of December 31, 2007 to December 31, 2016, and a toxic pollutants screen report submitted on October 25, 2007 for Outfall 001 and Outfall 002. A summary of data collected is given below in Tables 2-6:

Table 2 – DMR Data for Outfall 001

Sample Date	Specific Conductivity (µS/cm)	TDS (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Total Radium 226 (pCi/L)	Total Chromium (mg/L)	Acrylamide Monomer (mg/L)	Oil and Grease (mg/L)	pH max. (s.u.)	Flow (Outfall 001 and 002) (mgd)
12/31/2007	5,640	3,900	583	1,530	12.2				8.49	1.878
3/31/2008	5,800	3,900	605	1,630	24.4				7.5	1.651
6/30/2008	4,100	-	-	1,650	-				6.9	1.486
9/30/2008	5,630	3,660	550	1,650	15				6.7	1.44
12/31/2008	-	-	-	1,690	-				-	1.249
3/31/2009	5,800	3,960	547	1,670	16				7	1.335
6/30/2009	5,800	-	-	1,640	-			3	7	1.538
9/30/2009	5,700	3,940	-	-	21				7.1	1.415
12/31/2009	6,100	-	654	1,760	-				7.1	1.388
3/31/2010	5,750	4,130	671	1,690	20				7.1	1.44
6/30/2010	5,400	3,456	-	1,750	-			7.9	7.1	1.7
9/30/2010	5380	4,100	640	1,660	20	<0.05	<0.1	5	7.1	1.637
3/31/2011	5,380	3,940	604	1,590	16				7.4	0.973
3/31/2012	4,810	3,470	469	1,470	22	0	0	0	7.2	1.561
12/31/2012	4,860	3,670	484	1,480	26				6.8	1.535
3/31/2013	6,290	4,400	745	1,650	24.9				7	1.751
6/30/2013	6,390	4,400	535	1,590	24.9				7.1	2.097
9/30/2013	5,920	4,520	698	1,820	19.3				6.9	1.215
12/31/2013	5,920	4,520	698	1,720	19.3				7.5	0.671
3/31/2014	5,735	4,100	611	1,710	18.7				7.6	0.721
9/30/2014	5,754	3,890	641	1,810	24				7.2	1.24
12/31/2014	5,690	3,890	641	1,730	24				7.13	1.683
3/31/2015	6,030	4,320	147	2,010	19.1			0	6.8	1.572
6/30/2015	6,030	4,320	782	1,810	19.1				7.1	0.991
9/30/2015	5,260	3,810	673	1,850	18.9				6.61	1

Sample Date	Specific Conductivity (µS/cm)	TDS (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Total Radium 226 (pCi/L)	Total Chromium (mg/L)	Acrylamide Monomer (mg/L)	Oil and Grease (mg/L)	pH max. (s.u.)	Flow (Outfall 001 and 002) (mgd)
12/31/2015	5,553	3,810	673	1,670	18.9				7.07	0.624
3/31/2016	7,002	4,980	973	1,860	19				6.98	0.592
6/30/2016	7,002	4,980	973	1,930	19				7.19	0.625
9/30/2016	5,830	4,320	687	1,770	18				7.25	0.452
12/31/2016	5,830	4,320	687	1,710	18				7.16	0.088
Minimum	4,100	3,456	147	1,470	12.2	0	0	0	6.5	0.09
Average	5,736	4,104	639	1707	19.9	0	0	3.2	7.1	1.25
Maximum	7,002	4,980	973	2010	26	0	0	7.9	8.5	2.10
Limit	7,500	5,000	2,000	3,000	60	3	1	10	6.5-9.0	3.0

Table 3 – DMR Data for Outfall 002

Sample Date	Specific Conductivity (µS/cm)	Oil and Grease (mg/L)	pH max. (s.u.)
12/31/2007	597	0	7
3/31/2008	600	0	7.4
9/30/2008	723	0	7
3/31/2009	618	0	7
6/30/2009	618	0	7
9/30/2009	627	0	7
12/31/2009	627	0	7
3/31/2010	598	0	7
6/30/2010	700	0	7.1
9/30/2010	500	0	7
3/31/2011	496	0	8.1
3/31/2012	800	0	8.2
12/31/2012	390	0	7.8
3/31/2013	400	0	7.6

6/30/2013	400	0	7.8
9/30/2013	386	0	7.6
12/31/2013	386	0	7.6
3/31/2014	6,115	0	7
6/30/2014	6,115	0	7
9/30/2014	355	0	7.18
12/31/2014	355	0	7.18
6/30/2015	405	0	7.1
9/30/2015	428	0	7.72
12/31/2015	428	0	7.72
3/31/2016	567	0	7.14
6/30/2016	567	0	7.14
12/31/2016	2792	0	7.88
Minimum	355	0	7
Average	1022	0	7.34
Maximum	6115	0	8.2
Limit	7,500	10	6.5-9.0

Table 4 – Permit Application Data

Parameter	Units	Max	No. of Samples
Biological Oxidation Demand (BOD ₅)	mg/L	199	1
Chemical Oxidation Demand (COD)	mg/L	195	1
Total Organic Carbon (TOC)	mg/L	3.6	1
Total Suspended Solids (TSS)	mg/L	4.0	1
Ammonia (as N)	mg/L	1.4	1
Flow	mgd	1.992	365
Temperature (winter)	°C	47.8	1
Temperature (summer)	°C	Not Available	1
Sulfate	mg/L	1780	6
Bromide	mg/L	No Detect	1
Color	mg/L	40	1
Fluoride	mg/L	3.7	1
Nitrate-Nitrite (as N)	mg/L	Absent	-
Nitrogen, Total Organic (as N)	mg/L	Present	-
Phosphorus (as P), Total	mg/L	Absent	-
Radioactivity Alpha, Total	pCi/L	151	1
Radioactivity Beta, Total	pCi/L	115	1
Radium, Total	pCi/L	33.7	1
Radium 226	pCi/L	22	3
Sulfide (as H ₂ S)	mg/L	122	6
Sulfite	mg/L	270	6
Surfactants	mg/L	No Detect	1
Barium, Total	mg/L	No Detect	1
Boron, Total	mg/L	3.4	3
Cobalt, Total	mg/L	Absent	-
Iron, Total	mg/L	No Detect	2
Magnesium, Total	mg/L	68	2
Molybdenum, Total	mg/L	Absent	-
Tin, Total	mg/L	Absent	-
Silver, Total	mg/L	Absent	-
Titanium, Total	mg/L	No Detect	1
Arsenic, Total	mg/L	0.006	1
Cadmium, Total	mg/L	Absent	-
Chromium, Total	mg/L	No Detect	3
Copper, Total	mg/L	No Detect	1
Lead, Total	mg/L	Absent	-
Mercury, Total	µg/L	Absent	-
Selenium, Total	mg/L	13	3
Zinc, Total	µg/L	10	1
Benzene	µg/L	0.34	6
Ethyl benzene	µg/L	0.13	6
Toluene	µg/L	0.54	6
Naphthalene	µg/L	No Detect	1

Table 5 – Toxic Pollutants Screening Data for Outfall 001 (Sampling Date: 10/25/07)

Parameter	Units	Data	Reporting Limit	No. of Samples
Arsenic	µg/L	7	1	1
Aluminum	µg/L	<50	50	1
Cadmium	µg/L	<5	5	1
Copper	µg/L	<5	5	1
Iron	µg/L	<50	50	1
Lead	µg/L	<2	2	1
Manganese	µg/L	<50	50	1
Mercury	µg/L	<0.006	0.006	1
Nickel	µg/L	<5	5	1
Uranium	µg/L	<5	5	1
Zinc	µg/L	19	5	1
Nitrogen, Ammonia as N	mg/L	1.72	0.05	1
Gross alpha	pCi/L	97.9	1	1
Gross beta	pCi/L	120	2	1
Total Gross alpha and beta	pCi/L	217.9	-	-
Dissolved Oxygen	mg/L	0.45	0.10	1
COD	mg/L	42	3.0	1
Hardness	mg/L	1010	10	1

Table 6 – Toxic Pollutants Screening Data for Outfall 002 (Sampling Date: 10/25/07)

Parameter	Units	Data	Reporting Limit	No. of Samples
Arsenic	µg/L	<1	1	1
Aluminum	µg/L	<50	50	1
Cadmium	µg/L	<5	5	1
Copper	µg/L	<5	5	1
Iron	µg/L	70	50	1
Lead	µg/L	<2	2	1
Manganese	µg/L	<50	50	1
Mercury	µg/L	<0.006	0.006	1
Nickel	µg/L	<5	5	1
Uranium	µg/L	<5	5	1
Zinc	µg/L	<5	5	1
Nitrogen, Ammonia as N	mg/L	<0.05	0.05	1
Gross alpha	pCi/L	3.1	1	1
Gross beta	pCi/L	4.7	2	1
Total Gross alpha and beta	pCi/L	7.8	-	-
Dissolved Oxygen	mg/L	7.66	0.10	1
COD	mg/L	<3.0	3.0	1
Hardness	mg/L	164	10	1

Reasonable Potential (RP) Evaluation*Quantitative RP Analysis*

The NPDES regulations in 40 CFR § 122.44(d)(1)(i) – (iii) require Permit writers to assess effluent with respect to the EPA-approved water quality standards to evaluate the impact of direct dischargers on downstream water quality. This assessment is used to determine permit limitations that are protective of water quality uses. The EPA considered it appropriate to assess effluent discharged from this facility and evaluate RP with respect to tribally-approved water quality requirements. The RP for pollutants in the discharge to cause or contribute to an exceedance of applicable water quality requirements was evaluated for all parameters of concern measured and reported in the permit application, hazard screening, or DMR. The effluent data was compared to applicable acute and chronic aquatic life criteria values presented in Table 1 after consideration of pollutant variability in the discharge. A quantitative RP evaluation was performed using the Region 8 RP Tool, which assesses RP from effluent data with statistical procedures consistent with EPA’s Technical Support Document for Water Quality Based Toxics Control, March 1991. A confidence interval of 95% was used for all RP calculations. See results in Table 7 below.

Table 7 – Reasonable Potential Evaluation (metals, anions, etc.)

Parameter	Aquatic Life Water Quality Criteria		Maximum Reported Effluent Concentration	Reasonable Potential?	
	Acute	Chronic		Acute	Chronic
Fluoride, mg/L	2 ⁽²⁾	N/A	3.7	Maybe ⁽³⁾	N/A
Oil & Grease, mg/L	N/A	10	7.9	No	No
Sulfide (as H ₂ S), mg/L	-	0.002	122	-	Yes
Aluminum, µg/L	750	87	<50	No	No
Arsenic, µg/L	340	150	7	No	No
Cadmium, µg/L	7.7 ⁽¹⁾	0.6 ⁽¹⁾	<5	No	Maybe ⁽⁴⁾
Chromium (III), µg/L	1,773 ⁽¹⁾	231 ⁽¹⁾	0	No	No
Copper, µg/L	49.6 ⁽¹⁾	29.3 ⁽¹⁾	<5	No	No
Iron, µg/L	N/A	1,000	<50	-	No
Lead, µg/L	280.9 ⁽¹⁾	10.9 ⁽¹⁾	<2	No	No
Mercury, µg/L	1.40	0.77	<0.006	No	No
Nickel, µg/L	1,513 ⁽¹⁾	168 ⁽¹⁾	<5	No	No
Selenium, µg/L	N/A	5.0	13	N/A	Yes
Silver, µg/L	34.9 ⁽¹⁾	N/A	ND	No	No
Zinc, µg/L	379 ⁽¹⁾	382 ⁽¹⁾	19	No	No

(1) Calculated based on hardness value of 400 mg/L.

(2) The listed criterion is not an aquatic life water quality criterion, but rather a criterion to protect designated agriculture and wildlife uses.

(3) The permit application data provided by the Permittee included one sample result for fluoride. That sample result is higher than the acute fluoride criteria, but the

EPA is unable to determine whether the result is significant and thus represents actual effluent quality due to variability of this pollutant. Additional data is necessary.

- (4) Sampling conducted in the previous permit cycle relied on a method with a detection limit for cadmium of 5 µg/L, which is above the chronic cadmium criterion of 0.6 µg/L. As a result, a quantitative RP analysis could not be completed for this criterion. For this Permit, a lower cadmium detection limit of 0.1 µg/L is required.

The results of the quantitative evaluation identified sulfide (as H₂S) and selenium as having RP to cause or contribute to exceedances of the water quality criteria. As a result, the EPA is including a water quality based effluent limit for sulfide (as H₂S) and selenium.

Section 122.44(d)(1)(ii) of the EPA’s NPDES regulations require that the Agency account for the variability of a pollutant in the effluent when determining whether that particular pollutant has RP to cause or contribute to an exceedance of a water quality criterion. To confidently evaluate quantitatively the RP of a pollutant, however, a sufficient quantity of data of known quality to assess variability must be available. For fluoride and cadmium, insufficient quantitative data is available to adequately assess RP to exceed their numeric criteria. As a result, the EPA is not including a water quality based effluent limit for either pollutant but is instead requiring additional monitoring. This monitoring will allow the EPA to effectively characterize the nature of the pollutants in the discharge and confidently determine whether either pollutant has RP to cause or contribute to an exceedance of their respective water quality criteria.

Qualitative RP Analysis

In addition to quantitative RP analyses, the EPA also considers other qualitative information to help in its determination whether a pollutant has reasonable potential to cause or contribute to an exceedance of a water quality criterion. This qualitative RP analysis allows the EPA to assess the potential for uncertainty in effluent concentrations and consider other data or factors that may point toward actual concentrations of pollutants in the discharge. In cases where there are only one or two data points available, this qualitative analysis can inform the Agency’s decision to establish effluent limits or impose monitoring requirements. The qualitative RP analyses for sulfide, fluoride, cadmium, mercury, and organic compounds are described below.

Sulfide (as H₂S)

Sulfide (as H₂S) can be toxic to aquatic life. The sulfide as H₂S limitation of 200 mg/L for the 30-day average is based on the desired level of water quality for the receiving water as indicated by the clarifications in the letters provided by the Eastern Shoshone Tribe on January 26, 2016 and Northern Arapaho Tribe on January 25, 2016. The Tribes clarified their interpretation of the “zone of passage requirement” for chronic criteria, indicating that the limitation on water quality mixing zones for chronic criteria is not intended to apply to effluent dominated streams such as the discharge from Mission Creek to Wyoming Canal. As a result, the EPA has finalized a sulfide as H₂S effluent limitation that is based on a zone of non-attainment (mixing zone) that allows for the natural dissipation of hydrogen sulfide from the produced water. The extent of the zone is for a maximum length of approximately four miles from Lower Mission pond to Wyoming Canal. The Wyoming Canal location is the first non-effluent dominated stream downstream from the discharge and therefore the four miles mixing zone accords with the Tribes’ interpretation of their zone of passage requirements for chronic criteria.

Fluoride and Cadmium

As noted above, the data provided for these pollutants is insufficient to confidently determine the potential for this pollutant to impact the receiving streams in which the facility discharges. The EPA has no other information to allow it to assess the potential variability of these pollutants in the effluent. Thus, effluent limitations will not be established for fluoride and cadmium at this time. Instead, monitoring will be required using sufficiently sensitive analytical methods to collect adequate data to quantitatively assess RP during the next permit renewal.

Mercury

Although the mercury level did not exceed the aquatic life water quality criterion, the metal was detected in at least one sample and therefore, additional monitoring using clean methods are required to compile a more complete data set for future evaluation. Also, the reissued permit includes a trigger level established at the chronic water quality criteria of 0.77 µg/L and a requirement to develop and implement a mercury minimization plan if that trigger level is detected.

Organic Compounds

The permit application data submitted included one analysis of some volatile and semi-volatile organic compounds based on whether the Permittee believed that the analyte was present in the discharge. The data presented in Table 4 indicates the effluent contains measurable concentrations of benzene, ethyl benzene, and toluene.

The data was evaluated with respect to the EPA and Tribal water quality criteria for human health protection and the EPA Maximum Contaminant Levels (MCL) for drinking water to determine if there was RP for pollutants in the discharge to exceed the criteria in Table 8 below. There were no parameters identified at concentrations which exceeded the recommended criteria for human health protection and the MCL. Since the Tribes have not designated the receiving water as a drinking water source, the human health criteria and MCLs are not directly applicable to the water body and effluent limitations will not be established based on this evaluation.

Table 8 - Effluent Organic Compounds Detected and Water Quality Criteria Comparison

Parameter	Effluent Concentration (µg/L)	Water Quality Criteria (Human Health (µg/L) Water+Organism)	Water Quality Criteria (Human Health (µg/L) Organism only)	Drinking Water MCL (µg/L)
Benzene	0.34	2.1	58	5
Ethyl Benzene	0.13	68	130	700
Toluene	0.54	57	520	1,000

Although no effluent limitations were established for these volatile and semi-volatile organic compounds in the Permit, the effort required to reduce the concentration of other pollutants (e.g. sulfide (as H₂S)) in the discharge will concurrently reduce the concentration of volatile organic compounds in the discharge. Additional monitoring for volatile and semi-volatile organic

compounds will, however, be required as part of the toxic pollutants screening monitoring requirements in this renewal Permit.

Other Effluent Limitations

The daily maximum limitations for total radium 226 of 60 pCi/L, specific conductance of 7,500 µS/cm and total dissolved solids of 5000 mg/L have been retained in this renewal Permit and are based on previous permit limitations.

pH limitations of 6.5 - 9.0 are based on tribal requirements for aquatic life protection and carried over from the previous permit.

The Permittee requests removal of the acrylamide monomer and total chromium limits and monitoring requirements for the reissuance of this Permit in the permit application. They pointed out that the review of monitoring data shows there were no detectable amounts of acrylamide monomer or total chromium. The EPA reviewed the DMR data in Table 2 for acrylamide and monomer and total chromium and concurred with the Permittee’s evaluation. The EPA is not including the acrylamide monomer and total chromium limits and monitoring requirements for this Permit. This meets one of the antibacksliding requirement as outlined in the CWA section 402(o)(2), specific exceptions of “New information (other than revised regulations, guidance, or test methods) is available that was not available at the time of permit issuance and that would have justified a less stringent effluent limitation. If the effluent limitation was based on water quality standards, any changes must result in a decrease in pollutants discharged.”

Effluent Limitations

Based on the technology and water quality considerations and protecting beneficial uses, the following effluent limitations will be required for this facility:

Effluent Limitations - Outfalls 001 and 002.

Effluent Characteristic	Effluent Limitation		Basis for Limitation <u>b/</u>
	30-Day Average <u>a/</u>	Daily Maximum <u>a/</u>	
Flow, Total (Combined flow from Outfall 001 and Outfall 002), mgd	2.5	3.0	ELPP

The total flow limit is based on the Wind River Environmental Quality Commission (WREQC) requests that a monthly average flow limit of 2.5 MGD and a maximum daily discharge limit of 3.0 MGD be included in the permit for discharge to Mission Pond from the previous permit in 2003 because:

1. The wetland complex below the NPDES point can not filter, clean, and evaporate more than this quantity of water and degradation of the Wind River is possible (based on the conclusions of a WREQC study and report as outlined below),
2. Erosion and possible failure of the ponds and wetlands that were built are probable,
3. Insufficient capacity in the siphon which carries Mission Pond water under the Wyoming Canal,

4. Winter ice dams and the resulting flooding across Maverick Springs Road will be exacerbated, and
5. There is no further need for additional water for livestock or wildlife use downstream of Mission Pond.

Effluent Limitations - Outfall 001.

Effluent Characteristic	Effluent Limitation		Basis for Limitation <u>b/</u>
	30-Day Average <u>a/</u>	Daily Maximum <u>a/</u>	
Specific Conductance, $\mu\text{S}/\text{cm}$	N/A	7,500	ELPP
Total Dissolved Solids, mg/L	N/A	5,000	ELPP
Chloride, mg/L	N/A	2,000	WQR
Sulfate, mg/L	N/A	2,500	RCLW
Sulfide (as H_2S), mg/L	200	N/A	WQR
Total Radium 226, pCi/L	N/A	60	ELPP
The concentration of oil and grease shall not exceed 10 mg/L in any sample nor shall there be a visible sheen or cause a visible sheen in the receiving waters or deposits on the bottom or shoreline of the receiving waters.			ELPP , WQR
The pH of the discharge shall not be less than 6.5 or greater than 9.0 at any time.			WQR
There shall be no discharge of floating solids or visible foam in other than trace amounts			ELPP, WQR

a/ See Permit Part 1.1. for definition of terms.

b/ ELPP = Effluent limitations in previous permit; WQR = water quality requirements adopted by the Tribes for the Wind River Indian Reservation; RCLW = Recommended criteria for livestock and wildlife, based on the report “Water Quality for Wyoming Livestock & Wildlife, A Review of the Literature Pertaining to Health Effects of Inorganic Contaminants”, University of Wyoming department of Veterinary Sciences, et al.

Effluent Limitations - Outfall 002.

Effluent Characteristic	Effluent Limitation		Basis for Limitation <u>b/</u>
	30-Day Average <u>a/</u>	Daily Maximum <u>a/</u>	
Specific Conductance, $\mu\text{S}/\text{cm}$	N/A	7,500	ELPP
The concentration of oil and grease shall not exceed 10 mg/L in any sample nor shall there be a visible sheen or cause a visible sheen in the receiving waters or deposits on the bottom or shoreline of the receiving waters.			ELPP , WQR
The pH of the discharge shall not be less than 6.5 or greater than 9.0 at any time.			WQR

There shall be no discharge of floating solids or visible foam in other than trace amounts	ELPP, WQR
--	--------------

a/ See Permit Part 1.1. for definition of terms.

b/ ELPP = Effluent limitations in previous permit; WQR = water quality requirements adopted by the Tribes for the Wind River Indian Reservation; RCLW = Recommended criteria for livestock and wildlife, based on the report “Water Quality for Wyoming Livestock & Wildlife, A Review of the Literature Pertaining to Health Effects of Inorganic Contaminants”, University of Wyoming department of Veterinary Sciences, et al.

The ELPP limits for Outfall 001 and 002 are based on the EPA’s professional judgment to implement the requirements of the Oil and Gas Extraction Point Source Category Subpart C - Onshore Subcategory and Subpart E - Agricultural and Wildlife Water Use Subcategory 40 CFR 435 and consideration of: 1) current uses of the receiving waters; 2) the current desires of the Tribes to have similar requirements on the Wind River Reservation and in the State of Wyoming; and 3) State of Wyoming Chapter 2, Appendix H - Surface Discharge of Water Associated with the Production of Oil and Gas requirements.

Self-Monitoring Requirements

Sampling and test procedures for pollutants listed in this part shall be in accordance with guidelines promulgated by the Administrator in 40 CFR Part 136, as required in 40 CFR § 122.41(j). At a minimum, the following constituents shall be monitored at the frequency and with the type of measurement indicated; samples or measurements shall be representative of the volume and nature of the monitored discharge. If no discharge occurs during the entire monitoring period, it shall be stated on the Discharge Monitoring Report Form that no discharge or overflow occurred.

Self-monitoring requirements – Outfall 001 and Outfall 002

Parameter	Sampling Frequency		Sample/Monitoring Type <u>a/</u>
	Outfall 001	Outfall 002	
Total Flow, MGD <u>b/</u>	Monthly	Monthly	Instantaneous
Specific Conductance, μ S/cm	Monthly	Monthly	Grab
pH, std units	Monthly	Monthly	Grab
Oil and Grease, mg/L <u>c/</u>	Weekly	Weekly	Visual
Sulfide (as H ₂ S), mg/L <u>d/</u>	Quarterly	N/A	Grab
Chloride, mg/L	Quarterly	N/A	Grab
Sulfate, mg/L	Quarterly	N/A	Grab
Total Radium 226, pCi/L	Quarterly	N/A	Grab
Total Dissolved Solids, mg/L	Semi-Annually	N/A	Grab
Fluoride, mg/L	Semi-Annually	N/A	Grab
Cadmium, μ g/L	Semi-Annually	N/A	Grab
Mercury, Total, μ g/L <u>e/</u>	Three times after effective date of permit	N/A	Grab

Whole Effluent Toxicity, Acute (see Part 1.3.5.)	At least four times after the effective date of permit <u>f/</u>	N/A	Grab
Toxic Pollutants Screen (see Part 1.3.3.)	Up to three times after effective date of permit	N/A	Grab

- a/ See Permit Part 1.1, for definition of terms.
- b/ Flow measurements of effluent volume shall be made in such a manner that the Permittee can affirmatively demonstrate that representative values are being obtained. The average flow rate (in million gallons per day) during the reporting period and the maximum flow rate observed (in mgd) shall be reported.
- c/ A weekly visual observation is required. If a visible sheen is detected, a grab sample shall be taken immediately and analyzed in accordance with the requirements of 40 CFR Part 136. The concentration of oil and grease shall not exceed 10 mg/L in any sample.
- d/ The analysis for sulfide (as H₂S) shall be done with an approved procedure that has a method detection level of no greater than 0.10 mg/L (100 µg/L). In the calculation of average sulfide (as H₂S) concentrations, those analytical results that are less than 0.10 mg/L shall be considered to be zero. If all individual analytical results that would be used in the calculations are less than 0.10 mg/L, then “less than 0.10 mg/L” shall be reported on the discharge monitoring report form. Otherwise, report the maximum value and the calculated average value.
- e/ Monitoring periods shall be during the 1st, 3rd and 5th years after the effective date of this Permit. Based on current approved analytical mercury method, Method 1631, Revision E, the method detection limit (MDL) for mercury is 0.0002 µg/L. If the mercury trigger level of 0.77 µg/L is exceeded during the life of the Permit, the Permittee is required to develop and implement the Mercury Minimization Plan (MMP), as described in Part 1.3.7.
- f/ Tests shall be coordinated with the Toxic Pollutants Screen to ensure more even coverage as described in Part 1.3.5. of the Permit. To the extent practicable, tests shall be timed to provide results that represent seasonal variation in the discharge.

Additional Toxics Monitoring Requirements

Toxic Pollutants Screen.

This Permit requires the Permittee to monitor for the constituents listed below in the toxic pollutants screen up to three times during the life of the Permit. One monitoring event will be during the first year after the effective date of this Permit, and the second monitoring event during the third year after the effective date of this Permit. A third monitoring event will be required only if the Permittee undertakes a hydraulic fracturing job for a well that sends produced water to this facility. In that instance, the Permittee must complete a third toxic pollutants screen within one week of returning the hydraulically fractured well to production. Each of the toxic pollutants screen datasets shall be submitted to the permit issuing authority at the time of the DMR submittal for that reporting period in which the screening results were obtained. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this Permit.

Pollutants to Be Screened:

- All Volatile Organic Compounds listed in 40 CFR Part 122, Appendix D, Table II.
- All Base/Neutral and Acid Organic Compounds listed in 40 CFR Part 122, Appendix D, Table II

- All metals listed in 40 CFR Part 122, Appendix D, Table III, except mercury which is included in the regular self-monitoring (Part 1.3.2.).
- Fluoride as listed in 40 CFR Part 122, Appendix D, Table IV

The Toxic Pollutants Screen provision provides greater coordination between the toxicity monitoring requirements that are being established. The Permittee is required to coordinate its whole effluent toxicity (WET) monitoring and the Toxic Pollutants Screen to ensure even coverage over the permit term. In doing so, the two monitoring provisions will ensure that the EPA has regular monitoring data about potential toxicants and toxic effects present in the discharge across time. Two Toxic Pollutants Screens required during the first and third year of the permit term will identify a wide variety of potentially toxic parameters that may be present in the normal discharge. In addition, if the Permittee undertakes a hydraulic fracturing event at a well which sends produced water to the treatment facility, the Permittee must complete a third toxic pollutant screen within one week of returning the hydraulically fractured well to production. This third Toxic Pollutants Screen will ensure that the EPA and the Permittee have data on potential toxicants or toxic effects that may be attributable to hydraulic fracturing.

Whole Effluent Toxicity (WET) (Permit Part 1.3.5.)

The following WET requirements are based on the Tribe's expressed interpretation of their water quality requirements for effluent dominated streams on this reservation. The Permittee will coordinate WET testing and its Toxic Pollutant Screens to assess the toxicity of the produced water that discharges to these streams. At least four times after the effective date of the Permit, the Permittee shall conduct acute static-renewal toxicity tests on a grab sample of the produced water discharge from Outfall 001. These tests shall be coordinated with the Toxic Pollutants Screen required in Section 1.3.3. of this Permit to ensure that the acute static-renewal toxicity tests are staggered with the Toxic Pollutants Screens to ensure a more even coverage during the permit term. To the extent practicable, the static-renewal toxicity tests should also be timed to provide results that represent seasonal variation in the discharge. Samples must be chilled to 0°C to 6°C.

The static-renewal toxicity tests shall be conducted in accordance with the procedures set out in the latest revision of "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms", EPA-821/R-02-012 (October 2002). Acute WET test shall be performed on two species; *Daphnia magna*, EPA 2021.0, as a 48-hr, static-renewal definitive test with renewals at each 24-hr interval, and *Pimephales promelas*, EPA 2002.0, as a 96-hour static-renewal definitive test with renewals at each 24-hr interval. Both tests shall utilize the standard dilution series of 100%, 75%, 50%, 25%, 12.5% and a 0 control, with moderately hard synthetic laboratory water for dilutions with test temperature set at 25°C.

For the purpose of this Permit, *Daphnia magna* will be utilized as a toxicity indicator testing organism in lieu of *Ceriodaphnia dubia* due to its higher tolerance for the high TDS levels within the produced water from the wells. The high TDS levels will cause WET toxicity, and the purpose of the WET testing in this permit is to monitor for other sources of toxicity. This approach will ensure that any WET tests performed will control toxicity from other pollutants which may be present in the discharge that would be masked by the level of TDS in the discharge. There is no WET limit in this current permit, and RP for WET will be evaluated in the next permit cycle.

The Permittee or a laboratory performing the toxicity tests on behalf of the Permittee is allowed to utilize the sample preparation procedure described in Section 9.1.7 of the Acute Method to remove sulfide (as H₂S) from the discharge sample. This procedure may only be performed in the laboratory testing facility. The dissolved oxygen (DO) concentration in the samples should be near saturation prior to laboratory analysis. Aeration may be used to bring the DO and other gases into equilibrium with air, minimize oxygen demand, and stabilize the pH.

In accordance with the Technical Support Document for Water Quality-based Toxics Control EPA/505/2-90-001 March 1991, the permit conditions provide for toxics control using chemical specific criteria and Whole Effluent Toxicity testing. Limitations for sulfide (as H₂S) are established utilizing a zone of non-attainment (mixing zone) which protect against toxic effects at the edge of the mixing zone. The WET requirements for acute toxicity are applied at the end of the pipe without a mixing zone and as a result the WET tests are likely to fail due to the levels of sulfide (as H₂S) present. Since the permit contains a water quality based effluent limit for sulfide (as H₂S), the added provision allows the WET tests to be performed with potential toxicity due to sulfide (as H₂S) removed using the procedure in Section 9.1.7 of the Acute Test Method. This approach will ensure that any WET tests performed will control toxicity from other pollutants which may be present in the discharge that would be masked by the level of sulfide (as H₂S) in the discharge.

Acute toxicity occurs when 50 percent or more mortality is observed for either species at any effluent concentration. If more than 10 percent control mortality occurs, the test is not valid. The test shall be repeated until satisfactory control survival is achieved.

Regular acute toxicity test results shall be reported on the Discharge Monitoring Report (DMR) submitted for the reporting period when the acute toxicity monitoring was conducted. A laboratory reporting form consistent with the “Suggested R8 WET Toxicity Test Report Form”, including all chemical and physical data as specified shall also be submitted to the permit issuing authority as an attachment to the DMR. Copies of the format may be downloaded from the Region 8 web page at <https://www.epa.gov/sites/production/files/2016-01/wet-laboratory-reporting-forms.xlsm>.

If acute toxicity occurs in a test, the Permittee shall do the following:

- (1) Notify the Permit issuing authority within 48 hours of when the Permittee learned of the initial test failure;
- (2) Promptly take all reasonable measures necessary to immediately reduce toxicity; and
- (3) Initiate an additional test within two (2) weeks of the date of when the Permittee learned of the test failure. If only one species fails, retesting may be limited to this species.

The Permit issuing authority may waive either or both requirements (2) or (3) with justification (e.g., the toxicity has been ongoing and the Permittee is in the process of conducting a toxicity identification evaluation/toxicity reduction evaluation as required in Part 1.3.6. of this Permit).

Should acute toxicity occur in the second test, the Permittee shall immediately begin testing once a month until further notified by the Permit issuing authority. Accelerated monthly testing is only required for the species that failed the initial and second tests.

In addition to the accelerated monitoring, the Permittee shall perform a toxicity identification evaluation/toxicity reduction evaluation as required by Part 1.3.6 of this Permit to establish the cause of the toxicity, locate the source(s) of the toxicity, and develop control of, or treatment for the toxicity.

Test results from additional toxicity testing conducted (i.e. two week retest, monthly testing and TIE/TRE testing) shall be reported by the 28th of the month through NetDMR and following the test to the following address:

Wastewater Unit (8WD-CWW)
 Attn: Regional WET Coordinator
 U.S. EPA, Region 8
 1595 Wynkoop Street
 Denver, CO 80202-1129

Method Detection Limits (Permit Part 1.3.4.)

Monitoring methods must be sufficiently sensitive to meet the Method Detection Limits specified in Table 10 below:

Table 10- Required Method Detection Limits

Parameter	Required Detection Limits and Required Units
Arsenic, Total	1 µg/L
Aluminum, Total Recoverable	50 µg/L
Antimony, Total Recoverable	50 µg/L
Beryllium, Total Recoverable	1 µg/L
Cadmium, Total Recoverable	0.1 µg/L
Chromium, Total Recoverable	5 µg/L
Chloride	5 mg/L
Copper, Total Recoverable	5 µg/L
Lead, Total Recoverable	1 µg/L
Magnesium, Total Recoverable	30 µg/L
Manganese, Total Recoverable	2 µg/L
Nickel, Total Recoverable	1 µg/L
Radium 226, Total Recoverable	0.2 pCi/L
Selenium, Total Recoverable	2 µg/L
Silver, Total Recoverable	5 µg/L
Sulfide/Hydrogen Sulfide (S=, HS-)	100 µg/L

Thallium, Total Recoverable	50 µg/L
Zinc, Total Recoverable	2 µg/L
Hardness, Total	10 mg/L as CaCO ₃
Uranium, Total Recoverable	5 µg/L
Gross Alpha and Beta Radiation	0.2 pCi/L
Dissolved Oxygen	1 mg/L
Calcium	10 mg/L
Fluoride	1 mg/L
Volatile Organic Compounds	5 µg/L
Acid & Base/Neutral Organic Compounds	10 µg/L
Chemical Oxygen Demand	3 mg/L

Mercury Minimization Plan (MMP) (Permit Part 1.3.7.)

CWA Section 301(a) prohibits the discharge of any pollutant, including mercury, from a point source into waters of the United States except in compliance with Section 402 of the CWA. CWA Section 402 establishes the NPDES program, under which the EPA is authorized to issue permits that allow the discharge of pollutants into waters of the United States. These permits must contain (1) technology-based effluent limitations, which represent the degree of control that can be achieved by point sources using various levels of pollution control technology and (2) water quality-based effluent limitations (WQBELs), when necessary to ensure that the receiving waters achieve applicable water quality requirements.

Most WQBELs are expressed as numeric limits on the amounts of specified pollutants that may be discharged. However, WQBELs may also be expressed in narrative form such as Best Management Practices (BMPs) or pollutant minimization measures when it is infeasible to calculate a numeric limit (40 CFR § 122.44(k)(3)). In addition, BMPs may be imposed in the form of NPDES permit conditions to supplement numeric effluent limitations when the permit issuing authority determines that such requirements are necessary to carry out the purposes and intent of the CWA (40 CFR § 122.44(k)(4)).

On January 8, 2001, the EPA announced the availability of its recommended CWA Section 304(a) water quality criterion for methylmercury. This water quality criterion, 0.3 milligram (mg) methylmercury per kilogram (kg) fish tissue wet weight, describes the concentration of methylmercury in freshwater and estuarine fish and shellfish tissue that should not be exceeded. The EPA recommended that the criterion be used as guidance by states, territories, and authorized tribes in establishing or updating water quality standards for waters of the United States. The EPA completed the Guidance for implementing the January 2001 Methylmercury Water Quality Criterion in April 2010.³

³ United States Environmental Protection Agency, Office of Science and Technology (April 2010): Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion – Final, <http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/pollutants/methylmercury/upload/mercury2010.pdf>

According to the Methylmercury Guidance, where a water column translation is not available and the Permit writer determines that a numeric limit is infeasible to calculate, the Permit writer should include the following permit conditions:

1. The reissued permit will include a trigger level established at the chronic water quality criteria of 0.77 µg/L and a requirement to develop and implement a Mercury Minimization Plan (MMP) if that trigger level is detected;
2. Require the Permittee to implement a MMP tailored to the facility’s potential to discharge mercury. This MMP may be used as a trigger level, reduction goal or used to supplement an enforceable numeric limit to further manage mercury discharges;
3. Require effluent monitoring using a sufficiently sensitive EPA-approved method to determine if the MMP is effective. (EPA Clean Sampling Method 1669 and Analytical Method 1631); and
4. Include a reopener clause to modify the permit conditions if the MMP is not found to be effective or if a water column of the fish tissue criterion is developed.

The Permittee is required in the reissued permit to develop an MMP tailored to the facility’s potential to discharge mercury if the trigger level is detected. The MMP shall be available upon request by the permit issuing authority. At a minimum, the MMP shall include the following:

- Evaluation of existing best management plans or spill prevention and containment control plans;
- Identification and evaluation of current and potential mercury sources;
- Monitoring to confirm current or potential mercury sources;
- Identification of potential methods for reducing or eliminating mercury, including material substitution, material recovery, spill control and collection, waste recycling, process modifications, good housekeeping and disposal practices;
- Implementation of appropriate minimization measures identified in the MMP; and
- Effluent monitoring using sufficiently sensitive analytical methods to verify the effectiveness of the MMP.

Chemical Inventory Reporting Requirement (Permit Part 1.3.8)

The Permittee shall maintain an inventory of the quantities and concentrations of the specific chemicals used to formulate well treatment and workover fluids. Unless these fluids are segregated, the Permittee shall submit the following information with the DMR, to the extent such information is obtainable after making reasonable inquiries to suppliers: all chemical additives in the well treatment or workover fluid, their trade names, purposes, supplier, CAS number, concentrations and amounts. The type of operation that generated the well treatment or well workover fluids shall also be reported. To the extent a Safety Data Sheet (SDS) contains the information required above, it may be submitted for purposes of complying with this provision. For purposes of this provision, well treatment and workover fluids will be considered segregated if the Permittee takes steps to recover a volume of fluid equivalent to the volume of the well treatment or workover fluid used in the job.

“Well treatment fluids” means any fluid used to restore or improve productivity by chemically or physically altering hydrocarbon-bearing strata after a well has been drilled.

“Well workover fluids” means salt solutions, weighted brines, polymers, or other specialty additives used in a producing well to allow for maintenance, repair or abandonment procedures.”

The Chemical Inventory Reporting Requirement provides actual practices for well treatment and workover that occur at the facility. The facility can segregate fluids used in well treatment and workover. This Permit requires reporting of the chemical quantities, etc. used in well treatment and workover only when those fluids are not segregated and are actually discharged with the produced water.

Reporting of Monitoring Results: With the effective date of this Permit, the Permittee must electronically report all monitoring data into the discharge monitoring reports (DMR) on a semi-annually frequency using NetDMR. Electronic submissions by the Permittee must be sent to the EPA Region 8 using NetDMR no later than the 28th of the month following the completed reporting period. The Permittee must sign and certify all electronic submissions in accordance with the signatory requirements of the Permit. NetDMR is accessed from the internet at <https://netdmr.zendesk.com/home>.

In addition, the Permittee must submit a copy of the DMR to the Northern Arapaho and Eastern Shoshone Tribes. Currently, the Permittee may submit a copy to the Tribes by one of three ways: 1. a paper copy may be mailed. 2. the email addresses for Northern Arapaho and Eastern Shoshone Tribes may be added to the electronic submittal through NetDMR, or 3. the Permittee may provide the Tribes viewing rights through NetDMR.

The DMRs are due semi-annually and are due by the dates listed below and shall not be submitted until the reporting period is complete.

Reporting Frequency

Compliance Monitoring Period	Due Date
January through June	July 28
July through December	January 28

Notification of Planned Changes (Permit Part 4.1): The Permittee is required to give notice to the EPA as soon as possible of any planned physical alterations or additions to the permitted facility. Such notice is required when the alteration or addition could change the nature or increase the quantity of pollutant discharged. This would include any plans to increase production capacity that could result in increased flow rates and pollutant loadings from this facility. This notification requirement applies to all pollutants, whether or not they are subject to effluent limitations in the Permit. Depending on the scope and nature of the increases in flow and pollutant loading, the EPA may determine whether or not one or more of the causes listed in 40 CFR Part 122.62(a) for modification exist and, if so, may modify the permit accordingly (e.g., to include a flow limit, to assess reasonable potential to impact downstream State waters, etc.) subject to the limitations of 40 CFR Part 124.5(c).

Endangered Species Act (ESA) Requirements

Section 7(a) of the Endangered Species Act requires federal agencies to ensure that any actions authorized, funded, or carried out by an Agency are not likely to jeopardize the continued

existence of any federally-listed endangered or threatened species or adversely modify or destroy critical habitat of such species.

The U. S. Fish and Wildlife (USFWS) Information for Planning and Conservation (IPaC) website program was utilized to determine Federally-Listed Endangered, Threatened, Proposed and Candidate Species. The federally listed threatened and endangered species found in Fremont County, Wyoming include:

Species/Critical Habitat	Scientific Name	Status	Informal Consultation Determination (6/5/2018)
Canada Lynx	<i>Lynx canadensis</i>	Threatened	No effect
Grizzly Bear	<i>Ursus arctos horribillis</i>	Threatened	No effect (removed from the list of threatened and endangered species on June 22, 2017)
North American Wolverine	<i>Gulo luscus</i>	Proposed Threatened	No effect
Least Tern	<i>Sterna antillarum</i>	Endangered	May affect, but is not likely to adversely affect (Platt River Species)
Piping Plover	<i>Charadrius melodus</i>	Threatened	May affect, but is not likely to adversely affect (Platt River Species)
Whooping Crane	<i>Grus americana</i>	Endangered	May affect, but is not likely to adversely affect (Platt River Species)
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Threatened	May affect, but is not likely to adversely affect (Right riparian area)
Bonytail Chub	<i>Gila elegans</i>	Endangered	May affect, but is not likely to adversely affect (Platt River Species)
Colorado Pikeminnow (squawfish)	<i>Ptychocheilus lucius</i>	Endangered	May affect, but is not likely to adversely affect (Platt River Species)
Humpback Chub	<i>Gila cypha</i>	Endangered	May affect, but is not likely to adversely affect (Platt River Species)
Pallid Sturgeon	<i>Scaphirhynchus albus</i>	Endangered	May affect, but is not likely to adversely affect (Platt River Species)
Razorback Sucker	<i>Xyrauchen texanus</i>	Endangered	May affect, but is not likely to adversely affect (Platt River Species)
Desert Yellowhead	<i>Yermo xanthocephalus</i>	Threatened	No effect (Sand Dune Species)
Fremont County Rockcress	<i>Boechera pusilla</i>	Candidate	No effect
Ute Ladies'-tresses	<i>Spiranthes diluvialis</i>	Threatened	May affect, but is not likely to adversely affect

Western Prairie Fringed Orchid	<i>Platanthera praeclara</i>	Threatened	May affect, but is not likely to adversely affect
Whitebark Pine	<i>Pinus albicaulis</i>	Candidate	No effect

The EPA is utilizing the information provided by the USFWS IPaC system and had an informal phone consultation with the representative at the Cheyenne, Wyoming USFWS field office on June 5, 2018 to identify a determination for each specie in the table above. The EPA also sent a letter to USFWS to seek concurrence with EPA’s determination before public notice of the Permit.

Based on the informal consultation determination with the Wyoming USFWS field office representative, the EPA determined this Permit will have “no effect” or “may affect, but is not likely to adversely affect” to some species as described in the table above.

The EPA received a concurrence letter dated July 13, 2018, from the USFWS Wyoming field office on this determination.

National Historic Preservation Act (NHPA) Requirements

Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470(f) requires that federal agencies consider the effects of federal undertakings on historic properties. The EPA has evaluated its planned reissuance of the NPDES Permit for Steamboat Butte Fields to assess this action’s potential effects on any listed or eligible historic properties or cultural resources. The EPA does not anticipate any impacts on listed/eligible historic properties or cultural resources because this Permit is a renewal and will not be associated with any new ground disturbance or significant changes to the volume or point of discharge. The EPA notified the Tribal Historic Preservation Officer (THPO) of the planned issuance of this NPDES Permit and request their input on potential effects on historic properties and EPA’s preliminary determination in this regard during the public comment period.

Miscellaneous

The Permit will be issued for approximately five years, but not to exceed five years. The effective date and expiration date of the Permit will be determined at the time of permit issuance.

Permit and Statement of Basis drafted by:
 Qian Zhang P.E., EPA Region 8, 8WP-CWW, 303-312-6267
 December 11, 2017

Permit and Statement of Basis reviewed by:
 Wastewater staff (8WP-CWW) and ORC Attorney (8RC)
 July 3, 2018

Addendum to Statement of Basis

The EPA, Region 8 is certifying this Permit for the Eastern Shoshone and Northern Arapaho tribes that do not have §401 (a)(1) certification authority. The discharges authorized by this Permit will comply with the applicable provisions of the Clean Water Act Sections 301, 302, 303, 306, and 307 [33 U.S.C. Sections 1311, 1312, 1313, 1316, and 1317] so long as the Permittee complies with all permit conditions.

Response to Comments on Permits: Maverick Springs Battery (WY-0000779), Chatterton Battery (WY-0000922), Circle Ridge Field (WY-0000949), and Steamboat Butte Fields (WY-0033740).

The EPA public noticed the above four Merit Energy permits on March 20, 2019 and the public notice period closed on April 19, 2019. The EPA received comments from Northern Arapaho Tribe, the Northern Arapaho Natural Resource Office (NANRO), Merit Energy Company (Merit), and Gene R. George & Associates, Inc. during the public notice period.

1. NANRO commented that “the draft permits contain substantial revisions to the previous permits, including increased monitoring requirements and new effluent limitations. In general, these new provisions make them consistent with last round of Wind River NPDES oil and gas permits which were issued by Region 8 in 2016 to Wesco Operating and Phoenix. The 2016 Permits went through a lengthy Administrative Appeal and ADR process, with the participation of the Northern Arapaho Tribe. NANRO agrees with the need to update Merit’s permit to make them consistent with the 2016 permits.”

Response: The EPA acknowledges this comment. No change has been made in response to this comment.

2. NANRO commented that “NANRO does not agree with EPA’s determination in the statement of basis for draft permit Steamboat Butte Fields (WY-0033740) that Upper Mission Pond is not a “Water of the U.S.”. Upper Mission Pond was formerly an enclosed ephemeral playa basin with internal drainage and was not connected to “Water of the U.S.”. Upper Mission Pond was subsequently connected to Lower Mission Pond with a manmade channel. Region 8 has correctly determined that Lower Mission Pond is a “Water of the U.S.”. Region incorrectly asserts that the sole source of water in Upper Mission Pond is the Steamboat Butte facility and therefore a manmade facility. However, Upper Mission Pond is actually a natural feature that does not have any run-on control berms, and during precipitation events it collects ephemeral surface flow from the surrounding lands, which now flow into Lower Mission Pond. Therefore, it is a “Water of the U.S.” and not a manmade facility.”

Response: The EPA had received a request from the Permittee to move the compliance point for Outfall 001 from the outlet of the final treatment pit to the outlet of Upper Mission Pond. Pursuant to that request, the EPA conducted a review of available information and concluded that Upper Mission Pond was not a water of the U.S. Subsequently (see the Background Information section for more details in the SOB), Merit has withdrawn its request to move the compliance point, and as a result the SOB and Permit both reflect that the discharge point for Outfall 001 will continue to be located at the outlet of the final treatment pit.

3. NANRO commented that “NANRO believes the EPA should maintain the current point of compliance at the outlet of the discharge pits and does not agree with the proposed relocation of the compliance point downstream to the outlet of Upper Mission Pond, as requested by Marathon in its permit renewal application.”

Response: In Merit’s comment letter, the company withdrew its request to move the proposed new Outfall 001 to the outlet of Upper Mission Pond (latitude 43.256111°N, longitude 108.905833°W) for this permit term. Instead, the company has reduced the volume of produced water directed to the treatment pits and Outfall 001, resulting in greater hydraulic retention time and passive sulfide reduction before the compliance point. The EPA accepts this request and has maintained Outfall 001 at the outlet of the final treatment pit (latitude 43.260278°N, longitude 108.90444°W) for this Permit.

4. NANRO commented that “NANRO acknowledges that Upper Mission Pond does serve a valuable purpose in the enhancement of water quality downstream of the present compliance point. However, if Merit proposes to use Upper Mission Pond as part of its treatment system to achieve permit compliance, The Northern Arapaho Tribe requests that it be managed as such and will need to meet all current State of Wyoming and industry standards for the design, operation, and closure of produced water pits. This could include any or all of the following:
 - a. Appropriate fencing and warning signs to restrict access to wildlife, livestock, and unauthorized persons;
 - b. Run-on and runoff control berms;
 - c. Migratory bird and waterfowl landing deterrents (i.e. flagging, lights, sirens, etc.);
 - d. Engineered lining to collect solids and prevent subsurface contamination;
 - e. Leak detection system;
 - f. Adequate measures (siphons, absorbent booms) to prevent surface water contamination in the event of the accidental release of hydrocarbons into the system;
 - g. Plans for surface reclamation of the treatment unit as well as the assessment and cleanup of any subsurface contamination.

As an example, the 10-acre produced water disposal pits at Riverton Dome on the Wind River Reservation (photos attached) include all of these design and operation features.”

Response: Section 3.5.1.5. of the Permit requires the operator to “properly install fence around the Upper Mission pond to discourage entry and control access.” Section 3.5.1.1. of the Permit for the O & M Manual shall include the requirements for item f. for this comment. Imposing other operation and maintenance (O&M) requirements are out of scope of the permit requirements. The EPA recommends NANRO work with Merit Energy Company to implement additional O&M requirements for the Upper Mission Pond.

No change has been made in response to this comment.

5. Merit provided several comments under the general heading “Excessive or Unjustified Monitoring/Analysis/Reporting Frequency and Scope.” Merit described the new monitoring required in the Permit as follows: “Effluent sampling is currently a quarterly requirement for our Steamboat Butte facility and a semi-annual requirement for all other facilities (Circle Ridge, Chatterton, and Maverick Springs). However, with the permit modification, USEPA is requiring quarterly sampling and analysis, monthly field measurements, and weekly sheen observations. USEPA is also requiring a new and extensive whole effluent toxicity (WET) testing program, an unjustified mercury screening series, and the implementation of a

burdensome and complex toxic pollutant screen (TPS) protocol.”

Response: The EPA acknowledges this comment and addresses each related comment separately below.

6. Merit commented: “Unless USEPA has a compelling, facility-specific, compliance-based rationale to require increased monitoring frequency for any constituent or characteristic 6 to 26 times that required by the current permit, Merit Energy believes that increasing the field monitoring (field parameter measurements [pH, SC] and sheen observations) requirement to quarterly will more than adequately protect the environment and ensure suitable water quality for beneficial use.”

Response: This comment addresses monitoring requirements for three parameters – pH, specific conductance and oil sheen observations – which are met through observations and measurement in the field. The following monitoring frequencies were required in the previous iteration of these permits:

Monitoring Frequencies in 2007 Permits			
Facility	pH	Specific Conductance	Oil and grease
Chatterton Battery	Once per six months	Once per six months	Once per six months
Circle Ridge	Once per six months	Once per six months	Once per six months
Maverick Springs	Once per six months	Once per six months	Once per six months
Steamboat Butte	Once per six months	Once per six months	Once per three months

The revised draft permits contain the following monitoring frequencies:

Monitoring Frequencies in Draft Permits			
Facility	pH	Specific Conductance	Oil and grease
Chatterton Battery	Monthly	Monthly	Weekly
Circle Ridge	Monthly	Monthly	Weekly
Maverick Springs	Monthly	Monthly	Weekly
Steamboat Butte	Monthly	Monthly	Weekly

Merit comments that quarterly monitoring for these parameters is adequate. The EPA has determined that a single monitoring event every three months for these parameters is insufficient to adequately assess whether the discharge is meeting the permit limits. The EPA bases this decision on two grounds. First, is the fact that the make-up of produced water varies over time. These variations may be due to a number of factors, including but not limited to natural fluctuations in formation fluid, changes in temperature or pressure in the formation, variable rates of mixing downhole, and the presence of injected fluids or compounds such as routine maintenance additives. Second, is the fact that the raw produced water (i.e., influent) in the treatment facilities also varies over time. The treatment systems for these facilities end with settling ponds for flotation and skimming of oil. These ponds are exposed to the elements and are subject to variations in operating conditions, including temperature and wind, that can affect the presence, amount, or concentration of these three parameters in the discharge.

Because of this potential for variability, the EPA has concluded that more frequent monitoring of these parameters will provide a more representative assessment of compliance with their permit limits.

Finally, the EPA notes that these permit monitoring requirements are consistent with monitoring requirements included in the NPDES permits that the EPA issued in 2016 for five oil and gas production facilities operating on the Wind River Indian Reservation. These permits included those owned by Wesco Operating, Inc. (WY-0025232 and WY-0025607), Phoenix Production Co. (WY-0024945 and WY-0024953), and an Eagle Oil and Gas Co. facility subsequently purchased by Phoenix Production Co. (WY-0020338). The inclusion of these increased monitoring requirements to make the Merit permits consistent with the 2016 permits is supported by NANRO, as indicated in comment 1, above. No change has been made in response to this comment.

7. Merit commented, “With the draft permits, USEPA is requiring quarterly sampling, laboratory analysis, and reporting for all facilities. Merit believes that all permits should be based on a semester sampling, analysis, and reporting frequency as there is no justification to increase the sampling, analysis, and reporting frequency. None of the constituents of concerns have presented Merit with compliance challenges that would warrant increased sampling frequency. Furthermore, other operators on the Wind River Indian Reservation have not been required to report quarterly. These requirements only add costs, complexity, and yields no benefit to the operator, Tribes, or Agency. We therefore request that USEPA maintain both the Discharge Monitoring Report (DMR) submittal frequency and the analytical sampling suite as semi-annual requirements for all permits and associated SOB.”

Response: This comment addresses the following parameters for which monitoring requirements are met through sample collection and laboratory analyses, and for which the monitoring frequency has been increased from semi-annual to quarterly. These are:

Facility	Parameters
Chatterton Battery	Chloride, Sulfate, Sulfide, Total Radium 226
Circle Ridge	Chloride, Sulfate, Sulfide, Total Radium 226
Maverick Springs	Chloride, Sulfate, Sulfide, Total Radium 226
Steamboat Butte*	Chloride, Selenium, Total Radium 226

* In the previous iteration of this permit, the Steamboat Butte facility was required to sample sulfate, sulfite, sulfides, benzene, ethylbenzene, toluene and xylene every three months (i.e., quarterly). Quarterly sampling has been retained for sulfide and sulfate, and regular monitoring for the remaining pollutants has been eliminated.

The EPA has determined the semi-annual monitoring frequencies for total radium 226 and other pollutants may not provide sufficient data to characterize the effluent quality and to detect events of non-compliance. Since this facility treats source of produced water from many oil wells, this practice could result in a highly variable wastestream in terms of flow and pollutant concentrations. The EPA changed the monitoring frequencies to quarterly monitoring.

As noted in response to comment 5, above, this Permit has been reissued with monitoring frequencies that are consistent with the five NPDES issued to oil and gas operations on the

Wind River Indian Reservation in 2016. As a result, Merit will now be collecting samples at the same frequency as Wesco Operating, and Phoenix Production. No change has been made in response to this comment.

8. Merit commented, “Whole Effluent Toxicity (WET) testing was not a requirement under previous permits; now, USEPA is requiring a minimum of four seasonally-staggered end-of-pipe tests over a 5-year permit term. We believe only a single WET test is warranted upon permit issuance, beyond that, repeated WET testing efforts are wasteful and do not provide any additional protection.

- i. Because the NPDES pit system is a stable temperature, throughput, and chemistry, the effluent is not subject to seasonal variability. Therefore, the rationale for seasonal variation of the effluent quality is flawed, as the quality of the effluent at the end-of-pipe outfall is not significantly impacted by the time of year. The seasonally-staggered WET requirement to assess seasonal variability is not relevant and unnecessarily costly.”

Response: The EPA has included the WET monitoring requirement in this Permit to ensure compliance with the Tribes’ water quality requirement addressing toxic pollutants. This requirement prohibits the presence of toxic pollutants attributable to human activities in Reservation surface waters in concentrations or combinations that affect the physical, chemical or biological integrity of those waters. In particular, WET monitoring will ensure that any potential additive or synergistic effects of both known and unknown pollutants in the discharge are captured. Additionally, acute toxicity has been reported in other oil and gas operator permits on the Wind River Indian Reservation who have this same monitoring frequency. A single WET test would not capture the variability of this type of discharge. The EPA is requiring that, to the extent practicable, the WET monitoring be timed to capture seasonal variability in the discharge. The EPA included this requirement because, while the Agency recognizes that pollutant concentrations in the discharge may primarily vary with residence time and the effects of gravity separation, it is possible that pollutant concentrations may also vary due to seasonal effect, including increased evaporation during hot seasons and the effects of temperature on the oil/water separation performance, and potential chemical additives in well maintenance, treatment and stimulation/hydraulic fracturing.

The EPA seeks to capture any potential seasonal and operational variability, to the extent it is practicable for the operators to do so, when planning their WET monitoring. The EPA has included this practicability consideration in recognition of the logistical challenge operators may face when scheduling sampling events at remote facilities. However, the EPA has no reason to believe that the “seasonal variability” requirement will create additional costs for WET monitoring events. At a maximum, an operator will be required to conduct seven total WET monitoring (4) and toxic pollutant screening (3) events over the 60-month term of the permit, or roughly, one event every 8-9 months, assuming there is no WET failure. In that instance, an operator could readily capture any seasonal variability by adhering to a 6 to 9 months sampling interval. If an operator does not undertake a hydraulic fracturing event, it will be required to conduct six total WET monitoring and toxic pollutant screening events over the 60-month term of the permit, or one toxic monitoring event every 10 months. In either instance, operators are not bound to a particular schedule, and have significant flexibility in scheduling and implementing their toxics monitoring events. It should be noted WET samples are required to be staggered apart from the Toxic Pollutants Screens such that

either a WET test or a Toxic Pollutant Scan is conducted approximately every 8 to 9 months, and the timing of all monitoring shall still be conducted to ensure the sample is representative of the discharge.

No change has been made in response to this comment.

9. Merit also commented, “ii. As an alternative to end-of-pipe testing (or in response to a confirmed WET failure), while still being protective of aquatic life, Merit believes that the Operator ought to have the option to alternatively document WET compliance at a point immediately upstream of the effluent dominated drainage's confluence with natural waters (a downstream monitoring point).”

Response: This comment requests additional distance between the point of discharge and the point at which Merit may conduct its acute WET monitoring. While this comment does not characterize it as such, it is essentially a requesting a dilution allowance or mixing zone which, under section 3(ii) of the Tribes’ water quality requirements is defined as a “limited area or volume of a surface water body within which an effluent becomes thoroughly mixed with the water body.” Section 9(a) of the Tribes’ water quality requirements prohibits mixing zones for acute whole effluent toxicity. As a result, this request is denied with regards to the Circle Ridge, Chatterton Battery, and Maverick Springs facilities, Merit will be required to conduct WET monitoring at the outfalls for these three facilities.

With regards to Steamboat Butte facility, in its comments on the draft permit, Merit withdrew its request to move Outfall 001 to the outlet of Upper Mission Pond (latitude 43.256111°N, longitude 108.905833°W) for this permit term. Merit asserted that the volume of produced water directed to the treatment pits and Outfall 001 has been reduced, resulting in greater hydraulic retention time and passive sulfide reduction before the compliance point. The EPA accepted this request and maintains the Outfall 001 at the outlet of the final treatment pit (latitude 43.260278° N and longitude 108.904444° W). The EPA requires all WET testing for the Steamboat Butte facility to be conducted at Outfall 001.

10. Merit requested that the “language in the WET testing section be modified to allow initiation of a second WET test (after failure of the initial WET test) to be initiated within four weeks of the date of when the permittee learned of the test failure. The current language requires this second WET test to be initiated within two weeks of the permittee learning of the initial WET test failure. Due to limited WET lab availability and the time necessary to culture the test species to the appropriate age, it can be extremely difficult to initiate a second WET test within two weeks.”

Response: These WET requirements are consistent with the EPA WET guidance and policy that are in place to implement WET testing.⁴ These requirements are also supported by the NANRO and are consistent with the 2016 permits issued to Phoenix Production Co. and Wesco Operating Inc. on the Wind River Reservation. The EPA recognizes that coordination of WET testing can be difficult given the remote location of this facility, but

⁴ These include the *Technical Support Document for Water Quality-Based Toxics Controls*, as revised in March 1991 (EPA /505/2-90-001) (available at <https://www3.epa.gov/npdes/pubs/owm0264.pdf>); the *Whole Effluent Toxicity (WET) Control Policy*, July 1994 (EPA 833-B-94-002) (available at <https://www.epa.gov/sites/production/files/2015-09/documents/owm0117.pdf>); and *Clarifications Regarding Toxicity Reduction and Identification Evaluations in the National Pollutant Discharge Elimination System Program* (March 27, 2001) (available at https://www.epa.gov/sites/production/files/2015-10/documents/owmfinaltreti_1_1.pdf).

with advance planning a two-week timeframe for re-testing is not unreasonable or impracticable.

No change has been made in response to this comment.

11. Merit commented on accelerated testing under the WET monitoring provision:

“iv. If the facility fails a confirmatory second WET test, an accelerated testing schedule is required by the draft permits; while at the same time, the Operator is also required to enter into the Toxicity Identification Evaluation/Reduction process. Merit believes accelerated monthly testing requirement is not warranted, especially if the Operator and USEPA are working together to identify and reduce the source of toxicity.

v. The costs to comply with WET testing (> \$1,000/ analysis) and conduct the TIE/TRE studies (> \$30,000) is very significant. Should the Operator find itself having to reduce toxicity, the limited resources available should be dedicated to resolving toxicity, not more accelerated monthly testing that provides no added benefit.”

Response: These WET requirements are consistent with the EPA WET guidance and policy that are in place to implement WET testing. In particular, the use of an accelerated WET monitoring regimen is recommended by the March 27, 2001 guidance memorandum, *Clarifications Regarding Toxicity Reduction and Identification Evaluations in the National Pollutant Discharge Elimination System Program*. That guidance provides:

“Initial TRE activities should include accelerated testing (e.g., weekly testing) in conjunction with an in-plant survey to identify potential causes of toxicity related to changes in processes or chemical use... For a TIE to successfully identify and confirm toxicants as part of a TRE, toxicity must be present in a sample. Therefore, increasing the sample volume and testing frequency for the affected test species to obtain samples with sufficient toxicity is prudent to ensure a successful TIE. Expecting a TIE to immediately follow a single or infrequent event of WET noncompliance is unrealistic. Rather, the persistence (duration, frequency) and magnitude of components of the exposure should be characterized immediately through additional testing to evaluate whether a TIE would help reduce toxicity. A TIE should be initiated as soon as toxicity is observed in such follow-up analyses. Whenever WET monitoring indicates toxicity, EPA recommends additional testing at least once per month for six months. Testing also could be as frequent as once per week for at least two months.”

(p. 8) As described in the above quote, accelerated WET monitoring is an integral component of a TIE/TRE, as it allows the facility and the EPA to begin to characterize the nature of the toxicity. The accelerated testing frequency required under paragraph 1.3.5 of the Permit (i.e., monthly) falls within the once per week to once per month frequency outlined in the quoted guidance. As a result, this is a reasonable frequency and consistent with normal WET testing procedures. Moreover, if the facility fails a second WET test and is required to implement accelerated testing, paragraphs 1.3.6.1.4 and 1.3.6.1.5 allow Merit to request relief from the accelerated monitoring requirement. Similarly, under paragraph 1.3.6.7 of the Permit, if 10 consecutive WET tests indicate no acute toxicity, Merit may request a return to the normal WET testing frequency. The EPA also notes that these WET requirements were supported by the Tribes during the 2015 ADR process and continue to be

supported by the NANRO as stated in comment 1 above.
No change has been made in response to this comment.

12. Merit commented, “USEPA is requiring analysis of approximately 105 constituents included in the Toxic Pollutants Screen (TPS) analysis at least twice, and probably three times, during the term of the permit. Merit believes that a single TPS conducted upon permit re-issue would adequately evaluate the effluent for the wide array of constituents, including cadmium, fluoride, mercury, and selenium.
- i. Merit believes that the hazard screening requirements within 30 days of issuance under the current permits adequately evaluated the effluent for potential additional constituents of concern. In addition, the extensive sampling program required for permit renewal has served as an adequate screening analysis for all the constituents included in the TPS program, making the entire TPS requirement redundant and excessively costly.
 - ii. The scope of the TPS sampling program far exceeds the reasonable potential standard. In addition, the frequency of the TPS is excessive in that the second required TPS sampling event is not warranted and that a subsequent TPS should only be required at the outfall within one week of bringing a new hydraulically fractured (HF) well into production, during the term of the permit, but only if HF fluids are not segregated from the flowback to the production facility.”

Response: The WET monitoring and the toxic pollutant screening frequencies being required better coordination of the two types of monitoring. This coordination will ensure that the EPA obtains monitoring data that reflects the condition of the discharge across time and will allow the EPA to determine whether the regular discharge has any latent or synergistic toxicity effects. Additionally, conducting this monitoring in a way that provides more even coverage over the permit term helps ensure that the monitoring and potentially captures toxicity effects related to infrequent or sporadic well treatment or well maintenance events. In order to provide even coverage for monitoring, the Permittee is required to conduct WET testing or Toxic Pollutant Screen monitoring about every 6 to 10 months as described in response to comment 8, above. Thus, while the third, conditional Toxic Pollutant Screen is intended to provide post-hydraulic fracturing monitoring data (should such hydraulic fracturing occur), the Toxic Pollutant Screen is also part of a broader monitoring approach designed to monitor and protect against toxicity in the facilities’ discharge.

The EPA would also like to clarify that the third, conditional Toxic Pollutant Screen may be conducted at any time during the term of the permit, so long as it conducted “within one week of returning the hydraulically fractured well to production or startup production of a new well.” While this language may suggest that the Toxic Pollutant Screen requirement applies only to existing wells., the EPA believes that the requirement will be satisfied in situations such as Merit describes (i.e., a new well is hydraulically fractured).

No change has been made in response to this comment.

13. Merit commented, “Whether or not any modification to the draft permit sampling and monitoring requirements is actually made, Merit believes that at the conclusion of the 5 years permit term an automatic return to the current scope of the semi-annual sampling and reporting frequency is warranted. This will alleviate continuing an unnecessarily costly

monitoring and sampling program during the protracted renewal process and in subsequent renewals.”

Response: The EPA has determined that the increased sampling and reporting frequencies for most of the parameters listed in Section 1.3.2 of this permit are necessary to ensure that the EPA has sufficient data for each facility to characterize the effluent quality, to capture the variability of the concentrations of various pollutants in the discharge, and to provide ongoing protection of aquatic life and water quality on the Wind River Indian Reservation. As described in greater detail above, the EPA seeks data that is representative of the discharge from each facility across seasons and across different operational scenarios, including during and after well maintenance and well treatment events. As is usual for NPDES permits, these standard self-monitoring requirements will remain in effect until the permit is reissued.

The EPA has also included additional sampling requirements for Toxic Pollutant Screens, WET, and mercury monitoring in Section 1.3.2. As described in greater detail above, these requirements are included to focus on potential toxicity in the discharges, particularly toxicity that may result from the use of various well maintenance and well treatment additives and mercury toxicity. Unlike the standard self-monitoring, these requirements are finite in number. Thus, once Merit has conducted three Toxic Pollutant Screens, at least four WET monitoring events plus any required retesting and/or accelerated monthly testing, and three mercury sampling events, Merit may cease collecting these categories of samples regardless of whether this Permit has been administratively continued. The EPA will evaluate these data to determine any reasonable potential to set limits for the next permit cycle. No change has been made in response to this comment.

14. Merit commented, “Merit estimates that the cost to comply with the additional monitoring, sampling, and reporting requirements of the draft permits will add at least \$10,000/year per outfall above current compliance costs. Merit estimates these requirements will easily exceed \$250,000 over the term of our draft permits. The Tribes are our partners in several of the fields, this is money that should be helping to support Tribal interests or used to make in-field improvements to extend the life of the fields and prolong royalties.”

Response: The EPA has concluded that these monitoring, sampling, and reporting requirements are needed to properly characterize the nature of the effluent, capture variability in the discharge, and protect aquatic life and water quality in the Wind River Indian Reservation. The EPA recognizes that the monitoring will result in additional costs to the Permittee. Among the factors, the EPA has identified to be considered when establishing monitoring frequencies is the cost of monitoring relative to the Permittee’s capabilities.⁵ The EPA’s permit writing guidance suggests that monitoring frequency should not be excessive and should be what is necessary to provide sufficient information about the discharge. This comment provides insufficient information to consider either the total or incremental cost of the revised monitoring requirements or Merit’s capability to pay for such monitoring. Moreover, the comment does not explain how a different monitoring program would assure compliance with limitations or yield sufficient representative data, particularly with regards to highly variable pollutant sources such as well maintenance and well treatment chemicals. Additionally, these requirements were developed in concert with both Tribes in 2016 and are

⁵ NPDES Permit Writer’s Manual, September 2010 (EPA-833-K-10-001) (available at https://www.epa.gov/sites/production/files/2015-09/documents/pwm_2010.pdf).

supported by the NANRO.

No change has been made in response to this comment.

15. Merit provided several comments under the general heading, “Excessively Restrictive or Unnecessary Effluent Limits.” Merit commented, “There are several constituents included in the recurring sampling and analysis program that are not warranted, excessively restrictive, or unnecessary. As highlighted below and detailed in the accompanying exhibits, with consideration to range conditions, the proposed sulfate and fluoride limits are overly restrictive. Merit has already conducted the full analytical scope of the proposed TPS and self-monitoring requirements on each of our Wind River outfalls. Those results confirm that cadmium and mercury are not present at detectable concentrations and that continued selenium testing is unjustified (please see Exhibit A). Therefore, including these constituents in the self-monitoring requirements is not warranted and would be best documented during the initial TPS for each facility.”

Response: The EPA acknowledges this comment and addresses each related comment separately below.

16. Merit commented, “Excessively Restrictive Sulfate Limit: Current permits include a sulfate effluent limit of 3,000 mg/L, based on a comprehensive review (refer to Exhibit B) of toxicological data, Wyoming surface water characteristics, stock tolerance, feedback from ranch operations, and knowledge of how stock and wildlife consume this water, there is no compelling reason to reduce the effluent limit to 2,500 mg/L. Agricultural use of water with sulfate below 3,000 mg/L is allowed throughout the State of Wyoming and Merit believes that the availability and stock use of water up to that limit is far better than having no water availability. It is our understanding that the proposed 2,500 mg/L limit was derived for stock under feedlot conditions where animals are heavily stressed and have no other source of water. Therefore, Merit and the numerous beneficial users of our effluent believe that no reduction in the sulfate limit is warranted and should remain at 3,000 mg/L.”

Response: The SOB explains that the revised sulfate limitation of 2,500 mg/L is based on the EPA’s review of new information on the effect of sulfate intake on livestock and on livestock management practices occurring on the Wind River Indian Reservation. With regards to sulfate intake effects on livestock, the EPA reviewed a research report published by the University of Wyoming. This report, “Water Quality for Wyoming Livestock and Wildlife Report” (the “Agricultural Experiment Station (AES) bulletin”) was published first in 2007 as a research paper and then in 2008 by the University of Wyoming Extension as Experiment Station Bulletin. (2008. M. F. Raisbeck, et al). To become an Experimental State Bulletin the document must be peer reviewed, with additional reviews from the US Department of Agriculture (USDA). The EPA believes that, having gone through both peer review and review by the USDA, the AES bulletin represents the best available science concerning the effects of drinking water quality in Wyoming on livestock. The EPA has no indication that the research captured in this bulletin is speculative and thus has chosen to adopt its recommendations for the purposes of writing these permits. Before adopting the recommended sulfate concentrations in the AES bulletin, however, the EPA evaluated them to ensure they would ensure that discharges of produced water are of good enough quality for wildlife and livestock uses. That evaluation is summarized as follows:

The AES bulletin includes a review of the health effects of inorganic contaminants on livestock and wildlife. The AES bulletin recommends, “Assuming normal feedstuff [Total Sulfur] concentrations, keeping water SO_4^{2-} concentrations less than 1,800 mg/L should minimize the possibility of acute death in cattle. Concentrations less than 1,000 mg/L should not result in any easily measured loss in performance.” The AES bulletin recommendation is based on the common understanding of total intake. The EPA evaluated this recommendation to determine the impacts of these contaminants, including sulfur, on the beneficial use of produced water, and what level of such contaminants would provide water of ‘good enough quality’ as contemplated in Subpart E.

When evaluating the Total Sulfur(S) intake by livestock, the dry matter intake and the intake of sulfur through drinking water together yield the total intake. The National Research Council (NRC) “2005 Mineral Tolerance of Animals: Second Revised Edition” recommends maximum tolerable levels (MTL) for a variety of minerals. The MTL is the maximum intake of a mineral that an animal can ingest without suffering adverse effects and is typically presented as a concentration in feed or water. The 2005 NRC report recommends an MTL for S of 0.5 % of the daily intake of feed and water based on dry weight equivalent for ruminants fed diets of at least 40% forage. The EPA used this MTL as the basis for evaluating what concentration of sulfur in produced water discharges would be of good enough quality for cattle. The EPA assumed that if the total concentration of sulfur in feed and water for cattle was greater than 0.5%, the cattle would suffer adverse effects and the water would not be of good enough quality.

For purposes of this analysis, The EPA assumed that 100% of feed for cattle consuming the produced water discharges is forage. A University of Wyoming Extension document looked at forage mineral concentrations, including Sulfur in Big Horn County, Wyoming. This document provided the following concentrations:

0.17 % S Median
0.17% Mean
0.22% was 85th %tile
0.26% was the 95th %tile.

The EPA is confident that this data indicates Wyoming forage concentrations range from 0.1% to 0.3% S with an average of approximately 0.2% (see Horn). These concentrations are also reflected in the AES bulletin, which assumed sulfur concentrations in forage of 0.1%S, 0.2%S and 0.3%S on a dry matter basis.

To determine likely total sulfur intake for cattle consuming produced water discharges, the EPA utilized a sulfur calculator developed by Colorado State University Veterinary Teaching Hospital⁶. The EPA looked at each forage S content (0.1%, 0.2%, 0.3%) with various concentrations of sulfate, ranging from 500 mg/l to 4,000 mg/L. The EPA employed the following assumptions and inputs when running the sulfur calculator:

1. Young rapidly growing cattle 600 pounds estimate at 7-9 months in age
2. Recently placed on water
3. Mineral tolerance of animals

6 Calculator is available at <http://dlab.colostate.edu/webdocs/tools/sulfurcalc.cfm> (last checked: July 1, 2019).

4. Maximum tolerable levels (sheep and cattle) as 0.3 % dry matter for those on high concentrate diet
5. 0.5% as dry matter (DM) for high forage diet (as % DM includes food and water). We used 0.5%
6. Three temperatures used to describe the impact of additional water intake at higher temperatures.
7. Area shaded is greater than or equal to 20% above MTL of 0.5% S as DM

The sulfur calculator generated the following output for forage with 0.1%S:

Intake of S as % DM			
Feed 100% - 0.1%	Air Temperature		
SO ₄ in H ₂ O (mg/L)	40°F	70°F	90°F
500	0.15	0.17	0.22
1000	0.21	0.23	0.34
1500	0.26	0.3	0.46
1800	0.29	0.34	0.53
2000	0.31	0.37	0.58
2500	0.37	0.43	0.7
3000	0.42	0.5	0.82
3500	0.47	0.57	0.94
4000	0.53	0.63	1.06

The sulfur calculator generated the following output for forage with 0.2%S:

Intake of S as % DM			
Feed 100% - 0.2%	Air Temperature		
SO ₄ in H ₂ O (mg/L)	40°F	70°F	90°F
500	0.25	0.27	0.32
1000	0.31	0.33	0.44
1500	0.36	0.4	0.56
1800	0.39	0.44	0.63
2000	0.41	0.47	0.68
2500	0.47	0.53	0.8
3000	0.52	0.6	0.92
3500	0.57	0.67	1.04
4000	0.63	0.73	1.16

The sulfur calculator generated the following output for forage with 0.3%S:

Intake of S as % DM			
100% - Feed 0.3%	Air Temperature		
SO ₄ in H ₂ O (mg/L)	40°F	70°F	90°F
500	0.35	0.37	0.42

1000	0.41	0.43	0.54
1500	0.46	0.5	0.66
1800	0.49	0.54	0.73
2000	0.51	0.57	0.78
2500	0.57	0.63	0.9
3000	0.62	0.7	1.02
3500	0.67	0.77	1.14
4000	0.73	0.83	1.26

These three charts indicate that at all concentrations of S in forage there is a direct relationship between water intake and temperature: the higher the temperature the greater the water intake. As a result, as temperature increases, the total intake of sulfate (and, therefore, sulfur) also increases. University of Wyoming AES bulletin B1183 utilized a forage S content of 0.2%, and the Horn study indicates that the average S content of forage in Wyoming is about 0.2%. As a result, the EPA concluded that it is reasonable to base its analysis on an S content of 0.2% in forage for cattle on the Wind River Indian Reservation. Thus, the EPA relied upon the 0.2% forage content chart:

Intake of S as % DM			
Feed 100% - 0.2%	Air Temperature		
SO ₄ in H ₂ O (mg/L)	40°F	70°F	90°F
500	0.25	0.27	0.32
1000	0.31	0.33	0.44
1500	0.36	0.4	0.56
1800	0.39	0.44	0.63
2000	0.41	0.47	0.68
2500	0.47	0.53	0.8
3000	0.52	0.6	0.92
3500	0.57	0.67	1.04
4000	0.63	0.73	1.16

Assuming a forage content of 0.2%, this chart indicates that during times when the temperature is 70 °F, the sulfur MTL of 0.5% S for cattle is exceeded by 20% when the water consumed by the cattle exceeds 3,000 mg/L SO₄. When the temperature is 90 °F, the sulfur MTL for cattle of 0.5% S is exceeded by 26% when the water consumed by the cattle exceeds 1,800 mg/L SO₄. The EPA believes that this aligns with the AES bulletin with the same forage content of 0.2%, which recommended “keeping water SO₄²⁻ concentrations less than 1,800 mg/L” to minimize the possibility of death in cattle. Based on this analysis, the EPA established an initial sulfate exposure threshold concentration of 1,800 mg/L.

Having established the initial sulfate exposure thresholds, the EPA then considered additional information concerning actual livestock water practices on the Reservation provided by the Tribes and BIA. This additional information was contained in a letter the Bureau of Indian Affairs (BIA) sent to the Eastern Shoshone Tribe on January 21, 2016, and letters provided to the EPA by the Eastern Shoshone Tribe on January 26, 2016, and Northern Arapaho Tribe on January 25, 2016.

As noted previously, the EPA reviewed literature showed that the highest risk of adverse effects from sulfur exposure occurs during the summer months when livestock drink larger quantities of water. During cooler periods, there is lower risk of adverse effects because cattle drink less water. The supplemental information from BIA and the Tribes indicates that the livestock that have access to the produced water discharges from the Merit facility are managed in a manner which additional fresh water sources with a much lower sulfate concentration are available for the livestock during the entire grazing season.

The BIA letter identifies multiple sources of fresh water on Range 38 that are available to livestock. These sources include several perennial streams, two wells, several springs, and larger water bodies including the Little Wind River and the Wyoming Canal. BIA stated that the cattle use all the available water sources within the Range Unit, not just the produced water. BIA also indicates that the cattle are usually present in lowland areas near the produced water discharges only during the coolest parts of the permitted 9-month grazing period, which extends from May through January. Typically, the cattle are present from approximately May 1 to June 15, and then from September until the end of the roundup in mid-Fall. During the hottest periods of the year from late June to September, the cattle are moved to higher elevations away from the produced water discharges.

The additional information from BIA thus makes clear that livestock on Range 38 are not relying solely on the discharge from this facility for drinking water, that they have access to multiple sources of fresh water, and that they are not drinking the discharge water during the hottest months of the year. As a result, the risk of adverse effects to the cattle and horses from sulfur exposure, particularly during the hottest months of the year, is minimized.

The information from BIA and the Tribes does not allow for easy quantification of the change in sulfate intake due to the change in water access. However, the information provided by BIA and the Tribes does show that temperatures are lower when cattle are present on Range 38 and, as a result, likely drink lower volumes of water. The EPA concluded that this information supports basing the final sulfate exposure threshold on the 70°F column on the 0.2% forage content chart with MTL of about 0.5% S. That chart indicates that a sulfate concentration of 2,500 mg/L is protective of the “good enough quality” threshold for livestock use established under Subpart E. The EPA notes that this concentration is at the upper range of concentrations identified as likely to have no effect on livestock in the materials provided by Merit.

No change has been made in response to this comment.

17. Merit commented, “Unnecessary Cadmium Testing Requirement: USEPA should provide Merit with further justification in the SOB to include recurring cadmium testing and an effluent limit in the permit. Merit believes that the initial TPS shall adequately assess the potential for cadmium in the effluent at or below the chronic aquatic life threshold (0.6 ug/L). None of the six screening level analyses we have performed (Exhibit A) returned cadmium greater than the laboratory detection limit (1 ug/L). If a cadmium detection limit of <0.6 ug/L can be obtained, Merit is confident this result will still prove <DL. If such a limit cannot be obtained USEPA shall consider <1 ug/L as a basis to exclude recurring cadmium testing.”

Response: The draft permit does not contain an effluent limit for cadmium. As described above in the SOB, the sampling conducted in the previous permit cycle relied on a method

with a detection limit for cadmium of 5 µg/L, which is above the chronic cadmium criterion of 0.6 µg/L contained in the Tribes' water quality requirements. Similarly, the cadmium data in Exhibit A was collected using a method with a detection limit of 5 µg/L. As a result, the EPA lacked sufficient data to complete a quantitative RP analysis for the Tribes' cadmium criterion. In order to allow such an analysis in the next permit cycle, the draft permit requires additional cadmium monitoring with a lower cadmium detection limit of 0.1 µg/L. No change has been made in response to this comment.

18. Merit commented, "Excessively Restrictive Fluoride Limit: The Statements of Basis, Quantitative Reasonable Potential Analysis sections for all four facilities make the statement 'The permit application data provided by the permittee included one sample result for fluoride. The sample result is higher than the acute fluoride criteria, but the EPA is unable to determine whether the result is significant and thus represents actual effluent quality due to variability of this pollutant. Additional data is necessary.' To appropriately assess the significance of selenium on bovine health, Merit respectfully refers USEPA to Exhibit B (Attachment 1 - Section 3.2.1) which defines even the lowest threshold of no adverse health effects as being well above (>12x) the acute water quality criteria.
- i. Merit has reviewed the Wind River Reservation Surface Water Quality Standards and finds that there are no listed chronic or acute values for fluoride, only a Human Health Fish and Drinking Water Standard of 4.0 mg/L (based on the EPA human drinking water standard). All fluoride results obtained from effluent data are below the Human Health and Drinking Water primary standard of 4.0 mg/L.
 - ii. While a 4 mg/L standard for fluoride exists for the protection of human health, there is no ecologically-based federal standard. In published literature, the National Academy of Science (NAS) recommends 2 mg/L criteria for livestock protection. However, this criterion was derived from the 1972 publication from NAS, which reviewed available fluoride toxicity studies to livestock and concluded that tooth mottling in livestock may occur at concentrations as little as 2 mg/L fluoride. Except in extreme cases, this endpoint is neither a toxicologically nor an economically significant adverse effect as it generally describes a discoloration of the teeth. The U.S. Center for Disease Control and Prevention considers this a cosmetic effect harmless to the health of humans and Phillips et al (1960) noted that there was no instance where tooth mottling decreased the economic value of livestock.
 - iii. Additionally, the NAS recognized that, although 2 mg/L of fluoride may cause, in some cases, tooth mottling, "At least a several-fold increase [from 2 mg/L] seems, however, required to produce other injurious effects." In all the studies reviewed by NAS on the effects of fluoride in animals, none showed that tooth mottling causes injury to cattle or other animals that is measurable in terms of milk production, feed consumption, weight gain, growth, reproduction, development, life span, or other effects relevant to livestock producers or toxicologists. In the updated review (NRC 2005), NAS revised its recommendation to a limit of 40 parts per million (ppm) fluoride for livestock (40 ppm is equivalent to 40 mg/kg in feed or 8 mg/L in water, based on average feed and water ingestion rates of adult beef cattle), and higher limits for other types of livestock. A comprehensive review of livestock toxicity studies with fluoride (see Geomega 2007, Exhibit B - Attachment 2) showed that a minimum of 49 ppm fluoride was identified to result in decreased milk production in dairy

cattle (Stoddard et al. 1963). No effects to livestock on growth or reproduction were found at up to 200 ppm fluoride. Fluoride levels in Wyoming forage are low, about 25 mg/kg (Newman 1984); hence at even 5 mg/L fluoride, there is essentially no risk of additive dosing as the total dose of fluoride is well below the 49 ppm fluoride level even for the most sensitive variety of bovine found in Stoddard et al. (1963).

- iv. Therefore, Merit feels that any future proposed fluoride limit below 8 mg/L is excessively restrictive for the protection of livestock. Merit is not opposed to having fluoride monitoring requirements in the Toxic Pollutants Screen, but feels that semi-annual sampling, as proposed in the self-monitoring requirements is excessive and not warranted.”

Response: The draft permit does not contain an effluent limit for fluoride. As footnote 2 of Table 7 of the SOB indicates, the 2 mg/L criterion used to conduct a reasonable potential analysis for fluoride is not an aquatic life water quality criterion, but rather a criterion selected to protect the agriculture and wildlife designated uses for the receiving water. The 2 mg/L criterion is taken from the 2007 report from the University of Wyoming Extension, “Water Quality for Wyoming Livestock & Wildlife: A Review of the Literature Pertaining to Health Effects of Inorganic Contaminants.” The authors of the report reviewed a variety of scientific literature pertaining to fluoride intake in livestock. The authors concluded that in places, such as Wyoming, where fluoride concentrations in forage are less than 10 ppm fluoride, a water concentration of 3.75 mg/L fluoride would cause osteo-dental fluorosis in cattle. As a result, the report recommended that water for cattle contain less than 2 mg/L fluoride.

In selecting the 2 mg/L fluoride criterion, the EPA also reviewed a 2009 report from Agriculture and Agri-food Canada titled “Livestock Water Quality: A Field Guide for Cattle, Horses, Poultry and Swine.” This report also recommends a maximum fluoride concentration of 2 mg/L in livestock water. This recommendation is based on research indicating that a fluoride concentration of 2 mg/L in water leads to approximately 64-80 mg/day of fluoride ingestion through water intake. In areas with similar fluoride forage content to Wyoming (i.e., 10-20 ppm), the report indicates that cattle will ingest an additional 220-280 mg/day fluoride from forage intake. At these levels, total fluoride ingestion will be between 284-360 mg/day, which falls below the level identified in Canadian report as excessive. In both the University of Wyoming and Canada reports, the primary effect of fluoride ingestion at 2 mg/L in water is tooth mottling, but the Canada report also indicates other potential effects of low-level exposure including skeleton deposition, neonatal fluoride exposure via milk, impaired feed intake, stunted growth, and reduced milk yield. As a result, the EPA has concluded that the 2 mg/L fluoride criterion is protective of the agriculture and wildlife designated uses.

With regards to fluoride sampling frequency, the SOB describes that the permit application data provided by the Permittee included one sample result for fluoride. That sample result is higher than the agricultural and wildlife use protection criterion of 2 mg/L for fluoride that the EPA is using in these permits. However, the EPA is unable to determine whether the result is significant and thus represents actual effluent quality due to variability of this pollutant. Additional data is necessary. As a result, the EPA is not including a water quality based effluent limit for this pollutant but is instead requiring additional monitoring. No change has been made in response to these comments.

19. Merit commented, “Unnecessary Mercury testing requirement: USEPA should provide Merit with further justification in the SOB to include recurring mercury testing and an effluent limit in the permit. Merit believes that the initial TPS shall adequately assess the potential for mercury in the effluent (> 0.77 ug/L chronic aquatic life threshold) and recurring testing for mercury removed from the self-monitoring requirements. None of the six screening level analyses (Exhibit A) we have recently performed returned mercury greater than the laboratory detection limit (0.1 ug/L). These results can be made available to support the USEPA Reasonable Potential Evaluation.

- i. The Statements of Basis for all four facilities state: ‘Although the mercury level did not exceed the aquatic life water quality criteria, the metal was detected in at least one sample and therefore, additional using clean methods are required to compile a more complete data set for future evaluation. Also, the permit includes a trigger level established at the chronic water quality criteria of 0.77 ug/L and a requirement to develop and implement a mercury minimization plan if that trigger level is detected.’
- ii. Merit was unable to locate any data or analytical result showing a detect ion for mercury for any of the four facilities. Consequently, Merit requests that the EPA provide us with the date and analytical results showing a detectable amount of mercury in any of the effluents. If this data does not exist, Merit requests that the EPA remove the mercury Self Monitoring Requirement from the permits and Statements of Basis. Merit is not opposed to having mercury monitoring requirements in the Toxic Pollutant Screen. but feels this constituent should be removed from the Self-Monitoring Requirements, unless EPA can provide analytical results showing relevant, defensible sampling data with detectable amounts of this pollutant in the effluents.”

Response: As explained in Permit Part 1.3.7. and the SOB section for the Mercury Minimization Plan, the Permittee is required to implement an MMP tailored to the facility’s potential to discharge mercury only in the instance in which a mercury sample exceeds the aquatic life criterion of 0.77 µg/L. The EPA has determined that such a protective measure is necessary given that mercury is bioaccumulative in animals exposed to such discharges. The EPA based this requirement on the presence of mercury in the discharge from the four facilities. As the SOB describes, mercury was detected in at least one sample for all four permits in either the toxic pollutants screening data or permit application data. These sample results included the following:

Facility	Sample Date	Sample Concentration
Chatterton Battery	10/25/07	<0.006 µg/L
Circle Ridge	10/25/07	<0.006 µg/L
Maverick Springs	10/25/07	<0.006 µg/L
Steamboat Butte	10/25/07	<0.006 µg/L

Contrary to the assertions in this comment, the EPA cannot confidently conclude that there is no detectable mercury in the discharge because the available data was gathered using analytical methods with a detection limit well above the 0.0002 ug/L detection limit for method 1631. As a result, the EPA will continue to require mercury monitoring.

No change has been made in response to these comments.

21. Merit Energy commented on several topics under the heading “Permit-Specific Corrections or Inconsistencies.” These comments included:

“a. Inaccurate or Inconsistent Water Body Classifications: The Statements of Basis for the Chatterton, Circle Ridge, and Maverick Springs facilities refer to the Tribe's classification of Five Mile Creek (from the Wyoming Canal, upstream to the confluence of Maverick Springs Draw and Coal Draw) as 2C. However, based on the stream class definitions included in the Wind River Reservation Waterbody Classification List, Merit believes this reach of Five Mile Creek should be classified as 2E or 3E (Effluent Dependent), because the perennial flow in this segment of Five Mile Creek is totally dependent on the effluent discharged from the Chatterton, Maverick Springs, and Circle Ridge facilities.

- i. Merit (and previously Marathon Oil Company) have offered to work with the Tribes to collaboratively review and update the Wind River Reservation Waterbody Classification List to ensure that receiving waters are appropriately classified and adequately protected.”

Response: In developing these four permits, the EPA considered the version of the water quality provisions adopted by the Joint Business Council of the Eastern Shoshone and Northern Arapaho Tribes on October 17, 2007, which included the Tribes' Waterbody Classification List. That list classifies Five Mile Creek as 2C and Mission Creek (upstream from Wyoming Canal) as 2E. The EPA entered into Alternative Dispute Resolution with the petitioners and the Tribes for the issued Phoenix and Wesco permits. As part of the resulting settlement, both the Eastern Shoshone Tribe and the Northern Arapaho Tribes sent the EPA letters describing what each Tribe considered to be “good enough quality” for livestock and agricultural use within the meaning of 40 CFR Part 435, Subpart E, and clarifying their interpretation of the 2007 water quality provisions. The EPA has considered this correspondence in developing these permit limits. If the Eastern Shoshone Tribe and the Northern Arapaho Tribe decide to review and revise their 2007 water quality provisions, the EPA will consider any resulting water quality provisions in future permit cycles. Until that time, however, the EPA will continue to utilize the 2007 water quality provisions and subsequent Tribal clarifications as it develops NPDES permit for the Wind River Indian Reservation. No change has been made in response to this comment.

22. Merit commented, “Incorrect Permit Number - Circle Ridge Permit (Header pages 3 -23): The odd numbered pages, from page 3 through page 23, of the Circle Ridge draft permit incorrectly refer to the permit number for Chatterton (WY-0000922). The header should be corrected on these pages to show the proper permit number for the Circle Ridge Facility (WY-0000949).”

Response: The EPA corrected the Circle Ridge Facility permit header pages 3-23 to the permit number, WY-0000949.

23. Merit commented, “Proposed Location of the Steamboat Butte Outfall 001: The draft permit and Statement of Basis propose relocation of Outfall 001 to the outlet of Upper Mission Pond (Latitude 43.256111° N and Longitude -108.905833° W). Merit requests that these

documents be modified to keep Outfall 001 at the outlet of the final treatment pit (Latitude 43.260278° N and Longitude -108.904444° W). The rationale for not moving Outfall 001 includes:

- i. Merit Energy Company operates the Steamboat Butte field water flood differently than the previous operator (Marathon Oil Company). The end result being the volume of produced water directed to the treatment pits and outfall 001 has been reduced, resulting in greater hydraulic retention time and passive sulfide reduction before the compliance point.
- ii. Marathon failed WET and conducted a TIE/TRE under the current permit (2007) while discharging approximately 32,000 BWP (1.34 MGD). Since Merit has been operating the field, our discharge volume is typically less than 8,000 BWP (0.34 MGD).
- iii. The WET protocol under the current permit did not include an aeration protocol to purge sulfide from the effluent. Under the draft permit, aeration to remove sulfide from the discharge sample is allowed. Thus, Merit believes that the combined result of applying this procedure and the increased hydraulic retention time should result in passing WET at the existing Outfall 001.
- iv. In the SOB USEPA determined that Upper Mission Pond is not a Water of the US. Thus, should Merit fail WET at the current Outfall 001 location and also fail a subsequent test, possible options will be evaluated to reduce toxicity, including relocating the compliance point, if necessary.”

Response: The Permit and the SoB will continue to reflect the location of Outfall 001 at the outlet of the final treatment pit (latitude 43.260278° N, longitude 108.90444° W) for WET testing and all self monitoring requirements. In response to WET non-compliance at Outfall 001, Merit may request the EPA to evaluate possible options to reduce toxicity.

24. Merit commented, “Unnecessary Selenium Testing Requirement - Steamboat Butte Outfall 001: Merit requests that USEPA re-assess the reasonable potential for selenium in the Steamboat Butte SOB and eliminate recurring selenium testing and the associated effluent limit from the permit. Merit believes that the initial TPS shall adequately assess the potential for selenium in the effluent at or below the chronic aquatic life threshold (5 ug/L). Since 2010, the Steamboat Butte outfall has been sampled and analyzed for selenium 21 times (Exhibit A), all but one sample result returned SDL (1.0 ug/L). A single outlier of 13 ug/L was reported in 2011; however, based on the data set and the common interference experienced with Method 200.8, Merit believes this to be a false positive. Merit requests these data be re-considered in the Reasonable Potential Evaluation and the constituent dropped from the Self Monitoring Requirements section of the Steamboat Butte permit. Again, it appears that the TPS would be the most appropriate procedure to monitor for selenium. An excerpt detailing the technical description of the selenium interference is presented:

- i. From [Energy Laboratories’] experience the most common problem in Se analysis by method 200.8 is with samples that have a high Total Dissolved Solid (TDS) matrix. As mentioned earlier, the best mass available for Se analysis is mass 82 and since it is

only naturally present in nature at 8.73 percent, it does not have a lot of ions available to work with. This can be [a] problematic with samples containing low concentrations of selenium in a high TDS matrix. Low concentrations of Se at mass 82 often cannot be distinguished from background noise and periodically are misinterpreted by the instrument as a Se peak. When this occurs, a false positive is recorded. What can complicate this even further is when you throw in a dilution factor, a poor instrument tune, and a transport interference, the bias is even more pronounced. Environmental samples are often diluted prior to analysis because the method requires the analyst dilute the sample to approximately 2,000 mg/L of dissolved solids."

- ii. Energy Laboratories concludes, 'The best method for Se analysis in complicated matrices is either ICP-MS with Collision Cell Technology or Hydride Generation (Standard Method 31148)'."

Response: The EPA reviewed the additional selenium data in Exhibit A for Steamboat Butte Outfall 001. A revised quantitative RP evaluation was performed using the Region 8 RP Tool, which assesses RP from effluent data with statistical procedures consistent with EPA's Technical Support Document for Water Quality Based Toxics Control, March 1991. A confidence interval of 95% was used for all RP calculations. The tool indicated there is no RP for this selenium data set when the single outlier of 13 µg/L reported in 2011 was not included in the analysis. As a result, the EPA accepts the request and analysis to remove the selenium limitation and recurring monitoring for this Permit.

25. Merit commented, "Remove Acute WET Testing Reference - Steamboat Butte Outfall 002: Merit requests that Outfall 002 be removed from the discussion of WET testing in the first paragraph of Part 1.3.5 (page 10). As per page 8 of the permit (Part 1.3.2 Self-Monitoring Requirements Outfall 001 and 002); WET testing, as well as several other self-monitoring requirements, are not required for Outfall 002 because the discharge from Outfall 002 is fresh water overflow from the tribally-owned field fresh water system."

Response: The EPA removed WET testing from Outfall 002 in Part 1.3.5 for the Steamboat Butte Permit. This Permit requires the Permittee to sample only for total flow, specific conductance, pH, and oil and grease for Outfall 002. All other parameters are not applicable (N/A).

26. Merit commented, "Clarification of changed pH limits - Steamboat Butte SOB: Merit agrees with setting the permit pH limits at a range of 6.5 s.u. to 9.0 s.u. (an increase from an upper pH limit of 8.5 s.u. under the previous permit). However, Merit would like to point out that the current active permit already contains a pH limit of 6.5 s.u. to 9.0 s.u. Therefore, the second paragraph under Other Effluent Limits is no longer applicable and should be eliminated."

Response: The EPA made the following changes to all four SOBs under Other Effluent Limits for pH: "pH limitations of 6.5 - 9.0 are based on tribal requirements for aquatic life protection and carried over from the previous permit."

27. R. George & Associates, Inc. provided comments concerning the proposed reduction of sulfate limit from 3,000 mg/L to 2,500 mg/L in the draft permits.

Response: These comments are similar to comments and materials submitted by Merit concerning the 2500 mg/L effluent limit. The EPA has addressed these comments in response 16, above.

No change has been made in response to these comments.