DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER QUALITY DIVISION

MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM (MPDES)

Fact Sheet

Permittee:	US Army Corps of Engineers (USACE)
Permit No.:	MT0031551
Receiving Water:	Missouri River
Facility Information:	
Name	USACE Fort Peck Project Wastewater Treatment Facility
Location	#1 Lower Yellowstone Road Fort Peck, MT McCone County
Facility Contact:	Seth Reedy, Environmental Engineer P.O. Box 208 Fort Peck, MT 59223
Fee Information:	
Number of Outfalls	2 for fee purposes
Outfall – Type	Noncontact cooling water Non-process wastewater (sumps) Passthrough aquarium water

I. Permit Status

This is a renewal of Montana Pollutant Discharge Elimination System (MPDES) permit MT0031551. The 2011-issued permit became effective April 1, 2011 and expired March 31, 2016. The Montana Department of Environmental Quality (DEQ) received an application and fees from the United States Army Corps of Engineers (USACE) for renewal of MT0031551 on October 5, 2015 (2016 MPDES application). DEQ deemed the application complete, and the 2011-issued permit was administratively extended in a letter dated October 30, 2015.

DEQ proposes the following changes with this renewal:

1. Oil and grease WQBEL is removed for sump outfalls 001 and 007
2. Addition of Outfall 003 and 014 and removal of Outfall 023

II. Permit Status

A. Facility Description

USACE requested coverage for 12 outfalls from this facility. The outfalls are grouped as noncontact cooling water, passthrough (noncontact) aquarium water, and sump water. Three outfalls (001, 007, 010) discharge sump water, eight outfalls (002, 003, 004, 005, 006, 012, 013, and 021) discharge noncontact cooling water, and one outfall (014) discharges passthrough aquarium water. **Figure 1a** and **Figure 1b** below illustrate the location of all outfalls in this renewal.

The USACE owns and operates the Fort Peck Project Hydroelectric Power Generation Units (Fort Peck Project). The Fort Peck Project earthen dam was completed in 1940 as part of a jobs creation and flood control project. The Fort Peck dam forms Fort Peck Lake, and the facility discharges to the Missouri River below the dam. Water is diverted from Fort Peck Lake through two tunnels into two powerhouses (Power Plant #1 and Power Plant #2) for electricity generation and cooling for moving parts and ambient air in the dam. Power Plant #1 is typically down for maintenance in the spring, and Power Plant #2 is typically down for maintenance in the fall. **Figure 2** is a flow diagram of water through the Fort Peck Project.

Monitoring requirements were established in the 2011-issued permit for outfalls 001, 007, and 010 representing sumps, and for outfalls 004 and 012 representing noncontact cooling water. The 2018 Inspection Report notes that flow values for the monitored outfalls are calculated using gage measurements obtained throughout the powerhouses. The run-times of the unwatering pumps implemented to empty the sumps are used to calculate sump discharge flow, while a combination of thrust bearing gauges, air exchanger valves, and by-pass flow gauges are used to calculate the flow from monitored noncontact cooling water outfalls.

Figure 1a. USACE Fort Peck Project Power Plants and Outfall Locations

Figure 1b. USACE Fort Peck Project Power Plants and Outfall Locations

Sump Outfalls (001, 007, 010)

Outfall 001 (48°00'44.7" Latitude, - 106°24'42.7" Longitude) – sump water:

Power Plant #1 Sump: The sump collects water from leakage through power plant exterior walls including leakage from Tunnel 1, turbine pits, water stop leakage and gutter drains from various equipment rooms, and un-watering from turbine scroll case. The scroll case is the large pipe that pushes water from the penstock into the turbine that turns the generator. Discharge from outfall 023, defined in the 2011-issued permit, has been redirected into the Power Plant #1 sump and subsequently outfall 001. Discharge from outfall 001 is intermittent at a monthly average of 0.167 million gallons per day (mgd) and an average daily maximum of 0.247 mgd for the Period of Record (POR) of April 2011 through February 2018.

A Turner Designs Hydrocarbon Monitoring Instrument (TD 1000C "Oil in Water Monitor" sensor) was installed at this sump, but is not compatible with the flows discharged from this outfall. Sampling has been done by hand to determine visual sheen and sent for lab analysis if a sheen is present. The sump contains an oil/water separator as a Best Management Practice. Engineering controls allow oil/water layer separation to occur in the sump, which lets any oils accumulated in the sump to remain in the sump pit until removed and only water to be discharged to the tailrace.

Outfall 007 (48°00'47.1" Latitude, - 106°24'42.1" Longitude) – sump water:

Penstock Sump: This sump is located where the two power plants come together. It collects water leakage from Tunnel 2 (feeding Power Plant #2) and the condensation from the Tunnel 2 penstock feeder lines. These leakages and condensates are then routed to the sump through a network of gutters and drains. There is little flow into this sump, consequently the sump discharge pumps activate infrequently. The water in the sump evaporates. Some of the minerals in the sump precipitate out of solution and settle to the bottom or crystallizes on the walls of the sump. Minerals remaining in solution tend to be concentrated. The concentrated solution left behind is high in total dissolved solids (TDS) and total suspended solids (TSS). To decrease TDS and TSS in this sump, a water feed continually flows water into the sump. Biological activity over time in this sump can influence pH. There is an oil/water separator located in this sump.

The four discharge pumps are rated at 150 gallons per minute (gpm). There are no un-watering pumps at this outfall. Discharge is through two three-inch pipes above the water level. Outfall 007 discharges into the tailrace of Power Plant #1. The monthly average discharge is 0.024 mgd and the average daily maximum is 0.033 mgd for the POR April 2011 through February 2018.

Outfall 010 (48°00'48.1" Latitude, - 106°24'47.0" Longitude) – sump water:

Power Plant #2 Sump: (station drainage and un-watering) This sump collects water from leakage through power plant exterior walls including leakage from Tunnel 2, turbine pits, water stop leakage and gutter drains from various equipment rooms. Un-watering is typically associated with removing scroll case water in each turbine during unit maintenance and during out-of-cycle repair work when personnel need to enter the scroll case and physically perform repairs. Discharge occurs daily for

approximately 1.3 hours. The discharge pumps are rated at 250 gpm and un-watering pumps are rated at 3,000 gpm. Discharge occurs through two six-inch and two 12-inch pipes below water level. The monthly average discharge is 0.045 mgd and average daily maximum is 0.101 mgd for the POR April 2011 through February 2018.

A Turner Designs Hydrocarbon Monitoring Instrument (TD 1000C "Oil in Water Monitor" sensor) was installed at this sump, but is not compatible with the flows discharged from this outfall. Sampling has been done by hand to determine visual sheen and sent for lab analysis if a sheen is present. The sump contains an oil/water separator as a Best Management Practice. Engineering controls allow oil/water layer separation to occur in the sump, which lets any oils accumulated in the sump to remain in the sump pit until removed and only water to be discharged to the tailrace.

Non-contact Cooling Water (002, 003, 004, 005, 006, 012, 013)

Outfall 002 (48°00'45.6" Latitude, - 106°24'45.3" Longitude) – non-contact cooling water:

Power Plant #1 Air Conditioner: Raw water from the Fork Peck Lake is used to supply non-contact cooling water to air conditioning systems in the power plant. The seasonal discharge is continuous during the summer months (April through September) at an estimated 0.043 mgd for the POR of August 2013 through 2015. No pump is associated with this outfall. Discharge is through two four-inch pipes above the water level.

Outfall 003 (48°00'45.6" Latitude, - 106°24'45.3" Longitude) – non-contact cooling water:

Power Plant #1 Air Conditioner: Raw water from the Fork Peck Lake is used to supply non-contact cooling water to air conditioning systems in the power plant. The seasonal discharge is continuous during the summer months (April through September) at an estimated 0.086 mgd for the POR of August 2013 through 2015. No pump is associated with this outfall. Discharge is through one three-inch pipe above the water level, located directly below Outfall 002. This outfall is newly requested with the 2016 MPDES renewal application and is added in this 2018 permit renewal.

Outfall 004 (48°00'44.5" Latitude, - 106°24'43.7" Longitude) – non-contact cooling water:

Power Plant #1 Generator: Raw water is used to supply non-contact cooling for cooling generators and associated oil cooling systems. The discharge is continuous when the generators are operating. The monthly average discharge is 0.353 mgd and the average daily maximum discharge is 0.719 mgd for the POR April 2011 through February 2018. Flow is measured with an inline flow meter. Discharge is through an 8" pipe below the water level of the tailrace for each unit. No pump is associated with this outfall.

Outfall 005 (48°00'45.5" Latitude, - 106°24'43.5" Longitude) – non-contact cooling water:

Power Plant #1 Generator: Raw water is used to supply non-contact cooling for cooling generators and associated oil cooling systems. The discharge is continuous when the generators are operating. The monthly average discharge is 0.173 mgd for August 2013 through August 2015. Flow is measured with an inline flow meter. Discharge is through an 8" pipe below the water level of the tailrace for each unit. No pump is associated with this outfall.

Outfall 006 (48°00'45.9" Latitude, - 106°24'43.2" Longitude) – non-contact cooling water:

Power Plant #1 Generator: Raw water is used to supply non-contact cooling for cooling generators and associated oil cooling systems. The discharge is continuous when the generators are operating. The monthly average discharge is 0.173 mgd for August 2013 through August 2015. Flow is measured with an inline flow meter. Discharge is through an 8" pipe below the water level of the tailrace for each unit. No pump is associated with this outfall.

Outfall 012 (48°00'47.3" Latitude, - 106°24'47.2 Longitude) – non-contact cooling water:

Power Plant #2 Generator Cooling: Raw water used to supply non-contact cooling water for cooling generators and associated oil cooling systems. There is no pump at this outfall. Discharge for each unit is through an eight-inch pipe below the water level. The discharge is continuous when the generator is operating. The monthly average discharge is 0.842 mgd and the average daily maximum is 1.15 mgd for the POR April 2011 through February 2018. As an engineering control, thrust bearing oil coolers have a regulating valve downstream of the unit that maintains penstock water pressure inside the cooler to ensure no oil entering the non-contact cooling water being discharged.

Outfall 013 (48°00'47.9" Latitude, - 106°24'47.3" Longitude) – non-contact cooling water:

Power Plant #2 Generator Cooling: Raw water is used to supply non-contact cooling water for cooling generators and associated oil cooling systems. There is no pump at this outfall. Discharge for each unit is through an eight-inch pipe below the water level. The discharge is continuous when the generator is operating. The estimated average daily discharge is calculated as 0.971 mgd for the POR of August 2013 through 2015. As an engineering control, thrust bearing oil coolers have a regulating valve downstream of the unit that maintains penstock water pressure inside the cooler to ensure no oil entering the non-contact cooling water being discharged.

Outfall 021 (48° 00' 37.5" Latitude, - 106° 25' 16.2" Longitude) – non-contact cooling water:

Power Plant #1 Battery Room Air Conditioner (A/C) (main use): Non-contact cooling water is used for air conditioning. The A/C unit for Outfall 021 is not in service and no in-service date has been established. When in operation, the seasonal discharge is continuous from April through September. The estimated average daily discharge is 0.014 mgd. The discharge is through one four-inch pipe.

Other intermittent flow contributions to this outfall are: 1) the raw water strainer unit which supplies plant raw water on demand during annual maintenance, and, 2) battery-room eyewash/emergency shower units (only potable water is piped into these two units).

The eye-wash stations and deluge shower use a potable water supply. The stations are tested semi-annually and the discharge is approximately five (5) gallons per test. The Battery Room A/C unit in Power Plant #1 is a raw water non-contact cooling system. There is no Battery Room A/C unit associated with Power Plant #2. The Battery Room floor drains in both Power Plants have plugs in them. When in service, the A/C unit is brought back on line then it will utilize a non-contact raw water passthrough system.

Outfall 023 (48° 00' 44" Latitude, - 106° 24' 42" Longitude) – Terminated:

Power Plant #1 Cable Tunnel Air Conditioner: This outfall has been discontinued and was not included in the 2016 MPDES renewal application. The flow is diverted to the sump associated with outfall 001, and discharged there.

Passthrough Aquarium Water

Outfall 014 (48°00'37.5 Latitude, - 106°24'16.2" Longitude) – aquarium water:

This outfall is new with the 2016 MPDES renewal application and discharges passthrough that is filtered to remove large particles. Interpretive Center discharge water feeds two aquariums (8,000 gal and 12,000 gal) for visitors to view local fish species. Water is fed from Power Plant #1 Penstock #3 and Power Plant #2 main tunnel with a 10-inch steel pipe that feeds the City of Fort Peck water treatment facility (WTF). An eight-inch pipe branches off the 10-inch line and feeds the interpretive center aquariums with overflow from the aquariums making up the discharge. The seasonal discharge is continuous during October through April, estimated at approximately 0.432 mgd. There are no pumps associated with this outfall, and discharge is through one 16-inch steel pipe directly to the Missouri River, or onto a cobbled, vegetated bank before reaching the river at low flows. Figure 3 illustrates water flow through the Interpretive Center aquariums.

C. Additional Information

The Fort Peck Project is an electrical generating facility under Standard Industrial Classification code 4911 (Office of Management and Budget, Standards Industrial Classification Manual, 1987). The Fort Peck Project is not an industrial activity subject to the storm water permit requirements.

No sanitary wastewater is discharged at the Fort Peck Project because the facility is connected to the nearby Town of Fort Peck sanitary sewer system. The Fort Peck Project pipes raw water from Fort Peck Lake to the Town of Fort Peck and in turn receives potable water from the town.

B. Effluent Characteristics

DEQ characterized the USACE Fort Peck Project effluent based on review of the Discharge Monitoring Reports (DMRs) for the Period of Record of April 2011 through March 2018 (POR) and the complete application received October 5, 2015 (2016 MPDES application). As part of the 2011 MPDES application, the permittee submitted sample results for one grab sample obtained in 2010 from each of the sump outfalls (Outfall 001, 007, and 010) for parameters other than flow, pH. and oil and grease. Facility operations have not changed since the 2011 MPDES application, so grab sample collected in 2010 are considered relevant to the 2016 MPDES application and are used in effluent characterization for this renewal. **Table 1** summarizes samples obtained from each sump outfall (001, 007, and 010) for the monitoring POR and **Table 2** summarizes grab samples from sump outfalls for the permit renewal applications. **Table 3** summarizes flow and temperature data for outfalls where only noncontact cooling water is discharged.

The effluent limitations in the 2011-issued permit are as follows:

<u>Sump Outfalls (001, 007, and 010)</u>

- The pH must be maintained between 6.5 and 9.0 standard units.
- Oil and grease must be present in concentrations less than 10 mg/L.

<u>Noncontact Cooling Water Outfalls (002, 004, 005, 006, 012, 013, 021, and 023)</u>

- The maximum discharge temperature of noncontact cooling water must not exceed 80°F.
- The minimum discharge temperature of noncontact cooling water must be greater than 32°F.

Table 1. Sump Outfall (001, 007, 010) Effluent Characteristics

Parameter	Units	Outfall 001		Outfall 007		Outfall 010	
		number of records	value	number of records	value	number of records	value
Flow[1]	mgd	83	0.167/0.247[2]	83	0.024/0.033[2]	82	0.045/0.101[2]
Temperature[3]	°F	25	47.7/58.8[4]	25	47.7/60.0[4]	25	54.3/70.0[4]
pH[1]	S.U.	166	6.06/8.51[5]	166	6.69/9.89[5]	164	6.76/8.86[5]
Oil and grease[1]	mg/L	7	<1.0/1.0[4]	7	<1.0/1.0[4]	7	2.0/7.0[4]

Footnotes:

(1) POR April 2011 through March 2018
(2) Values shown as monthly average/average daily maximum. The 2018 inspection report indicates that monthly averages were calculated incorrectly during this POR.
(3) POR August 2013 through 2015
(4) Values shown as average/maximum
(5) Values shown as minimum/maximum

Table 2. Sump Outfall (001, 007, 010) Effluent Grab Sampling Results June-July 2010

Parameter[1]	Units	Outfall 001		Outfall 007		Outfall 010	
		number of records	value	number of records	value	number of records	value
Total Suspended Solids	mg/L	1	3	1	18	1	3
Biochemical Oxygen Demand	mg/L	1	<3	1	12	1	<3
Chemical Oxygen Demand	mg/L	1	12	1	31	1	17
Total Organic Carbon	mg/L	1	1.8	1	7.6	1	1.7
Ammonia	mg/L	1	<0.05	1	0.18	1	<0.05
Total Kjeldahl Nitrogen, as N (TKN)	mg/L	1	0.2	1	0.8	1	0.3
Nitrate + Nitrite, as N	mg/L	1	0.31	1	0.37	1	0.01
Total Phosphorus, as P	mg/L	1	0.01	1	0.02	1	0.01
Total Dissolved Solids	mg/L	1	373	1	1240	1	368
Specific Conductivity	umhos/cm	1	631	1	1810	1	614
Chloride	mg/L	1	10	1	21	1	10
Sulfate	mg/L	1	146	1	711	1	128
Alkalinity, as $CaCO_3$	mg/L	1	162	1	149	1	162
Acidity, as $CaCO_3$	mg/L	1	<5	1	<5	1	<5
Antimony	µg/L	1	<3	1	<3	1	<3
Arsenic	µg/L	1	4	1	5	1	4
Beryllium	µg/L	1	1	1	<1	1	<1
Cadmium	µg/L	1	<0.08	1	0.32	1	0.08
Chromium	µg/L	1	<1	1	1	1	<1
Copper	µg/L	1	2	1	8	1	4
Lead	µg/L	1	0.8	1	16	1	3.1
Mercury	µg/L	1	0.01	1	0.02	1	<0.01
Nickel	µg/L	1	<10	1	10	1	<10
Selenium	µg/L	1	<1	1	2	1	1
Silver	µg/L	1	<0.5	1	<0.5	1	<0.5
Thallium	µg/L	1	<0.2	1	<0.2	1	<0.2
Zinc	µg/L	1	10	1	40	1	20
Cyanide	µg/L	1	<5	1	<5	1	<5
Hardness	mg/L	1	212	1	97	1	182
Total phenolic compounds	mg/L	1	<0.01	1	<0.01	1	<0.01

Footnotes:
(1) Metals are all Total Recoverable.

Table 3. Non-contact Cooling Water Outfall (002, 003, 004, 005, 006, 012, 013, 021) and Passthrough Aquarium Water Outfall 014 Effluent Characteristics

Outfall	Flow (mgd)		Temperature (ºF)	
	number of records	value	number of records	value
002[1,2]	1	0.043 (calculated)	1	60
003[1,2]	1	0.086 (calculated)	1	60
004	80	0.353/0.719[3]	77	58.9/75.0[4]
005[2]	1	0.173	1	58.3
006[2]	1	0.173	1	58.3
012	80	0.842/1.15[3]	80	58.7/79.0[4]
013[2]	1	0.971 (calculated)	1	54.9
021[2]	1	0.014 (calculated)	1	50
014 (Aquarium)[5]	1	0.432	12	46.3/55.9

Footnotes:
(1) Seasonal discharge April-September
(2) POR August 2013 through August 2015
(3) Values shown as monthly average/average daily maximum for POR April 2011 through March 2018
(4) Values shown as average/maximum for POR April 2011 through March 2018
(5) Seasonal discharge October-April.

C. Compliance History

Permit violations noted during the POR April 2011 through July 2018 are:

- DEQ noted two pH exceedances of the maximum pH limit at outfall 007 in April and May 2011. A follow-up letter from the WTF explained that exceedances resulted from a valve that normally runs water through the gutter being inadvertently shut off.
- DMRs were submitted late for reporting periods ending August 31, September 30, and October 31, 2011 due to clerical error. Two pH exceedances of the minimum pH limit at outfall 001A during June and October.

DEQ inspected the USACE Fort Peck project WTF on March 12, 2012 and May 16, 2018. DEQ documented the following findings in the 2018 inspection reports:

- improper calculation of flow monthly averages
- improper calculation of temperature monthly averages.

III. Rationale for Proposed Technology-Based Effluent Limits

A. Applicability

Federal regulations at 40 Code of Federal Regulations (CFR) 122.44(a) require that permits include, at a minimum, effluent limits based on applicable technology-based standards. Technology-based effluent limits (TBELs) may be national standards established by the EPA, or, in some cases, standards established by the permit writer on a case-by-case basis.

EPA promulgates national technology-based standards of performance, effluent limit guidelines (ELGs) at 40 CFR Subchapter N for dischargers other than publicly-owned treatment works. There are no federal ELGs for hydroelectric power generation. When EPA has not promulgated a standard for a specific industry, permit limits may be based on best professional judgment (BPJ). Development of a limit through BPJ considers the same statutory factors EPA staff would use to promulgate a national effluent guideline, and apply circumstances relating to the applicant. In the 2011-issued permit, TBELs were based on BPJ because the USACE Fort Peck Project is not a new source and EPA has not established ELGs for hydroelectric power generation.

TBELs established in the 2011-issued permit, are:

- Oil/water separators to control oil and grease for the sump outfalls; and
- Limit the minimum and maximum discharge temperatures of noncontact cooling water (≥32°F minimum and ≤80°F maximum)

The discharge from the sump outfalls (001, 007, and 010) includes water collected from leakage through exterior walls, leakage from the tunnels, turbine pits, water stop leakage, and gutter drains from various equipment rooms (DEQ Inspection Report, June, 2018). Oil/water separators are present and operating in the three sumps at the Fort Peck Project to remove minor amounts of oil that may enter the sumps.

The discharge from noncontact cooling water outfalls (002, 003, 004, 005, 006, 012, 013, and 021) is used to cool large moving parts within the turbines and generators and passes through coils in HVAC units to maintain ambient temperature in the dam. Most of the total facility discharge is noncontact cooling water that has an initial temperature of 50°F and is warmed after being used to cool dam equipment and ambient dam temperature in warmer months of the year, or is cooled when the ambient dam temperature is less than 50°F in the colder months of the year.

B. Proposed TBELs

TBELs established in the 2011-issued permit, are maintained in this renewal:

- Oil/water separators to control oil and grease for the sump outfalls; and
- Limit the minimum and maximum discharge temperatures of noncontact cooling water

C. Nondegradation

The Montana nondegradation policy requires a significance review for dischargers defined as a new or increased source. The Fort Peck Project dam was completed in 1940. Power Plant #1 began operating in 1951 and Power Plant #2 began operating in 1961. New or increased sources are activities resulting in a change of existing water quality occurring on or after April 29, 1993. The Fort Peck Project is not a new or increased source; and therefore, a significance determination is not required.

IV. Water Quality-Based Effluent Limits

Permits are required to include water quality-based effluent limits (WQBELs) when TBELs are not adequate to protect state water quality standards. Montana water quality standards define both water use classifications for all state waters and numeric and narrative standards that protect their designated uses. No wastes may be discharged that can reasonably be expected to violate any state water quality standards.

A. Receiving Water

Discharges from the Fort Peck Project are to the Missouri River, which is identified as United States Geological Survey (USGS) Hydrologic Unit Code (HUC) 10060001 and Montana stream segment MT40S001_011. The river is classified as B-2 from the Fort Peck Dam to the Milk River. Class B-2 waters are to be maintained suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

The DEQ Draft 2018 Water Quality Integrated Report designates the receiving water as not fully supporting aquatic life with probable causes of alteration in stream-side or littoral vegetative covers, flow regime modification, and temperature. The probable source for these three impairments is "Impacts from Hydrostructure Flow Regulation." The receiving water has been listed as impaired for temperature on the 303(d) list since 2002 and a Total Maximum Daily Load (TMDL) has not been completed.

The USGS maintains a gaging station (USGS 06132000) eight miles below the Fort Peck Project. Based on data from 1937 to the present, the 7Q10 (7-day average low flow expected to occur on average once in 10 years) of the Missouri River 879 cubic feet per second (cfs). However, the 2011-issued permit renewal used 3,000 cfs because historical data does not reflect an accurate current 7Q10 for the Missouri River because it was averaged over 62 years and now the discharge from the dam controls the flow of the Missouri River below Fort Peck Lake (email from Peter McCarthy at USGS. October 20, 2010). The USACE, Omaha District, Water Management Division has established by-standing orders that the minimum discharge flow from the Fort Peck Project will be no less than 3,000 cfs (equal to 1939 mgd) for the combined power plants (USACE Command Order ST-1. 1993). The discharge value 1939 mgd will be used as the critical low flow of the river in this permit.

Receiving Water Data

DEQ obtained ambient water quality data from the Missouri River approximately 15 miles downstream of facility outfalls from monitoring done by Assiniboine & Sioux Tribes in August 2015. **Table 4** provides a summary of the ambient water quality data collected from the receiving water that is used in Reasonable Potential analysis. The only available data relevant to the pollutants of concern is one sample representing total recoverable lead monitoring data collected approximately 15 miles downstream of the facility outfalls. Lead is the only metal considered a pollutant of concern because the effluent metals concentrations are above the most stringent known water quality criteria.

The Circular DEQ-7 human health water quality standard for lead in surface water is 15 µg/L, but the aquatic life water quality criteria cannot be determined. The aquatic life water quality criteria for lead is hardness-based, however no hardness data is available in the area where lead data was collected.

Table 4. Missouri River Water Quality Data – Downstream

Parameter	Units	Receiving Water Value	Number of Samples	Monitoring Data Source
Lead, Total Recoverable	µg/L	0.12	1	Assiniboine & Sioux Tribes Fort Peck Indian Reservation (MT)

B. Applicable Water Quality Standards

Discharges to surface waters classified B-2 are subject to the specific water quality standards of ARM 17.30.624, Department Circulars DEQ-7, DEQ-12A, and DEQ-12B, as well as the general provisions listed in ARM 17.30.635 through 637. The applicable water quality criteria are pH and temperature standards.

- A one-degree (°F) maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 66°F.
- Where the naturally occurring water temperature is 66.5°F or greater, the maximum allowable increase in water temperature is 0.5°F.
- A 2°F per-hour maximum decrease below naturally occurring water temperature is allowed within the range of 55°F.
- Induced variation of hydrogen ion concentration (pH) within the range 6.5 to 9.0 must be less than 0.5 pH units.

C. Mixing Zone

DEQ adopted rules governing the granting of mixing zones at ARM 17.30, Subchapter 5. Mixing zones are granted by DEQ only when a mixing zone is needed (where a discharger cannot meet the applicable numeric water quality standard at the point of discharge), and when it is appropriate (based on the criteria specified in the regulations). No mixing zone will be granted that will impair beneficial uses.

Mixing zones are applied on a parameter-by-parameter basis based on parameters of concern. Parameters of concern identified below in **Table 5** are not eligible for dilution or a standard mixing zone and no dilution is granted for Reasonable Potential analysis.

D. Basis and Calculations for Reasonable Potential Analysis and WQBELs

DEQ assesses the need for a WQBEL for each pollutant of concern (POC). Pollutants and parameters are identified as POC for one or more of the following reasons: because they have listed TBELs; were identified as needing limits in the previous permit; are identified as present in the effluent through monitoring or otherwise expected present in the discharge; or are pollutants

associated with impairment which may or may not have a Wasteload Allocation (WLA) in a TMDL. **Table 5** lists the basis for each POC.

Table 5. Identification of Parameters of Concern

Parameter	Outfall	Basis for Identifying as POC
pH	001, 007 and 010	Previous Permit Limits
Oil & Grease	001, 007 and 010	Previous Permit Limits
Temperature	002, 003, 004, 005, 006, 012, 013, 014, and 021	Previous Permit Limits
Lead	007	Observed present

Limitations must be established in permits to control all pollutants or pollutant parameters that are or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard. MPDES permit limits must control all pollutants which will cause, or have Reasonable Potential (RP) to cause or contribute to an excursion above any water quality standard, including narrative criteria.

The USACE Fort Peck Project does not discharge sanitary wastewater because the facility is connected to the Fort Peck sanitary sewer system. Therefore, there are no sources of biological material or total residual chlorine in the effluent. The facility processes do not include sources of ammonia, nutrients, or volatile organic compounds not associated with oil and grease. Oil and grease and pH are pollutants of concern because of the presence of turbine oils at the facility. Once-through non-contact cooling water discharges associated with each generator unit and air conditioning unit have no known additives or pollutant sources, however temperature is a pollutant of concern due to the temperature gradient from the noncontact cooling water to the receiving water.

Reasonable Potential Analysis

DEQ can perform RP analysis numerically or narratively. When RP analysis is performed numerically, DEQ uses a mass balance equation (see *Equation 1* and *Equation 2*) to determine RP and develop WQBELs, based on *EPA's Technical Support Document for Water Quality-based Toxics Control, March 1991* (TSD), EPA/505/2-90-001.

$$C_r = \frac{C_d Q_d + C_s Q_s}{Q_d + Q_s} \qquad \textit{(Equation 1)}$$

Given:

C_r = the resulting receiving water concentration
Q_d = critical discharge rate
Q_s = instream flow available for dilution (critical low flow x available % for dilution)
C_d = critical effluent pollutant concentration (maximum discharge concentration x TSD multiplier)
C_s = critical ambient pollutant concentration (75^{th} percentile concentration)

RP for the facility discharge to cause exceedances of water quality standards is evaluated using *Equation 1*, and presented in **Attachment A**. The critical effluent concentration (C_d) is obtained following the method recommended by the EPA's TSD. A multiplier is determined using TSD methods, based on the dataset statistics.

WQBELs must be developed for any parameter for which there is RP to cause or contribute to exceedances of instream numeric or narrative water quality standards. To establish WQBELs for an existing discharger DEQ first calculates WLAs. As shown in *Equation 2*, the mass-balance equation can be arranged to calculate the WLA (C_{WLA}) so that the discharge does not cause or contribute to an exceedance of the applicable water quality standard under critical conditions.

$$C_{WLA} = \frac{Q_r C_r - Q_s C_s}{Q_d} \qquad \textit{(Equation 2)}$$

Given:

C_{WLA} = calculated wasteload allocation necessary to achieve instream water quality standard
Q_d = critical discharge rate
$Q_r = Q_d + Q_s$
C_r = water quality standard
Q_s = instream flow available for dilution (critical low flow x available % for dilution)
C_s = critical upstream ambient pollutant concentration (75^{th} percentile concentration)

The WLAs are then translated into average monthly limitations (AMLs) and maximum daily limitations (MDLs) using TSD multipliers.

The following subsections discuss the basis for the RP and WQBELs in this permit.

1. Outfalls 001, 007 and 010 (Sumps)

pH – The 2011-issued permit included a pH limit "The pH must be maintained between 6.5 and 9.0 standard units. pH in effluent from Outfall 001, Outfall 010 and Outfall 007 was less than 6.5 and greater than 9.0 during the POR of April 2011 through March 2018 for two excursions for Outfall 001 in 2012 and two excursions for Outfall 007 in 2011. pH limits are maintained in this renewal. pH must be maintained between 6.5 and 9.0 standard units (s.u.).

Oil and Grease – Montana regulations require state waters be free from substances attributable to discharges that will result in concentrations of oil and grease at or in excess of 10 mg/L. The 2011-issued permit included an oil and grease limit of 10 mg/L. Oil/water separators are used to control oil and grease in sump effluent.

Reasonable potential for the facility discharge to cause exceedances of the oil and grease water quality standards were evaluated using the following values in *Equation 1*.

Outfall 001
Given:
Q_d = 0.247 mgd average daily maximum
Q_s = 0 mgd (7Q10 x available dilution of 0%)
C_d = 2.0 mg/L (maximum observed (1.00 mg/L) x TSD multiplier (2.0))
C_s = 0 mg/L
Calculated Result:
C_{r001} = 2.0 mg/L oil and grease

Outfall 007
Given:
Q_d = 0.033 mgd average daily maximum
Q_s = 0 mgd (7Q10 x available dilution of 0%)
C_d = 2.0 mg/L (maximum observed (1.00 mg/L) x TSD multiplier (2.0))
C_s = 0 mg/L
Calculated Result:
C_{r007} = 2.0 mg/L oil and grease

Outfall 010
Given:
Q_d = 0.101 mgd average daily maximum
Q_s = 0 mgd (7Q10 x available chronic dilution of 0%)
C_d = 14.0 mg/L (maximum observed (7.00 mg/L) x TSD multiplier (2.0))
C_s = 0 mg/L
Calculated Result:
C_{r010} = 14.0 mg/L oil and grease

Using the above calculated critical effluent concentrations (C_d) and receiving water concentration (C_s), average discharge (Q_d) and low flow rate based on 0% of the 7Q10 (Q_s) in *Equation 1*, the resulting downstream pollutant concentration (C_r) is calculated as 2.0 mg/L for outfall 001 and 007, and 14.0 mg/L for outfall 010. C_r is greater than the water quality standard for outfall 010, therefore DEQ finds that the facility has RP to exceed the oil and grease standard and an effluent limit is required (see **Attachment A**). The permit limit of 10 mg/L is maintained in this renewal for sump outfall 010.

Total Recoverable Metals – Grab samples for metals in the Fort Peck Project sump discharge were collected in June, 2010. A TMDL has not been completed. The receiving water, the Missouri River below the dam, is not listed as impaired for metals. There is no relevant hardness data available for determination of metals acute or chronic aquatic life standards for the Missouri River.

The 2010 data submitted with the 2016 application indicates a sump outfall 007 effluent lead concentration greater than the human health standard of 15 µg/L. Acute and chronic standards are

unknown due to lack of hardness data. The water flow through the facility does not include any process that is likely to contribute metals. Concentration for all other metals were below the most stringent water quality criteria, except in the case of hardness-based water quality criteria, which could not be calculated due to lack of hardness data.

Fort Peck Lake, which provides source water for sump outfalls, does not fully support drinking water or aquatic life beneficial uses (DEQ Draft 2018 Water Quality Integrated Report, MT40E004_010) and is on the 303(d) list as impaired for lead. The elevated lead concentrations in facility effluent are most likely the result of pre-existing conditions upstream of the outfalls. Based on water quality information for intake water and receiving water bodies, and that there are no processes or materials likely to contribute lead to the facility discharge, DEQ determines there is not reasonable potential for the discharge to cause or contribute to an exceedance of the lead water quality standard at this facility.

2. Outfalls 002, 003, 004, 005, 006, 012, 013, and 021 (Noncontact cooling water)

Once-through non-contact cooling water discharges associated with each generator unit and air conditioning unit have no known additives or pollutant sources except temperature. Outfall 014 represents passthrough water that is not used for cooling, but may transfer a small amount of heat to the receiving water. Total discharge flow from noncontact cooling water sources is a maximum of 3.2 mgd as calculated from discharges at outfalls 002, 003, 005, 006, 013, and 021, and average daily maximum flows summarized in the DMR for outfalls 004 and 012.

Temperature – The 2011-issued permit includes limits for temperature for only the noncontact cooling water outfalls. Water temperature at approximately 140 feet below the surface of Fort Peck Lake remains relatively constant at 50°F except during the winter months when it drops to a cooler temperature.

The applicable water quality standard is relevant to a maximum increase of one degree (°F). Reasonable Potential analysis is completed below using the concept of heat energy transfer from effluent to receiving water to determine if the receiving water temperature may be raised by greater than one degree (°F).

Given: 1 (one) British Thermal Unit (BTU) is the amount of heat necessary to raise 1 (one) pound of water 1°F.

volume of water (gal/day) x *unit conversion factor (lb/gal)* x *change in temperature (°F) = BTUs*

The maximum temperature discharged from noncontact cooling water is 79°F (MPDES application), measured at outfall 012. The upstream water temperature at approximately 140 feet below the surface of Fort Peck Lake remains relatively constant at 50°F except during the winter when it becomes colder.

Then: If the total non-contact cooling water effluent volume was at the maximum recorded temperature of 79°F, then 4.1 mgd of non-contact cooling water will have been raised

29F by the time it is discharged to the receiving water. If the total non-contact cooling water effluent volume was at the maximum TBEL of 80°F, then 4.1 mgd of non-contact cooling water will have been raised 30°F (80°F - 50°F) by the time it is discharged to the receiving water.

The calculation below demonstrates that $9.9x10^8$ BTUs is required to increase the temperature of the noncontact cooling water effluent discharge by 29°F to reach the max recorded effluent temperature (79F at outfall 012).

$$4.1 \text{ mgd} \times \frac{8.34 \text{ lb}}{1 \text{ gal.}} \times 29°F = 9.9x10^8 \text{ BTUs}$$

The calculation below demonstrates that $1.03x10^9$ BTUs is required to increase the temperature of the noncontact cooling water effluent discharge by 30°F to reach the maximum temperature TBEL (80F).

$$4.1 \text{ mgd} \times \frac{8.34 \text{ lb}}{1 \text{ gal.}} \times 30°F = 1.03x10^9 \text{ BTUs}$$

The calculation below demonstrates $1.62x10^{10}$ BTUs is required to increase the total receiving water (1,939 mgd) temperature by the maximum water quality criteria temperature increase of 1°F.

$$1{,}939 \text{ mgd (3,000 cfs)} \times \frac{8.34 \text{ lb}}{1 \text{ gal.}} \times 1°F = 1.62x10^{10} \text{ BTUs}$$

Therefore:

If the maximum volume (4.1 mgd) of noncontact cooling water is discharged at the maximum temperature of 79°F (temperature raised 29°F), the effluent would transfer only $9.9x10^8$ BTUs to the receiving water, which is not enough to increase the entire receiving water temperature 1°F (1.62×10^{10} BTUs), and the discharge would not exceed the water quality standard for temperature in the receiving water.

If the maximum volume (4.1 mgd) of noncontact cooling water is discharged at the maximum TBEL of 80°F (temperature raised 30°F), the effluent would transfer only $1.03x10^9$ BTUs to the receiving water, which is not enough to increase the entire receiving water temperature 1°F (1.62×10^{10} BTUs), and the discharge would not exceed the water quality standard for temperature in the receiving water.

The comparison demonstrated in the calculations above shows no reasonable potential for effluent to raise the receiving water temperature to exceed the water quality standard, as the energy required to increase the total receiving water temperature above the maximum water quality criteria is greater than the energy required to increase the effluent to the maximum

recorded temperature or to the proposed TBEL maximum. No WQBEL is developed for temperature in this renewal.

3. Outfall 014 (passthrough aquarium water)
   Since 2011, outfall 014 effluent is discharged through surface drains and is piped to the Missouri River after being used in two aquariums for fish native to Fort Peck Lake. Because the water in the aquariums is drawn from Fort Peck Lake and is maintained at conditions optimal for aquatic life in the receiving water, there are no parameters of concern for outfall 014 and no WQBELs are established.

E. Proposed WQBELs

Proposed WQBELs in this permit renewal are:

Oil and grease must be present in concentrations at or less than 10 mg/L in effluent from Outfall 010.

pH must be maintained between 6.5 and 9.0 standard units (s.u.)

V. Proposed Final Effluent Limits

Effluent limitations or conditions in reissued permits must be at least as stringent as those in the existing permit, with certain exceptions. Federal regulations require permits to contain the more stringent TBEL or WQBEL limitation applicable to an individual pollutant. DEQ considered the proposed permit limits to ensure that they were as stringent as previous limits, or met the anti-backsliding requirements. **Table 6** and **Table 7** summarize the proposed final effluent limits in this permit renewal.

Beginning on the effective date and lasting through the term of the permit, the discharge from Outfall 001, 007, and 010 shall, at a minimum, meet the following effluent limits:

A. Outfalls 001, 007 and 010 (sumps)

Table 6. Proposed Final Effluent Limits for Sump Outfalls 001, 007, and 010

		Effluent Limitations[1]			
Parameter	**Units**	**Average Monthly Limit**	**Average Weekly Limit**	**Maximum Daily Limit**	**Instantaneous Maximum Limit**
pH[2]	s.u.	--	--	--	6.5 – 9.0
Oil and Grease[3]	mg/L	--	--	--	10

Footnotes:
(1) See Definition section at end of permit for explanation of terms.
(2) Effluent pH shall remain between 6.5 and 9.0 (instantaneous minima and maxima). For compliance purposes, any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.
(3) This limit applies to Outfall 010 only.

The pH must be maintained between the range of 6.5 to 9.0 standard units in effluent from Outfalls 001, 007, and 010.

Oil and grease must be present in concentrations at or less than 10 mg/L in effluent from Outfall 010.

Oil/water separators must be maintained to control oil and grease in effluent form Outfalls 001, 007, and 010.

B. Noncontact Cooling Water Outfalls 002, 003, 004, 005, 006, 012, 013, and 021

Table 7. Proposed Final Effluent Limits for Non-contact Cooling Water Outfalls 002, 003, 004, 005, 006, 012, 013, and 021

		Effluent Limitations[1]			
Parameter	**Units**	**Average Monthly Limit**	**Average Weekly Limit**	**Maximum Daily Limit**	**Instantaneous Maximum Limit**
Temperature[2]	°F	--	--	--	32 – 80

Footnotes:
(1) See Definition section at end of permit for explanation of terms.
(2) Effluent temperature shall remain between 32°F and 80°F (instantaneous minima and maxima). For compliance purposes, any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

The maximum discharge temperature of noncontact cooling water must not exceed 80°F.

The minimum discharge temperature of noncontact cooling water must be greater than 32°F.

VI. Monitoring Requirements

A. Effluent Monitoring

Self-monitoring and reporting of the quality of the effluent discharged is required by the permit. The samples collected and analyzed must be representative of the volume and nature of the effluent discharged from the facility. All analytical methods used to determine the effluent quality must be an approved method as listed in 40 CFR Part 136 and sufficient to either have a detection or meet the required reporting levels specified. The monitored parameters and the reporting requirements are presented below in **Table 8, Table 9, and Table 10**.

A. Sump Outfalls 001, 007, and 010

Monitoring of effluent discharged at Outfall 001, Outfall 007 and Outfall 010 shall be conducted in the sumps. Monitoring established in the 2011-issued permit is retained in this renewal. Fort Peck Project is in the process of replacing the TDC1000CD monitors with Leakwise ID-221 sensors with SLC-220 digital signal processor controllers. Installation is scheduled to be complete by March 2019. The power house control room is staffed 24 hours a day, 7 days a week. The operator, upon receiving an annunciation for alarm would then have to respond to the sump area to put the oil water separator into continual operation and to manually turn off the discharge and dewatering pumps.

Table 8. Monitoring Requirements for Sump Outfalls 001, 007, and 010

Parameter	Unit	Sample Location	Sample Frequency	Sample Type[1]
Flow[2]	mgd	Effluent	1/Week	Instantaneous/Calculated
pH	s.u.	Effluent	1/Month	Instantaneous[4]
Oil & Grease[3]	mg/L	Effluent	1/Quarter	Instantaneous[4]

Footnotes:
(3) See Definition section at end of permit for explanation of terms.
(4) Flow measurement based on pump curves or other similar method.
(5) Use EPA Method 1664, Revision A: N-Hexane Extractable Material (HEM), or equivalent.
(6) Grab samples may be taken in lieu of instantaneous samples.

B. Noncontact Cooling Water Outfalls 004 and 012

Monitoring locations for Outfall 004 and 012 provide representative effluent temperature data for Power Plant #1 and Power Plant #2. Monitoring established in the 2011-issued permit is retained in this renewal.

Table 9. Monitoring Requirements for Non-contact Cooling Water Outfalls 004 and 012

Parameter	Unit	Sample Location	Sample Frequency	Sample Type[1]
Flow	mgd	Effluent	1/Week	Instantaneous
Temperature	°F	Effluent	1/Week	Instantaneous

Footnotes:
(1) See Definition section at end of permit for explanation of terms.

Maximum monthly, minimum monthly and average monthly temperature for noncontact cooling water from each power plant will be reported on the DMR.

C. Passthrough Aquarium Outfall (014)

Monitoring locations for Outfall 014 will be established by the permittee at a location that provides representative effluent temperature data for the Fort Peck Dam interpretive center aquarium.

Table 10. Monitoring Requirements for Passthrough Aquarium Water Outfall 014

Parameter	Unit	Sample Location	Sample Frequency	Sample Type [1]
Flow	mgd	Effluent	1/Week	Instantaneous
Temperature	°F	Effluent	1/Week	Instantaneous

Footnotes:
(1) See Definition section at end of permit for explanation of terms.

VII. Information Sources

1. Montana Code Annotated Title 75 - Environmental Protection Chapter 5 - Water Quality.
2. Administrative Rules of Montana Title 17 Chapter 30 - Water Quality
   a. Subchapter 2 - *Water Quality Permit and Application Fees*.
   b. Subchapter 5 - *Mixing Zones in Surface and Ground Water*.
   c. Subchapter 6 - *Montana Surface Water Quality Standards and Procedures*.
   d. Subchapter 7- *Nondegradation of Water Quality*.
   e. Subchapter 12 - *MPDES Standards*.
   f. Subchapter 13 - *MPDES Permits*.
3. Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. §§ 1251-1387, October 18, 1972, as amended.
4. Federal Water Pollution Control Act (Clean Water Act), § 303(d), 33 USC 1313(d) Montana List of Waterbodies in Need of Total Maximum Daily Load Development, 2016.
5. US Code of Federal Regulations, 40 CFR Parts 122-125, 130-133, & 136.
6. Montana Department of Environmental Quality Circular DEQ-7, Montana Numeric Water Quality Standards.
7. Montana Department of Environmental Quality 2018 Integrated Water Quality Report
8. Montana Pollutant Discharge Elimination System (MPDES) Permit Number MT0031551:
   a. Administrative Record.
   b. Renewal Application DEQ Form 1 and EPA Form 2A (2016) and Supplemental Documents
9. US EPA Technical Support Document for Water Quality-Based Toxics Control, EPA/505/2-30- 001, March 1991.
10. US EPA NPDES Permit Writers' Manual, EPA 833-B-96-003, September 2010.

Completed by Emilie Erich Hoffman, September 2018

Figure 2. USACE Fort Peck Project Water Flow Diagram

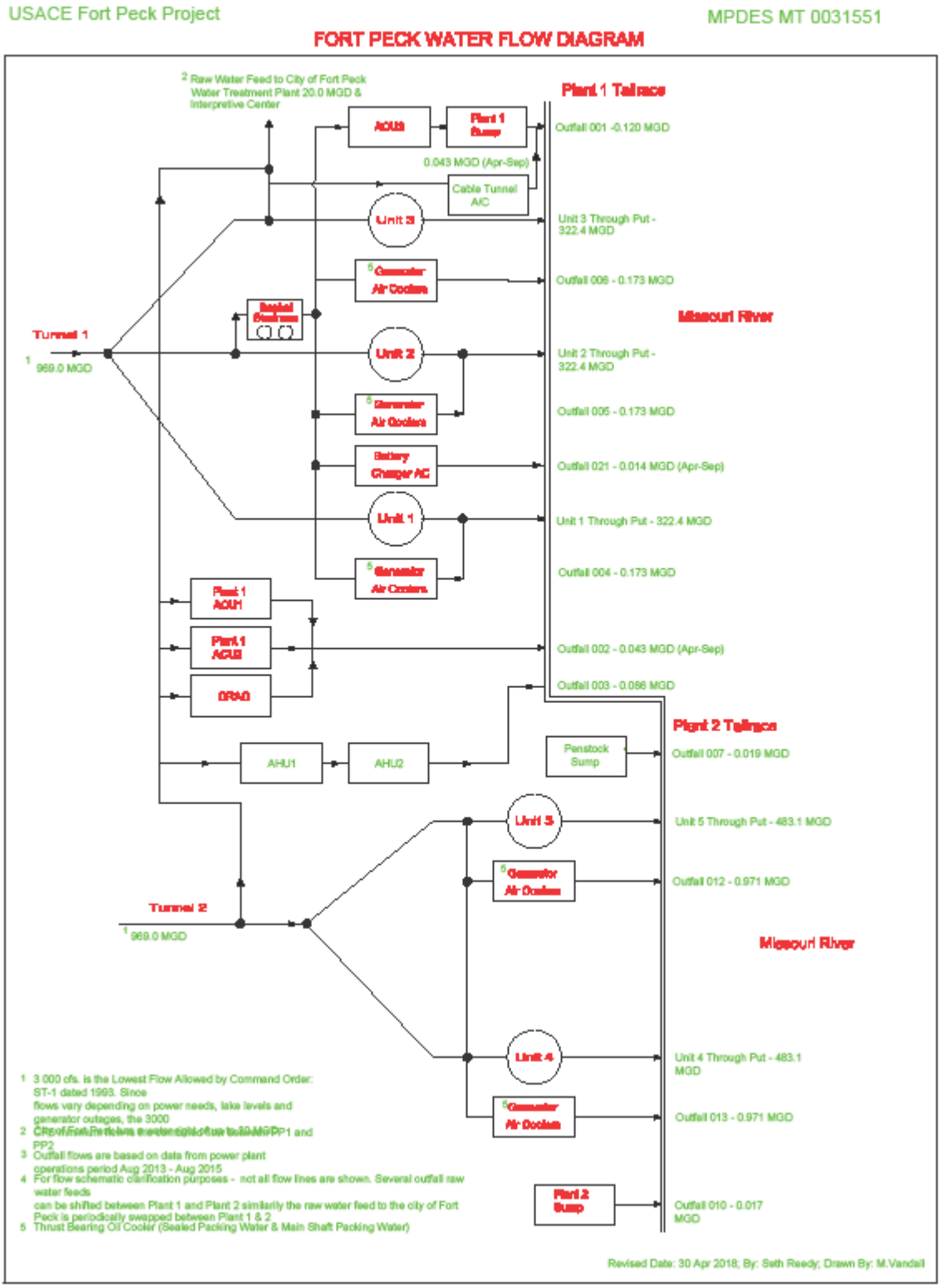

Figure 3. USACE Fort Peck Project Interpretive Center Aquarium Water Flow Diagram