STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

In compliance with the Missouri Clean Water Law (Chapter 644 RSMo, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.	MO-0004812
Owner:	Union Electric Co. d/b/a Ameren Missouri
Address:	1901 Chouteau Ave. PO Box 66149, MC 602, St. Louis MO 63166
Continuing Authority:	Same as above
Address:	Same as above
Facility Name:	Ameren Missouri - Labadie Energy Center
Facility Address:	226 Labadie Power Plant Road, Labadie, MO 63055
Legal Description:	Secs. 18 & 19, T44N, R02E, Franklin Co.
UTM Coordinates:	See following pages
Receiving Stream:	See following pages
First Classified Stream and ID:	See following pages
USGS Basin & Sub-watershed No.:	Labadie Creek – Missouri River 10300200-0603

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

Steam electric power generation; SIC# 4911; NAICS# 221122. This facility does not require a certified wastewater operator; domestic wastewater is managed in an on-site system. Industrial wastewater is discharged primarily from outfall #02B. Landfill leachate is not authorized for discharge under this permit. See pages 2 and 3 for detailed explanation.

This permit authorizes only wastewater and stormwater discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas.

Effective Date

Edward B. Galbraith, Director, Division of Environmental Quality

Expiration Date

Chris Wieberg, Director, Water Protection Program

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FACILITY DESCRIPTION (CONTINUED)

WASTEWATER OUTFALLS:

OUTFALL #001 – single pass non-contact cooling water; heated water can be routed back to intake structure (#010) to prevent icing, subject to CWA §316(a)

UTM Coordinates:	X = 688550; Y = 4270779
Receiving Stream:	Missouri River (P)
First Classified Stream and ID:	Missouri River (P) WBID# 1604; 303(d)
Design Flow:	1,428 MGD
Average Flow:	1,334 MGD

OUTFALL #002 – requirements removed during 2020 renewal, former ash pond discharge, ash pond discharges no longer authorized. Discharges to man-made canal which directs wastewater to the Missouri River. While wastewater continues to exit through this pipe from outfalls #02A, #02B, and #012, no permit requirements are implemented for this outfall.

UTM Coordinates:	X = 688039; Y = 4269441.

OUTFALL #02A – internal monitoring point for domestic wastewater. Discharge then passes through LVW at outfall #02B. Activated sludge, and extended aeration. UV disinfection installed 2017. Sludge holding tank, sludge removed by contract hauler. Potable water from Franklin County.

UTM Coordinates:	X = 688586; Y = 4270160
Receiving Stream:	pipe and manmade channel to the Missouri River (P) (parallels Labadie Creek)
First Classified Stream and ID:	Missouri River (P) WBID# 1604; 303(d)
Design Flow:	0.05 MGD
Actual Flow Averages:	0.013 MGD
Design Sludge Production:	0.85 dry tons per year
Actual Sludge Production:	0.85 dry tons per year

OUTFALL #02B – concrete parallel basins for low volume waste (LVW); categorical waste stream per 40 CFR 423.15(b)(3) NSPS; and domestic wastewater from outfall #02A. Wastewater sources: boiler house coal handling silo floor drain, pump seal water (bearing lube, glands, and bearing cooling), clarifier, water treatment plant (WTP), coal yard drains, WTP clarifier blowdown, WTP sand filter backwash, demineralizer regeneration waste batch neutralization system (pH adjusted as necessary), boiler blowdown, boiler quench water, air heater wash water, decant of quench wastewater for ash, reclaim sumps, and building drains. Stormwater sources: direct fall, coal pile handling area runoff, coal receiving area yard drains. Basins are 2 cells, alternating use (one is in service while the other is taken out of service for sludge removal); 6.2 million gallons design total volume. Coagulation, settling, and pH adjustment. Sludge is taken to the on-site utility waste landfill. Net limits for TSS #02B wastewater only; excludes domestic wastewater and stormwater. Permitted construction CP0001844, completed 2018.

UTM Coordinates:	X = 688511; Y = 4270075
Receiving Stream:	pipe and manmade channel to the Missouri River (P) (parallels Labadie Creek)
First Classified Stream and ID:	Missouri River (P) WBID# 1604; 303(d)
Design Flow:	5.3 MGD
Actual Flow Averages:	5.1 MGD

OUTFALL #02C – no discharge; emergency overflow of west detention basin (WDB); WDB wastes from coal yard stormwater. Categorical stormwater per 40 CFR 423.

UTM Coordinates:	X = 688295; Y = 4269675
Receiving Stream:	pipe and manmade channel to the Missouri River (P) (parallels Labadie Creek)
First Classified Stream and ID:	Missouri River (P) WBID# 1604; 303(d)
Design Flow:	0 MGD
Actual Flow Averages:	0 MGD

OUTFALL #009 – removed 2020 renewal, former ash pond emergency spillway. Discharge is not authorized from this outfall.

UTM Coordinates:	X = 688017; Y = 4269440

PERMITTED FEATURE #010 – river intake subject to CWA §316(b), impingement and entrainment, BTA: rotating 3/8 inch mesh screens with fish-friendly return not currently installed.

UTM Coordinates:	X = 688556; Y = 4270810
Withdrawal Waterbody ID:	Missouri River (P) WBID #1604; 303(d)
Design Intake:	1,438 MGD
Average Intake:	1,377 MGD

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FACILITY DESCRIPTION (CONTINUED)

STORMWATER OUTFALLS:

OUTFALL #004 – Stormwater discharge from storeroom yard area. This outfall drains 1.4 acres, all of which is impervious surface. No design flow is established for this outfall as the actual flow is dependent on precipitation. The estimated 10 year 24 hour event is 0.19 MGD using the rational equation at 5.5 inches precipitation per 24 hours, and a runoff coefficient of 0.9.
UTM Coordinates: X = 688327; Y = 4270631
Receiving Stream: Missouri River (P)
First Classified Stream and ID: Missouri River (P) WBID# 1604; 303(d)

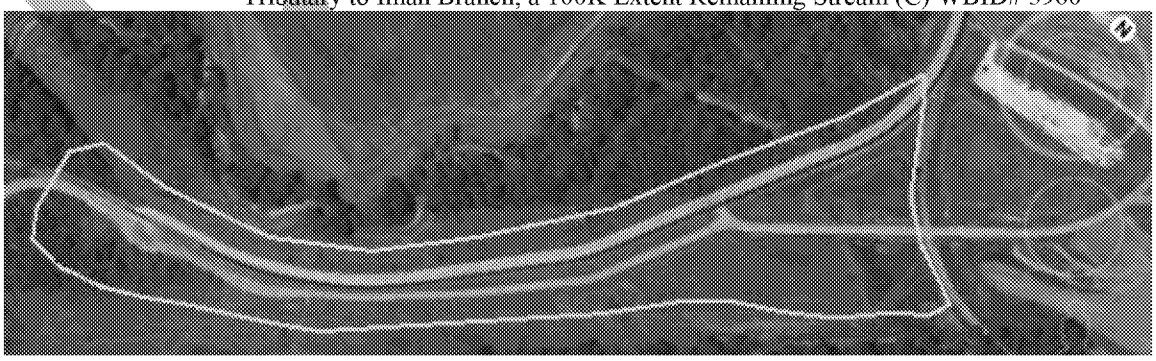
OUTFALL #005 – Stormwater discharge from yard drains near water treatment plant. This outfall drains 0.1 acres, with 0.05 acres impervious surface. No design flow is established for this outfall as the actual flow is dependent on precipitation. The estimated 10 year 24 hour event is 0.007 MGD using the rational equation at 5.5 inches precipitation per 24 hours, and a runoff coefficient of 0.5.
UTM Coordinates: X = 688245; Y = 4270547
Receiving Stream: Missouri River (P)
First Classified Stream and ID: Missouri River (P) WBID# 1604; 303(d)

OUTFALL #011 – Stormwater east detention basin, completed 2018, designed to 10 year 24 hour precipitation event. This outfall drains 18.81 acres, with 10 acres impervious surface. No design flow is established for this outfall as the actual flow is dependent on precipitation. The estimated 10 year 24 hour event is 1.39 MGD using the rational equation at 5.5 inches precipitation per 24 hours, and a runoff coefficient of 0.5; only after basin has reached capacity.
UTM Coordinates: X = 688578; Y = 4270838
Receiving Stream: manmade channel to the Missouri River (P) in thermal discharge canal
First Classified Stream and ID: Missouri River (P) WBID# 1604; 303(d)

OUTFALL #012 – new outfall 2020 renewal; stormwater from historic ash pond; completed December 2020. No design flow is established for this outfall as the actual flow is dependent on precipitation. This outfall drains 0.1 acres, utilizing ClosureTurf with designed 100% runoff coefficient to eliminate infiltration into the waste mass.
UTM Coordinates: X = 688178; Y = 4269505
Receiving Stream: pipe and manmade channel to the Missouri River (P) (parallels Labadie Creek)
First Classified Stream and ID: Missouri River (P) WBID# 1604; 303(d)

STORMWATER AREAS:

PERMITTED FEATURE #S01 – new area 2020 renewal; storm water area at southeast entrance of plant encompassing historic outfalls #006, #06A, #06B, #06C, #06D, #06E, #06F, #007, #07A, #07B, #07C, #07D, #07E, #07F, #07G, #008, #08A, #08B, #08C. No design flow is established for this area as the actual discharge flow is dependent on precipitation, hypsography, ground cover, and BMPs employed. This area encompasses approximately 35 acres, and approximately 4 linear acres are impervious surfaces. This stormwatershed is characterized by numerous runoff points from paved access roadways, secondary roadways, and rail lines. Vegetative buffers are utilized to decrease stormwater velocity and increase stormwater infiltration. The vegetation consists of primarily grasses maintained by seasonal mowing. This area is required to be included in the permit per 40 CFR 122.26(b)(14); however, discrete named outfalls are not required under 40 CFR 122.44(k) stormwater regulations.
First Classified Streams and IDs: Missouri River (P) WBID# 1604;
Labadie Creek (P) WBID# 1693;
Tributary to Iman Branch, a 100K Extent Remaining Stream (C) WBID# 3960



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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL #001 *single pass cooling*	**TABLE A-1 FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**					
The permittee is authorized to discharge from outfall(s) as specified. The final effluent limitations shall become effective on **Effective Date** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited, and monitored by the permittee as specified below:						
EFFLUENT PARAMETERS	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
LIMIT SET: T ▲						
PHYSICAL						
Flow, Effluent (Qe)	MGD	*		*	continuous	24 hr. total
Flow, Effluent (Qe)	cfs	*		*	continuous	instantaneous
Flow, Stream Net (Qs-Qi)	cfs	*		*	continuous	calculation
Temperature, Effluent (Te)	°F	*		*	continuous	measured
Mixing Zone (M1)	%	*		*	continuous	calculation
Thermal Discharge Parameter (TDP)	value	0.95		*	continuous	calculation
MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE MONTH 28, 20XX.						
LIMIT SET: TV (THERMAL VARIANCE) ♠						
Thermal Discharge Parameter (TDP)	value	*		*	continuous	calculation
Mixing Zone (M1)	%	40		*	continuous	calculation
Time Variance Used	hours	-		* total ♠	continuous	calculation
MONITORING REPORTS SHALL BE SUBMITTED WHEN THE THERMAL VARIANCE IS USED. A REPORT IS NOT DUE IF THE VARIANCE IS NOT BEING USED. IF THE VARIANCE IS USED, THE REPORT IS DUE ON THE 28TH DAY OF THE MONTH FOLLOWING THE VARIANCE USE.						
LIMIT SET VA: ANNUAL THERMAL VARIANCE REPORTING REQUIREMENT						
Time Variance Used	hours	* total ♠		528 ♠	continuous	calculation
MONITORING REPORTS SHALL BE SUBMITTED ANNUALLY; THE FIRST REPORT IS DUE MONTH 28, 20XX.						
LIMIT SET: U (UNSCHEDULED)						
Whole Effluent Toxicity, Acute See Special Condition #1	TU_a	3.3			upon treatment	grab
MONITORING REPORTS SHALL BE SUBMITTED BY THE 28TH DAY OF THE MONTH FOLLOWING THE COLLECTION OF THE TEST. SEE SPECIAL CONDITIONS						

PERMITTED FEATURE #010 *intake*	**TABLE A-2 FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**					
The final monitoring and reporting requirements shall become effective on **Effective Date** and remain in effect until expiration of the permit.						
EFFLUENT PARAMETERS	UNITS	FINAL SAMPLING REQUIREMENTS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
LIMIT SET: I (INFLUENT)						
PHYSICAL						
Flow, Influent (Qi)	MGD	*		*	continuous	24 hr. total
Flow, Influent (Qi)	cfs	*		*	continuous	measured
Flow, Stream (Qs)	cfs	*		*	continuous	measured
Temperature, Stream (Ts)	°F	*		*	continuous	measured
CONVENTIONAL						
Total Suspended Solids	mg/L	*		*	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE MONTH 28, 20XX.						

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (CONTINUED)

▲ Limit Set T Requirements, calculated each hour

Qe = maximum daily effluent flow volume from outfall #001 in MGD and cfs
Qs = maximum daily stream flow minus maximum daily intake flow in cfs
Te = maximum daily effluent temperature from outfall #001 in °F
Ts = maximum daily stream temperature in °F

Equation #1
M1 is the ratio of the volume of the discharge to the volume of the river. M1 is expressed as a decimal in the equations below. To determine the percentage, multiply by 100. The percentage of mixing used by the facility cannot be greater than 25% on normal days and cannot be greater than 40% on days where the thermal variance is being used. M1 = (Qe / (Qe+Qs)) * 100 = %

For equations #2 through #4
Td is the difference between the temperature of the effluent, and the temperature of the stream. Td = Te – Ts
If Td is equal to 20 or between 20 and 50, use the actual Td value.
If Td is less than 20, use 20
If Td is greater than 50, use 50; a value greater than 50 shall not be used for any equation.

Equation #2
When Ts < 80.0 °F:
$M2 = 0.00006024 (Td)^2 - 0.00604124 (Td) + 0.2470357$

Equation #3
When 80.0 °F ≤ Ts ≤ 85.0 °F:
$M2 = 0.00006024 (Td)^2 - 0.00604124 (Td) + (-0.000200 Ts + 0.2207404)$

Equation #4
When 85.1 °F < Ts ≤ 90.0 °F and Td is between 10 and 50:
$M2 = (-0.362 * Ts + 32.578) * Td^{-0.925}$
If M2 is >0.108 set M2 to 0.108
If Td is less than 10, set Td to 10.

When Ts > 90.0, the thermal variance time must be used to operate.

Equation #5
TDP = M1 / M2

Stream flow is measured in cubic feet per second (cfs) and stream temperature is measured in degrees Fahrenheit (°F). Data to fulfil this reporting requirement shall be gathered from USGS Gage Station 06935550 near Labadie, MO. If gaging station data is not available for temperature, the facility may manually attain temperature at the intake or other representative location. If flow data is unavailable, the flow data shall be averaged from the preceding three days and three days after the flow gage is fixed. The facility may contact the Department for other alternatives if necessary.

♠ Limit Set TV Requirements, calculated each hour, variance used in 1 hour increments:

The facility only needs to use this limit set when using the thermal variance conditions outlined here. When the thermal variance is being used, the facility will not report a TDP value in the Limit Set: T group. The thermal variance can only be use if the in-stream river temperature is greater than 87.0 °F or the river flow is below 40,000 cfs.

The facility will report the monthly total in the monthly average column. A separate annual report is due for the calendar year.

Mixing Zone (As Percent of Total River Flow) shall be calculated using the following equation:
Mixing Zone = [0.1857 ln (M1 / M2) + 0.234] * 100

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (CONTINUED)

OUTFALL #02A *domestic wastewater*	**TABLE A-3 FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**					
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective on **Effective Date** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited, and monitored by the permittee as specified below:						
EFFLUENT PARAMETERS	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
LIMIT SET: Q						
PHYSICAL						
Flow	MGD	*		*	once/quarter ◊	24 hr. total
CONVENTIONAL						
Biochemical Oxygen Demand 5 Day	mg/L	45		30	once/quarter ◊	grab
E. coli †	#/100 ml	1030		206	once/quarter ◊	grab
pH †	SU	6.0 to 9.0		-	once/quarter ◊	grab
Total Suspended Solids	mg/L	45		30	once/quarter ◊	grab
MONITORING REPORTS SHALL BE SUBMITTED QUARTERLY; THE FIRST REPORT IS DUE MONTH 28, 20XX. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (CONTINUED)

OUTFALL #02B *low volume waste*	**TABLE A-4 FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**					
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective on **Effective Date** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited, and monitored by the permittee as specified below:						
EFFLUENT PARAMETERS	UNITS	FINAL EFFLUENT LIMITATIONS			MONITORING REQUIREMENTS	
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
LIMIT SET: M						
PHYSICAL						
Flow	MGD	*		*	once/week***	24 hr. total
CONVENTIONAL						
Oil & Grease	mg/L	15		10	once/month	grab
pH †	SU	6.0 to 9.0		6.0 to 9.0	once/week***	grab
Total Suspended Solids, Gross	mg/L	*		*	once/week***	grab
Total Suspended Solids, Net	mg/L	100		30	once/week***	grab
NUTRIENTS						
Ammonia as N	mg/L	*		*	once/month	grab
Kjeldahl Nitrogen, Total (TKN)	mg/L	*		*	once/month	grab
Nitrate plus Nitrite	mg/L	*		*	once/month	grab
Phosphorus, Total (TP)	mg/L	*		*	once/month	grab
MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE MONTH 28, 20XX. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
LIMIT SET: Q						
CONVENTIONAL						
Chemical Oxygen Demand	mg/L	*		*	once/quarter ◊	grab
METALS						
Boron, Total Recoverable	µg/L	*		*	once/quarter ◊	grab
OTHER						
Chloride	mg/L	*		*	once/quarter ◊	grab
Sulfate	mg/L	*		*	once/quarter ◊	grab
Chloride plus Sulfate	mg/L	*		*	once/quarter ◊	grab
MONITORING REPORTS SHALL BE SUBMITTED QUARTERLY; THE FIRST REPORT IS DUE MONTH 28, 20XX. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						
LIMIT SET: A						
OTHER						
Whole Effluent Toxicity, Acute See Special Condition #1	TUa	3.3			once/year	grab
MONITORING REPORTS SHALL BE SUBMITTED ANNUALLY; THE FIRST REPORT IS DUE JANUARY 28, 20XX. THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.						

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (CONTINUED)

PERMITTED FEATURE #02C *no discharge wastewater basin (west detention basin)*	**TABLE A-5 NO DISCHARGE: FINAL MONITORING REQUIREMENTS**					
The permittee is not authorized to discharge from this feature. The final requirements shall become effective on **Effective Date** and remain in effect until expiration of the permit. This feature shall be monitored and operationally controlled by the permittee as specified below:						
MONITORING PARAMETERS	UNITS	MONITORING REQUIREMENTS				
		DAILY MINIMUM		MONTHLY AVERAGE	MEASUREMENT FREQUENCY	SAMPLE TYPE
LIMIT SET: OM						
Freeboard	feet	*		*	once/month	measured
MONITORING REPORTS SHALL BE SUBMITTED MONTHLY; THE FIRST REPORT IS DUE MONTH 28, 20XX. NO DISCHARGES ARE AUTHORIZED FROM THIS FEATURE						

OUTFALLS #004, #005, #011, AND #012 *Stormwater Only*	**TABLE A-6 FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**					
The permittee is authorized to discharge from outfall(s) with serial number(s) as specified in the application for this permit. The final effluent limitations shall become effective on **Effective Date** and remain in effect until expiration of the permit. Such discharges shall be controlled, limited and monitored by the permittee as specified below:						
EFFLUENT PARAMETERS	UNITS	FINAL LIMITATIONS		BENCH-MARKS	MONITORING REQUIREMENTS	
		DAILY MAXIMUM	MONTHLY AVERAGE		MEASUREMENT FREQUENCY	SAMPLE TYPE
LIMIT SET: Q						
PHYSICAL						
Flow	MGD	*		-	once/quarter ◊	24 Hr Est.
CONVENTIONAL						
Chemical Oxygen Demand	mg/L	**		90	once/quarter ◊	grab
Oil & Grease	mg/L	**		10	once/quarter ◊	grab
pH †	SU	**		6.5 to 9.0	once/quarter ◊	grab
Total Suspended Solids	mg/L	**		100	once/quarter ◊	grab
MONITORING REPORTS SHALL BE SUBMITTED QUARTERLY; THE FIRST REPORT IS DUE MONTH 28, 20XX. THERE SHALL BE NO DISCHARGE OF OIL SHEEN OR VISIBLE SOLIDS IN OTHER THAN TRACE AMOUNTS AT ANY TIME.						

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (CONTINUED)

* Monitoring and reporting requirement only

** Monitoring and reporting requirement with benchmark. See Special Conditions for additional requirements.

*** One sample per week means one sample per calendar week, from Monday through Sunday. The facility may use one data point for a week spanning two months, but may only include the data point in the average if the sampling day occurred in the month. Data should be collected at generally the same interval so all samples are representative of the weekly discharges.

ǂ *E. coli*: final limitations and monitoring requirements are applicable only during the recreational season from April 1 through October 31. The Monthly Average Limit for *E. coli* is expressed as a geometric mean.

† pH: the facility will report the minimum and maximum values; pH is not to be averaged.

⁝ Regularly scheduled Whole Effluent Toxicity (WET) Testing is not required at outfall #001. However, in the event the permittee determines they must use a molluskicide or other toxic pollutant(s) to remove organisms from intake structures, WET Testing shall be conducted concurrent of use, once per year as described in the terms and conditions for WET Testing for outfall #001, which is contained in Special Condition #1 of this operating permit.

◊ Quarterly sampling

MINIMUM QUARTERLY SAMPLING REQUIREMENTS				
QUARTER	MONTHS	*E. COLI*	ALL OTHER PARAMETERS	REPORT IS DUE
First	January, February, March	Not required to sample.	Sample at least once during any month of the quarter	April 28th
Second	April, May, June	Sample at least once during any month of the quarter	Sample at least once during any month of the quarter	July 28th
Third	July, August, September	Sample at least once during any month of the quarter	Sample at least once during any month of the quarter	October 28th
Fourth	October	Sample once during October	Sample at least once during any month of the quarter	January 28th
	November, December	No sample required		

B. STANDARD CONDITIONS

In addition to specified conditions stated herein, this permit is subject to the attached Part I and Part III standard conditions dated August 1, 2014 and August 1, 2019, respectively, and hereby incorporated as though fully set forth herein.

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C. SPECIAL CONDITIONS

1. Whole Effluent Toxicity (WET) Test shall be conducted as follows:
   Acute Whole Effluent Toxicity (WET) tests shall be conducted as follows:
   (a) Freshwater Species and Test Methods: Species and short-term test methods for estimating the acute toxicity of NPDES effluents are found in the most recent edition of *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA/821/R-02/012; Table IA, 40 CFR Part 136). The permittee shall concurrently conduct 48-hour, static, non-renewal toxicity tests with the following species:
      - The fathead minnow, *Pimephales promelas* (Acute Toxicity EPA Test Method 2000.0).
      - The daphnid, *Ceriodaphnia dubia* (Acute Toxicity EPA Test Method 2002.0).

   (b) Chemical and physical analysis of the upstream control sample and effluent sample shall occur immediately upon being received by the laboratory, prior to any manipulation of the effluent sample beyond preservation methods consistent with federal guidelines for WET testing requiring stabilization the sample during shipping. Where upstream receiving water is not available or known to be toxic, other approved control water may be used.
   (c) Test conditions must meet all test acceptability criteria required by the EPA Method used in the analysis.
   (d) The laboratory shall not chemically dechlorinate the sample.
   (e) The Allowable Effluent Concentration (AEC) is 9%; the dilution series is: 2.25%, 4.5%, 9%, 18%, and 36%.
   (f) All chemical and physical analysis of the effluent sample performed in conjunction with the WET test shall be performed at the 100% effluent concentration.
   (g) The facility must submit a full laboratory report for all toxicity testing. The report must include a quantification of acute toxic units ($TU_a = 100/LC_{50}$) reported according to the test methods manual chapter on report preparation and test review. The Lethal Concentration 50 Percent (LC_{50}) is the effluent concentration causing death in 50 percent of the test organisms at a specific time.
   (h) Accelerated Testing Trigger: If the regularly scheduled acute WET test exceeds the TU_a limit, the permittee shall conduct accelerated follow-up WET testing as prescribed in the following conditions. Results of the follow-up accelerated WET testing shall be reported in TU_a. This permit requires the following additional toxicity testing if any one test result exceeds a TU_a limit. Follow-up tests do not negate an initial test result.
      (1) A multiple dilution test shall be performed for both test species within 60 calendar days of notification the regularly scheduled WET test exceeded the TU_a limit, and once every two weeks thereafter, until one of the following conditions are met:
         i. Three <u>consecutive</u> multiple-dilution tests are below the TU_a limit. No further tests need to be performed until next regularly scheduled test period.
         ii. A total of three multiple-dilution tests exceed the TU_a limit.
      (2) The permittee shall submit a summary of all accelerated WET test results for the test series along with complete copies of the laboratory reports as received from the laboratory within 14 calendar days of the availability of the third test exceeding a TU_a limit.
   (i) TIE/TRE Trigger: The following shall apply upon the exceedance of the TU_a limit in three accelerated follow-up WET tests. The permittee should contact the Department within 14 calendar days from availability of the test results to ascertain as to whether a TIE or TRE is appropriate. If the permittee does not contact the Department upon the third follow up test exceeding a TU_a limit, a toxicity identification evaluation (TIE) or toxicity reduction evaluation (TRE) is automatically triggered. The permittee shall submit a plan for conducting a TIE or TRE within 60 calendar days of the date of the automatic trigger or the Department's direction to perform either a TIE or TRE. The plan shall be based on EPA Methods and include a schedule for completion. This plan must be approved by the Department before the TIE or TRE is begun.

2. Thermal Model Verification. The facility shall, on an annual basis, provide sampling results and a summary of the results for thermal model verification. The report is due on January 28th for the previous calendar year. The facility shall replicate, to the best extent possible, the sampling methods described in Appendix C of the 2016 sampling report for completion of the confirmatory sampling. A brief summary shall be included which describes the results and any incongruities between the confirmatory sampling and the modeling results for each day, and a comparison between the size of the mixing zone of the mathematical model and the actual ground-truth mixing zone size. The facility should strive to sample at the lowest anticipated river flow and highest river temperatures projected for the year.

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C. SPECIAL CONDITIONS (CONTINUED)

3. 40 CFR 423.13(a): There shall be no discharge of polychlorinated biphenyl compounds (PCBs) such as those commonly [historically] used for transformer fluid.

4. 40 CFR 423.13(c)(2): Neither free available chlorine [or bromine] nor total residual chlorine [or bromine] may be discharged for more than two [total] hours [per day] from any unit at this facility.

5. 40 CFR 423.13(h) and (k): The facility shall not discharge either fly ash or bottom ash transport wastewater [sluice water] upon permit issuance. Ash transport wastewater within the ponds may be allowed to be discharged during closure activities after permit issuance, so long as federal effluent limitation guidelines (40 CFR 423) are met for the discharge of legacy wastewater.

6. Discharge of chemical cleaning wastewater is not authorized under this permit. Specific plans for discharging chemical cleaning wastewater from boilers shall be submitted to the Department's St. Louis Regional Office at least 60 days prior to any such cleaning. Alternate monitoring requirements, additional effluent limitations, antidegradation review, specified procedures, and any other necessary conditions may be required by the Department for the duration of the proposed discharge.

7. Cooling Water Intake Structure Requirements for Impingement.
In accordance with 125.98(b)(2), this permit incorporates Best Technology Available (BTA) requirements per 40 CFR 401.14 to reduce impingement mortality per 40 CFR 125 Subpart J. Future BTA determinations may vary based on the studies submitted by the facility during the next permit term. The facility shall supply all studies in accordance with 40 CFR 122.2(r) and as listed below. The following shall be completed by the timeframes listed below or as soon as practicable in accordance with 40 CFR 125.98(c):
   (a) The BTA determination is modified 3/8 inch mesh traveling screens with optimization for fish friendly return to the river as described at 40 CFR 125.92(s) for this facility.
   (b) Within three years of permit effective date, the facility shall install 3/8 inch mesh traveling screens with fish-friendly returns for all intake bays.
   (c) Screen optimization performance study in accordance with 40 CFR 125.98(e)
   (d) Operational measures shall be implemented in accordance with 40 CFR 125.92(w) as necessary.

8. Cooling Water Intake Structure Requirements for Entrainment and Cooling Water Discharges.
In accordance with 125.98(b)(2), this permit incorporates Best Technology Available (BTA) and Best Available Technology (BAT) requirements per 40 CFR 401.14 to reduce entrainment per 40 CFR 125.94(d) and to comply with 40 CFR 125.3(d)(3) for establishment of technology for cooling discharges. The BTA determination for entrainment is currently single pass cooling for this facility. Future entrainment determinations may vary based on the studies submitted by the facility during the next permit term. The facility shall supply all studies in accordance with 40 CFR 122.2(r) and as listed in the application requirements section of the special conditions.

9. Cooling Water Discharge: Additional Requirements for Thermal Variance Continuation.
   (a) The facility shall request the CWA §316(a) thermal variance be continued with the application for permit renewal. The request shall contain:
      i. Sufficient evidence showing the bioassessment conducted for the 2020 CWA §316(a) thermal variance request continues to adequately represent the impact of the thermal discharge in the Missouri River, including confirmation the Missouri River's aquatic population has not changed utilizing a sufficient and relevant subset of the population, or the changes in the aquatic population are not due to the facility's discharge.
      ii. The facility shall use data collected during the traveling screen optimization study and entrainment characterization study for the intake to determine if population changes are occurring. Supplemental data may need to be gathered to assure no changes are caused by the thermal discharge. The facility shall determine, either visually or genetically, the identified species of any sturgeon impinged or entrapped.
   (b) The facility shall operate the cooling system to:
      i. Maintain BTA/BAT. Documentation shall include maintenance and operational controls necessary to maintain the discharge's consistency. The facility will describe narratively and numerically how the thermal discharge fluctuates with electricity generated; this report will be used to determine if any additional operational controls are necessary for the thermal discharge. And;
      ii. Maintain a mixing area of 40% or less at all times.
   (c) The facility shall specifically assess if thermally sensitive species are or are not present in the river during the summer months from the entrainment and impingement studies detailed in the "renewal application requirements" below. This information will be submitted with the permit renewal documents, at least 180 days prior to permit expiration.

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C. SPECIAL CONDITIONS (CONTINUED)

10. Per 40 CFR 125.98(b)(1): "Nothing in this permit authorizes take for the purposes of a facility's compliance with the Endangered Species Act."

11. Per 40 CFR 117.12, substances regulated by federal law, transported, or stored, or used for maintenance, cleaning, or repair, shall be managed under the Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This facility is exempt from Clean Water Act §311 reporting for sulfuric acid and sodium hydroxide.

12. Groundwater Monitoring of Historic Ash Impoundments. This facility shall:
    (a) Monitor the groundwater, at a minimum, semiannually over the next permit term in accordance with the groundwater monitoring programs as established under the USEPA CCR Rule (40 CFR §257.90 through §257.95) at the monitoring wells established by the facility.
    (b) The facility shall monitor for, and provide data for, the following constituents at a minimum: Appendix III to 40 CFR 257, Appendix IV to 40 CFR 257, and Appendix I of 10 CSR 80-11.
    (c) The facility shall notify the Water Protection Program, in writing, of all well monitoring results. The facility shall provide the information in the eDMR system as an uploaded report.
    (d) The facility must establish a monitoring well network which shows the extent of any groundwater contaminant plume(s) at the site. This network must be within the owned perimeter of the site; and must meet the following groundwater quality parameter limits. The data, well locations in UTM Zone 15, and all sampling information including laboratory and field sheets will be submitted with the application for renewal.

Parameter	Value	Units
Arsenic	50	µg/L
Boron	2,000	µg/L
Manganese	50	µg/L
Sulfate	250	mg/L

    (e) During the permit term, if the facility cannot meet the above concentrations in the perimeter monitoring wells, the facility must develop a plan for remediation and/or risk assessment. The facility may consider a pump and treatment scenario, or other scenarios as determined applicable. The information regarding the chosen method of groundwater compliance must be submitted with the application for permit renewal. If this includes underground injection, the forms required for the specified activity must be included.

13. Electronic Discharge Monitoring Report (eDMR) Submission System
    Per 40 CFR Part 127 National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, reporting of effluent monitoring data and any report required by the permit (unless specifically directed otherwise by the permit), shall be submitted via an electronic system to ensure timely, complete, accurate, and nationally consistent set of data about the NPDES program.
    (a) eDMR Registration Requirements. The facility must register with the Department's eDMR system through the Missouri Gateway for Environmental Management (MoGEM) before the first report is due. Registration and other information regarding MoGEM can be found at [HYPERLINK "https://dnr.mo.gov/mogem"]. Information about the eDMR system can be found at [HYPERLINK "https://dnr.mo.gov/env/wpp/edmr.htm"].The first user shall register as an Organization Official and the association to the facility must be approved by the Department. Regarding Standard Conditions Part I, §B, #7, the eDMR system is currently the only Department approved reporting method for this permit unless a waiver is granted by the Department.
    (b) Electronic Submissions. To access the eDMR system, use the following link in your web browser: [HYPERLINK "https://apps5.mo.gov/mogems/welcome.action"] If you experience difficulties with using the eDMR system you may contact [HYPERLINK "mailto:edmr@dnr.mo.gov"] or call 855-789-3889 or 573-526-2082 for assistance.
    (c) Waivers from Electronic Reporting. The facility must electronically submit compliance monitoring data and reports unless a waiver is granted by the Department in compliance with 40 CFR Part 127. Only facilities with an approved waiver request may submit monitoring data and reports on paper to the Department for the period the approved electronic reporting waiver is effective. Facilities may obtain an electronic reporting waiver by first submitting an eDMR Waiver Request Form: [HYPERLINK "http://dnr.mo.gov/forms/780-2692-f.pdf"]. The department will either approve or deny this electronic reporting waiver request within 120 calendar days.

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C. SPECIAL CONDITIONS (CONTINUED)

14. Spills, Overflows, and Other Unauthorized Discharges.
    (a) Any spill, overflow, or other discharge(s) not specifically authorized above are unauthorized discharges.
    (b) Should an unauthorized discharge cause or permit any contaminants to discharge or enter waters of the state, the unauthorized discharge must be reported to the regional office as soon as practicable but no more than 24 hours after the discovery of the discharge. If the spill or overflow needs to be reported after normal business hours or on the weekend, the facility must call the Department's 24 hour spill line at 573-634-2436.
    (c) If the unauthorized discharge was from an overflow from a no-discharge wastewater basin, the report must include all records confirming operation and maintenance records documenting proper maintenance in accordance with condition (d) below.
    (d) Permittee shall adhere to the following minimum Best Management Practices (BMPs) for no-discharge wastewater holding structures:
        (1) To prevent unauthorized discharges, the no-discharge wastewater basin must be properly operated and maintained to contain all wastewater plus run-in and direct precipitation.
        (2) Weekly inspection of no-discharge wastewater basins shall occur. Inspection notes will be kept at the facility and made available to the Department upon request.
        (3) The inspections will note any issues with the no-discharge structure and will record the level of liquid as indicated by the depth marker.

15. Stormwater Pollution Prevention Plan (SWPPP).
    The facility's SIC code or description is found in 40 CFR 122.26(b)(14) and/or 10 CSR 20-6.200(2) and hence shall implement a Stormwater Pollution Prevention Plan (SWPPP) which must be prepared and implemented upon permit effective date. The SWPPP must be kept on-site and should not be sent to the Department unless specifically requested. The SWPPP must be reviewed and updated annually or if site conditions affecting stormwater change. The permittee shall select, install, use, operate, and maintain the Best Management Practices prescribed in the SWPPP in accordance with the concepts and methods described in: *Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators*, (EPA 833-B-09-002) published by the EPA in 2015 [HYPERLINK "https://www.epa.gov/sites/production/files/2015-11/documents/swppp_guide_industrial_2015.pdf"] The purpose of the SWPPP and the Best Management Practices (BMPs) listed herein is the prevention of pollution of waters of the state. A deficiency of a BMP means it was not effective at preventing pollution [644.016(17)] to waters of the state. Corrective action describes the steps the facility took to eliminate the deficiency.
    The SWPPP must include:
    (a) A listing of specific contaminants and their control measures (or BMPs) and a narrative explaining how BMPs are implemented to control and minimize the amount of contaminants potentially entering stormwater.
    (b) A map with all outfalls and structural BMPs marked.
    (c) A schedule for at least once per month site inspections and brief written reports. The inspection report must include precipitation information for the entire period since last inspection, as well as observations and evaluations of BMP effectiveness. Throughout coverage under this permit, the facility must perform ongoing SWPPP review and revision to incorporate any site condition changes.
        (1) Operational deficiencies must be corrected within seven (7) calendar days.
        (2) Minor structural deficiencies must be corrected within fourteen (14) calendar days.
        (3) Major structural deficiencies (deficiencies projected to take longer than 14 days to correct) must be reported as an uploaded attachment through the eDMR system with the DMRs. The initial report shall consist of the deficiency noted, the proposed remedies, the interim or temporary remedies (including proposed timing of the placement of the interim measures), and an estimate of the timeframe needed to wholly complete the repairs or construction. If required by the Department, the permittee shall work with the regional office to determine the best course of action. The permittee should consider temporary structures to control stormwater runoff. The facility shall correct the major structural deficiency as soon as reasonably achievable.
        (4) All actions taken to correct the deficiencies shall be included with the written report, including photographs, and kept with the SWPPP. Additionally, corrective action of major structural deficiencies shall be reported as an uploaded attachment through the eDMR system with the DMRs.
        (5) BMP failure causing discharge through an unregistered outfall is considered an illicit discharge and must be reported in accordance with Standard Conditions Part I.
        (6) Inspection reports must be kept on site with the SWPPP and maintained for a period of five (5) years. These must be made available to Department personnel upon request. Electronic versions of the documents and photographs are acceptable.
    (d) A provision for designating an individual to be responsible for environmental matters and a provision for providing training to all personnel involved in housekeeping, material handling (including but not limited to loading and unloading), storage, and staging of all operational, maintenance, storage, and cleaning areas. Proof of training shall be submitted upon request by the Department.

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C. SPECIAL CONDITIONS (CONTINUED)

16. Site-wide minimum Best Management Practices (BMPs). At a minimum, the permittee shall adhere to the following:
    (a) Prevent the spillage or loss of fluids, oil, grease, fuel, etc. from vehicle maintenance, equipment cleaning, warehouse activities, and other areas, and thereby prevent the contamination of stormwater from these substances.
    (b) Ensure adequate provisions are provided to prevent surface water intrusion into wastewater storage basin(s) and to divert stormwater runoff around the wastewater storage basin(s).
    (c) Protect all embankments from erosion and collapse.
    (d) Ensure all roadways and railways operated and under the control of the facility remain free of ash residue to prevent stormwater contamination.
    (e) Provide collection facilities and arrange for proper disposal of waste products including but not limited to petroleum waste products, and solvents.
    (f) Store all paint, solvents, petroleum products and petroleum waste products (except fuels), and storage containers (such as drums, cans, or cartons) so these materials are not exposed to stormwater or provide other prescribed BMPs such as plastic lids and/or portable spill pans to prevent the commingling of stormwater with container contents. Commingled water may not be discharged under this permit. Provide spill prevention control, and/or management sufficient to prevent any spills of these pollutants from entering waters of the state. Any containment system used to implement this requirement shall be constructed of materials compatible with the substances contained and shall also prevent the contamination of groundwater. Spill records should be retained on-site.
    (g) Provide good housekeeping practices on the site to keep trash from entry into waters of the state.
    (h) Provide sediment and erosion control sufficient to prevent or control sediment loss off of the property.
    (i) After snow or ice, if the facility applies sand/salt to the pavement of the parking lots, sidewalks, or stairs, the facility shall sweep the lots to remove sand/salt as soon as possible after snow or ice melt, collect excess solids, and minimize and control the discharge of solids into stormwater inlets. Salt and sand shall be stored in a manner that minimizes mobilization in stormwater (for example: under roof, in covered container, in secondary containment, under tarp, etc.).

17. Stormwater Benchmarks. This permit stipulates pollutant benchmarks applicable to your stormwater discharges.
    (a) The benchmarks do not constitute direct numeric effluent limitations; therefore, a benchmark exceedance alone is not a permit violation. Benchmark monitoring and visual inspections shall be used to determine the overall effectiveness of the SWPPP and to assist you in knowing when additional corrective action may be necessary to protect water quality. If a sample exceeds a benchmark concentration you must review your SWPPP and your BMPs to determine what improvements or additional controls are needed to reduce the pollutant in your stormwater discharge(s).
    (b) Any time a benchmark exceedance occurs, a Corrective Action Report (CAR) must be completed. A CAR is a document recording the efforts undertaken by the facility to improve BMPs to meet benchmarks in future samples. CARs must be retained with the permit records and be available to the Department upon request. If the efforts taken by the facility are not sufficient and subsequent exceedances of a benchmark occur, the facility must contact the Department if a benchmark value cannot be achieved. Failure to take corrective action to address a benchmark exceedance and failure to make measureable progress towards achieving the benchmarks is a permit violation.

18. Requirements to Determine Compliance with Narrative Criteria for Odor.
    (a) The facility shall determine if the discharge from outfall #001 is causing a violation of the odor producing substances free-from clause per 10 CSR 20-7.031(5)(C), and 10 CSR 20-7.031(5)(E) for odor. The general criteria at 10 CSR 20-7.031 apply to mixing zones as well as the entire river. The discharge canal is not included in the mixing area as it is not a water of the state because it is identified as part of the discharge appurtenances.
    (b) If the facility determines the odor from outfall #001 discharge negatively effects the receiving stream causing violation of the regulations in (a), the facility shall disclose
        i. The method used to determine non-compliance with the WQS in (a); and
        ii. The steps which will need to be taken to reduce or eliminate the odor, or odor producing substances from the discharge.
    (c) If the facility determines there is no odor at all times from the outfall #001 discharge, or the odor from outfall #001 discharge does not negatively affect the Missouri River or violate the regulations stated in (a), the facility shall provide:
        i. The method used to determine compliance with the WQS in (a); and
        ii. Fully describe the decision items and defend the decision statement.
    (d) Either (b) or (c) is due at the time of permit renewal.

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C. SPECIAL CONDITIONS (CONTINUED)

19. Prescribed Minimum Stormwater Best Management Practices (BMPs)
    (a) The historic bottom and fly ash ponds closed in December 2020. The following prescribed BMPs are to be initiated as soon as practicable, but no later than July 2021. Monthly inspection checklists and notes shall be kept with the permit records.
        i. The infiltration basins shall be maintained in a manner so they are free of accumulated debris and maintain the maximum possible basin volume.
        ii. Basins shall be examined for crevices and fissures which could provide a direct conduit to groundwater.
        iii. Basins shall be watered to protect from cracking during droughts.
        iv. Basin berms shall be maintained free of obtrusive vegetation and berms will be maintained to prevent sloughing and failure.
        v. Basins shall have at least one overflow channel, constructed of impermeable materials and inspected monthly.
    (b) Minimum BMPs for Stormwater Area (permitted feature) #S01.
        i. The stormwatershed must be observed for oils and other contaminants at least monthly, and, additionally, shall be inspected as soon as possible after precipitation events greater than 1 inch occurring over a 24 hour period (midnight to midnight). Monthly inspections must include a close inspection of all temporary BMPs
        ii. Vegetation shall be maintained to the extent possible so no bare soils are exposed directly to precipitation. Areas of lost or deficient vegetation shall be re-established (season permitting) as soon as possible. Interim stabilization methods shall be applied where vegetation is lacking but can't be revegetated within 14 calendar days due to weather. Interim stabilization shall consist of well-established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time.
        iii. The stormwatershed shall be observed for rills, headcuts, or other signs of erosion and shall be fixed as soon as possible.
        iv. Silt fencing shall be installed in areas where sediments have high potential for discharge. Silt fence maintenance shall be included in the notes, and BMPs shall be removed as soon as no longer needed (vegetation reestablished, rip-rap replaced, etc.). The facility shall remove accumulated sediments per the engineered design or if sediment has accumulated to one-quarter the height of the barrier. Dispose of, or re-use sediment appropriately.
        v. The facility shall maintain oil adsorbent booms/pads at locations known to have historic, current, or potential oily or petroleum discharges. Booms/pads will be changed based on need or every 12 months, whichever is less.
        vi. In coordination with the rail company, stationary engines and rail cars should be observed for fluid and cargo leaks; ash spills from stationary engines or rail cars must be cleaned up as soon as possible.
        vii. All required observations and survey notes will be kept for at least the term of the permit; electronic records retention is acceptable.
        viii. See Renewal Requirements in this section for submission information.

20. Petroleum Secondary Containment.
    Before releasing water accumulated in petroleum secondary containment areas, it must be examined for hydrocarbon odor and presence of sheen to protect the general criteria found at 10 CSR 20-7.031(4).
    (a) If odor or sheen is found, the water may be disposed of in accordance with legally approved methods, such as being sent to an accepting wastewater treatment facility, or transported to the on-site Low Volume Waste treatment device.
    (b) The secondary containment area must be routinely checked for signs of leaks, spills, and releases of petroleum. All petroleum captured in the secondary containment area must be expeditiously removed and the source of the product determined. Leaks, or otherwise compromised equipment, must be promptly resolved.
    (c) In absence of precipitation, the secondary containment device should remain clean and dry. Unimpacted stormwater should be drained from the secondary containment as soon as reasonable after a precipitation event.
    (d) If the facility wishes to discharge the accumulated stormwater with hydrocarbon odor or presence of sheen, *and* has been complying with the requirements listed immediately above (1b – 1c), the water shall be treated using an appropriate removal method (e.g. adsorbent pads or booms). Following treatment and before release, the water shall be visually inspected. If the water is free of sheen or floating product and odor, it may be released without further monitoring.
    (e) The drainage area for the secondary containment system shall be checked at least monthly for signs of phytotoxicity or vegetative stress. If present, the facility shall re-evaluate their secondary containment maintenance practices and, for the next thirty days, impacted water shall be tested for oil and grease and benzene using 40 CFR part 136 methods prior to release. All pollutant levels must be below the most protective, applicable standards for the receiving stream, found in 10 CSR 20-7.031 Table A before discharge is authorized.
    (f) The area below the secondary containment outlet(s) must be maintained in a manner that minimizes soil washout, such as with stabilized vegetation, rip rap, or by releasing accumulated water slowly.
    (g) Records of all testing and treatment of water accumulated in secondary containment shall be available on demand to the Department. Electronic records retention is acceptable.

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C. SPECIAL CONDITIONS (CONTINUED)

21. The full implementation of this operating permit, which includes implementation of any applicable schedules of compliance, shall constitute compliance with all applicable federal and state statutes and regulations in accordance with RSMo 644.051.16, and the CWA section 402(k); however, this permit may be reopened and modified, or alternatively revoked and reissued to comply with any applicable effluent standard or limitation issued or approved under Clean Water Act Sections 301(b)(2)(C) and (D), §304(b)(2), and §307(a) (2), if the effluent standard or limitation so issued or approved contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or controls any pollutant not limited in the permit. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, termination, notice of planned changes, or anticipated non-compliance does not stay any permit condition.

22. All outfalls and permitted features must be clearly marked in the field.

23. Report "no discharge" when a discharge does not occur during the report period. It is a violation of this permit to report no-discharge when a discharge has occurred.

24. This permit does not apply to fertilizer products receiving a current exemption under the Missouri Clean Water Law and regulations in 10 CSR 20-6.015(3)(B)8., and are land applied in accordance with the exemption.

25. Changes in Discharges of Toxic Pollutant.
    In addition to the reporting requirements under 40 CFR 122.41(l), all existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director as soon as they know or have reason to believe:
    (a) That an activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following notification levels:
        (1) One hundred micrograms per liter (100 µg/L);
        (2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile;
        (3) Five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4, 6-dinitrophenol;
        (4) One milligram per liter (1 mg/L) for antimony;
        (5) Five (5) times the maximum concentration value reported for the pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or
        (6) The notification level established by the Department in accordance with 40 CFR 122.44(f).
    (b) That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":
        (1) Five hundred micrograms per liter (500 µg/l);
        (2) One milligram per liter (1 mg/l) for antimony;
        (3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7).
        (4) The level established by the Director in accordance with 40 CFR 122.44(f).

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C. SPECIAL CONDITIONS (CONTINUED)

26. Reporting of Non-Detects.
    (a) Compliance analysis conducted by the permittee or any contracted laboratory shall be conducted in such a way the precision and accuracy of the analyzed result can be enumerated. See sufficiently sensitive test method requirements in Standard Conditions Part I, Section A, #4 regarding proper testing and detection limits used for sample analysis. For the purposes of this permit, the definitions in 40 CFR 136 apply; method detection limit (MDL) and laboratory established reporting limit (RL) are used interchangeably in this permit.
    (b) The permittee shall not report a sample result as "non-detect" without also reporting the MDL. Reporting "non-detect" without also including the MDL will be considered failure to report, which is a violation of this permit.
    (c) For the daily maximum, the permittee shall report the highest value; if the highest value was a non-detect, use the less than "<" symbol and the laboratory's highest method detection limit (MDL) or the highest reporting limit (RL); whichever is higher (e.g. <6).
    (d) When calculating monthly averages, zero shall be used in place of any value(s) not detected. Where all data used in the average are below the MDL or RL, the highest MDL or RL shall be reported as "<#" for the average as indicated in item (c).

27. Failure to pay fees associated with this permit is a violation of the Missouri Clean Water Law (644.055 RSMo).

28. This permit does not cover land disturbance activities.

29. This permit does not authorize the placement of fill materials in flood plains, placement of solid materials into any waterway, the obstruction of stream flow, or changing the channel of a defined drainage course. The facility must contact the U.S. Army Corps of Engineers (Corps) to determine if a CWA §404 Department of Army permit or §401 water quality certification is required for the project.

30. Annual reports are due to the Department on February 28th of each year for the previous calendar year, for the term of the permit (including the year of renewal) which must include the following:
    (a) Annual certification report for the intake in accordance with 40 CFR 125.97(c) to fulfil Department requirements at 40 CFR 125.98(k).
    (b) Record of visual or remote inspections of the intake conducted weekly in accordance with 40 CFR 125.96(e).
    (c) Status update for impingement and entrainment requirements; including completion details and operational status after implementation.
    (d) Annual reports should be uploaded into the electronic discharge monitoring report system.

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C. SPECIAL CONDITIONS (CONTINUED)

31. Renewal Application Requirements. 180 calendar days prior to permit expiration listed on page 1 of the permit, the following are due to the Department:
    (a) Complete Forms A, C, and D including all required testing of effluent and stormwater.
    (b) The facility must submit Form B for the domestic wastewater outfall, #02A.
    (c) The facility must sample the stormwater outfalls and provide analysis for every parameter contained in the permit at any outfall for at the site in accordance with 10 CSR 20-6.200(2)(C)1.E(I) and (II). The facility is not required to quantitatively sample the Stormwater Area for application purposes.
    (d) The facility will submit all reports generated for the Stormwater Area #S01 over the previous permit term. These should be submitted electronically.
    (e) The facility may use the electronic submission system to submit the application to the Program, if available.
    (f) The facility must submit all corrective action reports completed for the last permit term if a numerical benchmark exceedance occurred.
    (g) Any other item listed in the permit as "submit with renewal application".
    (h) A copy of the most recent SWPPP.
    (i) Cooling water requirements:
        i. Cooling water intake structure data as required by 40 CFR 122.21(r)(3)(iii).
        ii. Biological characterization study in accordance with 40 CFR 122.21(r)(4). In addition to the study results, the facility will provide a determination regarding the biological characterization of the local population of fish, shellfish, and other aquatic organisms. Historic data may be used.
        iii. Cooling water system data as required by 40 CFR 122.21(r)(5)(i), (ii), and (iii)
        iv. Chosen (continued or new) method of compliance with impingement mortality standard as required by 40 CFR 122.21(r)(6) et seq. and determinations from the options outlined in 40 CFR 125.94(c).
        v. Provide results of a two-year impingement technology performance optimization study as implemented per 40 CFR 125.98(e), and following 40 CFR 122.21(r)(6)(ii). The study must allow for at least once per month sampling.
        vi. Historic yet relevant entrainment data acquired under any phase of the regulations associated with Clean Water Act §316(b) in accordance with 40 CFR 122.21(r)(7).
        vii. Provide the operational status of the facility in accordance with 40 CFR 122.21(r)(8)
        viii. Provide the results of a two-year Entrainment Characterization Study in accordance with 40 CFR 122.21(r)(9) after the traveling screens with 3/8 inch fine mesh are installed. The entrainment characterization study may run concurrently with the screen optimization study.
        ix. Provide any and all communications with the United States Fish and Wildlife Services or Missouri Department of Conservation, and any other communications regarding aquatic organisms at the site, with any state or federal agency in compliance with 40 CFR 122.21(r)(1)(ii)(C) and 40 CFR 122.21(r)(1)(ii)(H).
    (j) Groundwater:
        i. Provide an excel spreadsheet summarizing all the data collected for groundwater monitoring during the last 10 years (or as much collected) for the ash ponds. Data shall be independent of qualifiers so data manipulation can occur. (ie. cells shall not contain "0.2 J" or "<0.2"; the qualifier [e.g. "J" or "<"] shall be placed in an adjacent cell).
        ii. Provide a corrective measures assessment and results report for coal combustion residual ponds with statistically significant levels of Appendix IV constituents consisting of corrective measures aligned with 40 CFR 257.96 and 257.97 with the application for permit renewal.
        iii. Coal Combustion Residual (CCR) Units: The facility shall supply all documents (if not previously made available) regarding closure for each of the CCR units, including, any communications between the facility and other Department of Natural Resources programs, and any federal resources and communications used to complete the actions.
        iv. The facility shall supply an updated groundwater flow pattern and how, if at all, the stormwater infiltration basins or the cap completion change the groundwater flow or constituent concentrations in any way.
    (k) Subsurface Hydraulic Connection to Surface Water
        i. The facility shall analyze, whether from past data or new data, the impacts (if any) the coal combustion residual (CCR) waste mass has on the Missouri River, Labadie Creek, and any other nearby waterbodies.
        ii. The facility shall provide the data from which the conclusions were based.
        iii. The facility shall provide calculations of pollutant loading for each pollutant from the waste mass to the river or stream.

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D. NOTICE OF RIGHT TO APPEAL

If you were adversely affected by this decision, you may be entitled to pursue an appeal before the administrative hearing commission (AHC) pursuant to Sections 621.250 and 644.051.6 RSMo. To appeal, you must file a petition with the AHC within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal should be directed to:

Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: [HYPERLINK "https://ahc.mo.gov"]

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
FACT SHEET
FOR THE PURPOSE OF RENEWAL
OF
MO-0004812
LABADIE ENERGY CENTER (LEC)

The Federal Water Pollution Control Act ("Clean Water Act" Section 402 Public Law 92-500 as amended) established the National Pollutant Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States, and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the "Clean Water Act"). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Director of the Missouri Department of Natural Resources (Department) under an approved program, operating in accordance with federal and state laws (Federal "Clean Water Act" and "Missouri Clean Water Law" Section 644 as amended). MSOPs are issued for a period of five (5) years unless otherwise specified for less.

As per [40 CFR Part 124.8(a)] and [10 CSR 20-6.020(1)(A)2.] a factsheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the Missouri State Operating Permit (MSOP or operating permit) listed below. A factsheet is not an enforceable part of an operating permit.

PART I. FACILITY INFORMATION

Facility Type:	Industrial: Major, Primary, Categorical; >1 MGD
SIC Code(s):	4911
NAICS Code(s):	221112
Application Date:	01/31/2020
Modification Date:	05/03/2017, 09/01/2018
Expiration Date:	07/31/2020
Last Inspection:	09/08/2014

FACILITY DESCRIPTION:
Steam electrical power generation plant primarily engaged in the generation of electricity for distribution and sale. The plant consists of four generating units with a net capability of 2,407 megawatts (MW). The LEC has four coal-fired generating units with a total gross winter generating capacity of 2,580 MW. In the summer, the total gross generating capacity decreases to 2,488 MW.

PERMITTED FEATURES TABLE FOR WASTEWATER:

OUTFALL	AVERAGE FLOW	DESIGN FLOW	TREATMENT LEVEL	EFFLUENT TYPE
#001	941 MGD	1,428 MGD	316(a) variance	single pass condenser cooling thermal wastewater
#02A	0.013 MGD	0.05 MGD	activated sludge, extended aeration, UV	domestic wastewater
#02B	5.1 MGD	5.3 MGD	coagulation, settling, pH adjustment	low volume wastes and #02A
#02C	0	0	no discharge	emergency overflow of west detention basin
#010 (intake)	1,377 MGD	1,438 MGD	bar rack and rotating screens	intake subject to CWA §316(b)

REMOVED OUTFALLS:
Outfall #002 historically discharged wastewater from the bottom ash pond, fly ash pond, coal pile, coal pile runoff, and sewage treatment plant. Treatment historically included carbon dioxide (CO_2) injection for pH adjustment, settling, precipitation. UTM Coordinates: were X = 688017; Y = 4269440; receiving stream was listed as the Missouri River (P), WBID #1604. Design flow was 57.8 MGD; actual flow was 15.8 MGD; this facility has ceased sluicing ash and now utilizes an on-site landfill for utility wastes. A portion of the stormwater historically routed to this outfall is being monitored at new outfall #012; the rest is being directed to the new on-site infiltration basins for the fly and bottom ash ponds.

Outfall #003 is continued as a stormwater outfall, however, after review of the activities occurring in this outfall's watershed, it was determined there was no industrially exposed areas therefore does not need to be monitored under this permit. This outfall continues to

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drain a total of 5 acres, with 3.8 acres impervious surface, with flow wholly dependent on rainfall. UTM coordinates: X = 688455; Y = 4270696.

Outfall #009 was the historic ash pond emergency spillway. UTM Coordinates: X = 688017; Y = 4269440; the historic receiving stream was Labadie Creek (P) WBID# 1693, the design flow was 85.37 MGD. The ash ponds are almost capped and no longer have potential to discharge wastewater through outfall #009.

FACILITY PERFORMANCE HISTORY:
The electronic discharge monitoring reports were reviewed since the last permit renewal. Only one exceedance was noted; total suspended solids at outfall #02A. The exceedance was of a technology-based limit and was temporary; the exceedance likely did not cause a violation of the water quality criteria due to mixing with/passing through outfall #02B prior to discharge to the Missouri River.

On May 13, 2020, the permit writer reviewed all documents uploaded into the electronic filing system by Ameren using the electronic discharge monitoring reporting system as required by 40 CFR 127. It appeared Ameren submitted all required daily records. The records were spot-checked for accuracy by comparing to numeric data submitted; no inaccuracies were noted. However, the permit writer notes, the forms used, while appropriate, are no longer distributed by the Department. The facility may use any daily DMR form they create. A form upload is required when the facility obtains more than one sample for the reporting period. The eDMR system can only accept one data point.

The facility reported an unauthorized release from a sump occurring on May 1, 2018. This caused a release of the east water treatment plant sump to the storeroom yard drain wastewater which flowed into the stormwater watershed for outfall #004. The east water treatment sump wastewater was 9.4 pH, about 600 gallons was discharged. A pump insufficiency was noted as the cause and Ameren indicated the pump issue would be fixed. No other release of this type was noted.

On October 26, 2017, the facility contacted the Department to provide an update to the electronic discharge monitoring reporting values which were entered incorrectly into the system for outfall #001 for August and September 2015, and January 2016.

BUSINESS REGISTRATION:
The charter number for the continuing authority for this facility is 00040441; this number was verified by the permit writer to be associated with the facility and precisely matches the continuing authority reported by the facility.

OTHER PERMITS:
In accordance with 40 CFR 122.21(f)(6), the Department evaluated other permits currently held by this facility. This facility has the following permits: EPA ID#: 110000440470; DNR permits: utility waste landfill 0907101; air 2907100003; Part 70 Air permit [HYPERLINK "https://dnr.mo.gov/env/apcp/permits/docs/amerenmo-labadie-2017opf.pdf%20OP2017-048"], and hazardous waste MOD079933198 permit.

RENEWAL COMMENTS:
Sampling for renewal occurred on November 19, 2019 for outfalls #001, #02A, #02B, and the intake; stormwater samples were collected on October 29 and 30, 2019. The sampling methods were appropriate (grab and composite) for each parameter. The facility stores and uses a variety of chemicals, bulk chemicals, solvents, dust suppressants, pH modifiers, laboratory reagents, lubricants, macroinvertebrate control, and coal conditioning products. The extensive list, found in the application materials, was reviewed. The facility has a Spill Prevention, Control, and Countermeasures (SPCC) plan as required by 40 CFR 112. Storage requirements and usage conditions were reviewed and the chemicals on site were deemed appropriately used and controlled as described. Many of these chemicals, if released, would be identified by either oil and grease monitoring or pH monitoring in the established stormwater outfalls. However, the facility is required to mitigate all spills (see special conditions) upon occurrence.

Outfall #02A is domestic wastewater outfall which is, technically, an internal monitoring point. However, as this outfall is specifically designed to treat domestic wastewater, effluent limitations derived in this permit include water-quality based limits as well as technology limits and are established at #02A before the influence of the large amounts of process wastewater from #02B can impact the discharge. The system was upgraded in 2017 to include an ultraviolet treatment system to kill *E. coli*. The statement of work completed was received on June 19, 2017 for CP0001787. To effectively monitor the UV system's performance, the facility is required to monitor *E. coli* at the internal monitoring point instead of after passing through the low volume waste basins. Additionally, the facility requested removal of outfall #002 from the permit as the ash pond has been capped, thus water quality sampling will occur at outfalls #02A and #02B for process wastewater and at #012 for potential stormwater from the capped ash pond

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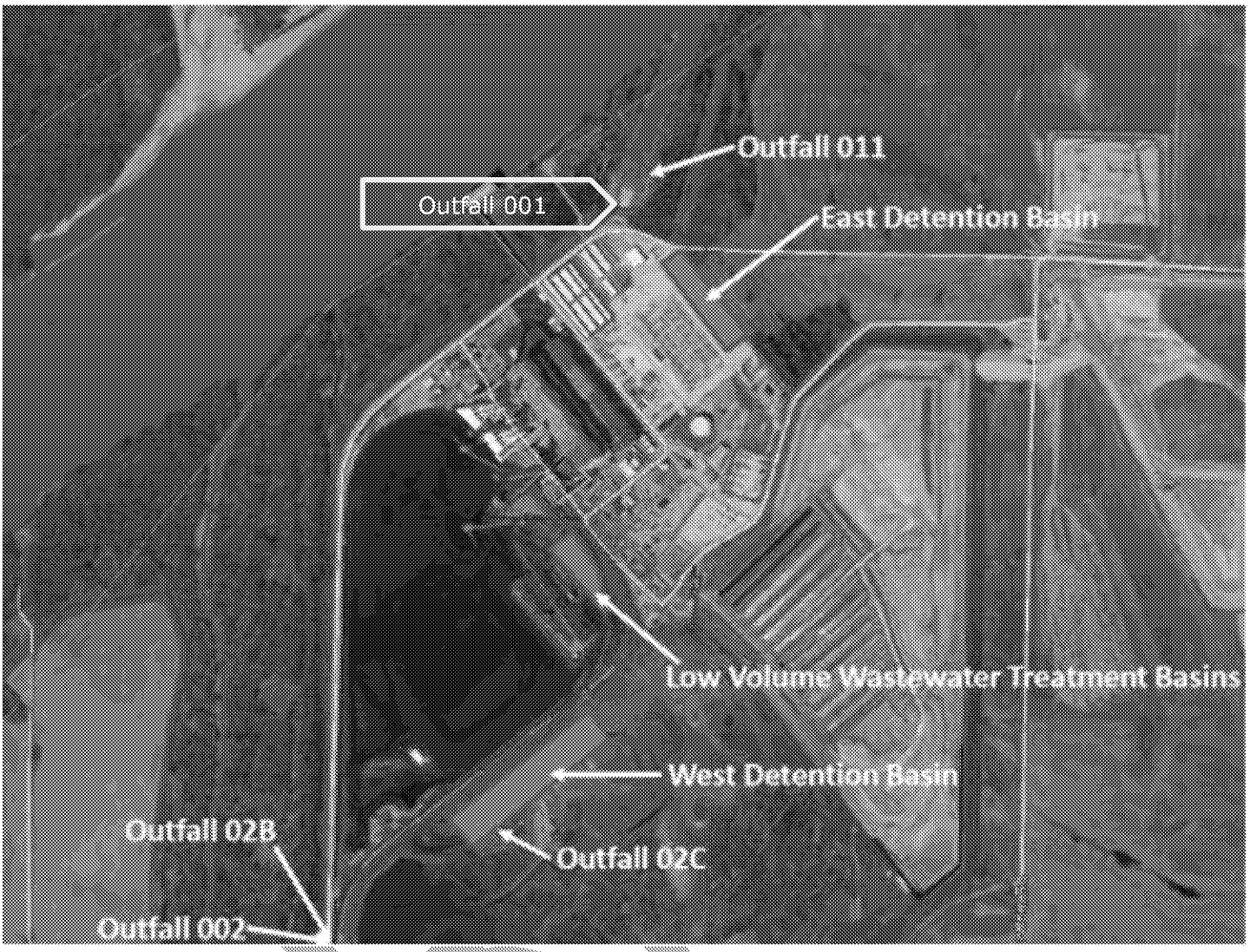
FACILITY MAP:



Outfall #001 makes up the majority of the channel's flow; outfall #011 merges into the channel.

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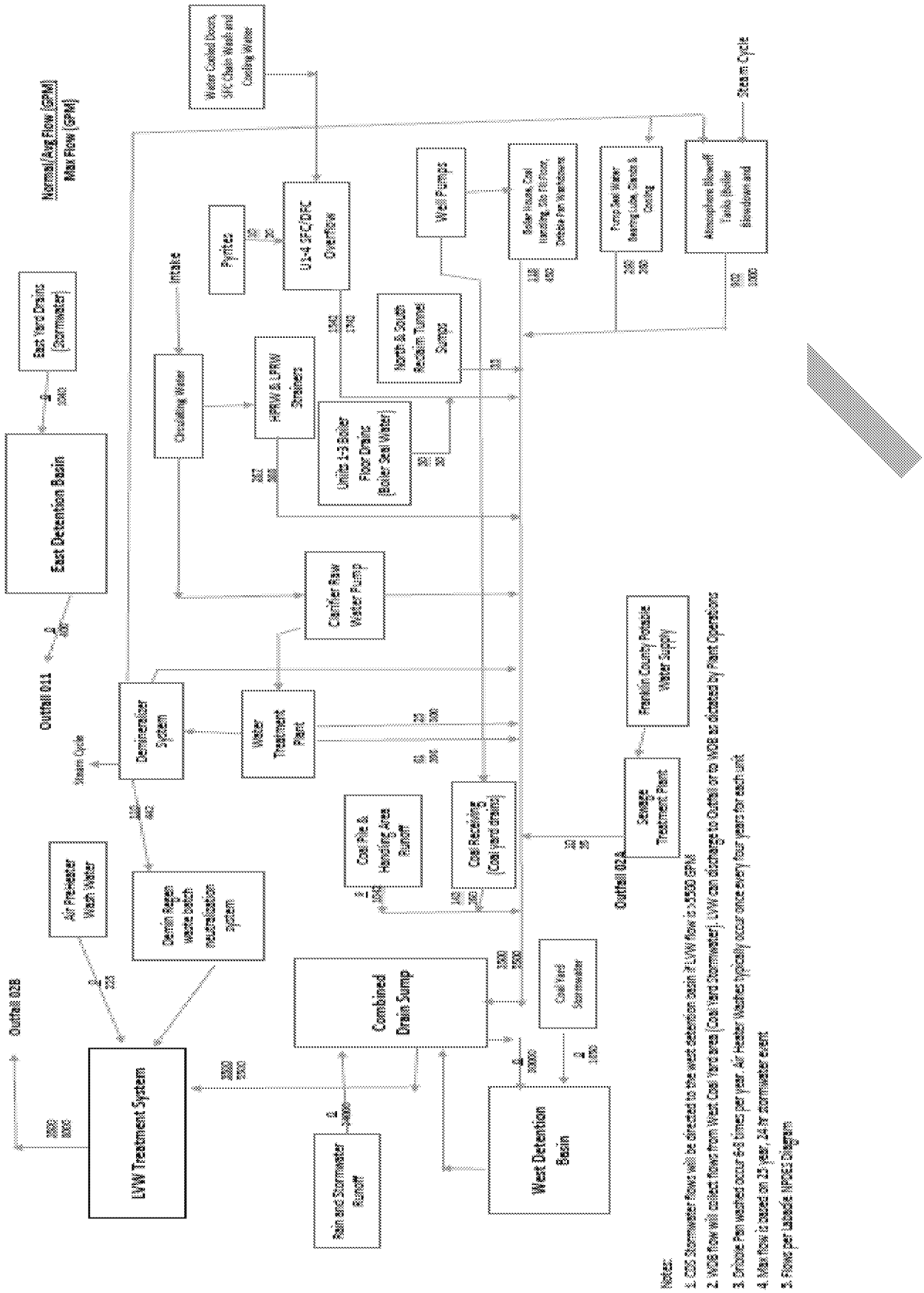
WATER BALANCE DIAGRAM:



PART II. RECEIVING WATERBODY & THERMAL VARIANCE INFORMATION

RECEIVING WATERBODY TABLE:

WATERBODY NAME	CLASS	WBID #	DESIGNATED USES	12-DIGIT HUC
Missouri River	P	1604	DWS, GEN, HHP, IND, IRR, LWW, SCR, WBC-B, WWH (ALP)	Labadie Creek – Missouri River 10300200-0603
Labadie Creek	P	1693	GEN, HHP, IRR, LWW, SCR, WBC-B, WWH (ALP)	
Tributary to Iman Branch	C	3960	GEN, HHP, IRR, LWW, SCR, WBC-B, WWH (ALP)	

Classes are representations of hydrologic flow volume or lake basin size as defined in 10 CSR 20-7.031(1)(F). L1: Lakes with drinking water supply - wastewater discharges are not permitted to occur to L1 watersheds per 10 CSR 20-7.015(3)(C); L2: major reservoirs; L3: all other public and private lakes; P: permanent streams; C: streams which may cease flow in dry periods but maintain pools supporting aquatic life; E: streams which do not maintain surface flow; and W: wetland. Losing streams are defined in 10 CSR 20-7.031(1)(O) and are designated on the Losing Stream dataset or determined by the Department to lose 30% or more of flow to the subsurface.

WBID = Waterbody Identification: Missouri Use Designation Dataset per 10 CSR 20-7.031(1)(Q) and (S) as 100K Extant-Remaining Streams or newer; data can be found as an ArcGIS shapefile on MSDIS at [HYPERLINK "ftp://msdis.missouri.edu/pub/Inland_Water_Resources/MO_2014_WQS_Stream_Classifications_and_Use_shp.zip"]; New C streams described on the dataset per 10 CSR 20-7.031(2)(A)3. as 100K Extent Remaining Streams.

10 CSR 20-7.031(1)(C)1.: **ALP** = Aquatic Life Protection (formerly AQL); current uses are defined to ensure the protection and propagation of fish shellfish and wildlife, further subcategorized as: WWH = Warm Water Habitat; CLH = Cool Water Habitat; CDH = Cold Water Habitat; EAH = Ephemeral Aquatic Habitat; MAH = Modified Aquatic Habitat; LAH = Limited Aquatic Habitat. This permit uses ALP effluent limitations in 10 CSR 20-7.031 Table A1-B3 for all habitat designations unless otherwise specified.
10 CSR 20-7.031(1)(C)2.: Recreation in and on the water
WBC = Whole Body Contact recreation where the entire body is capable of being submerged;
WBC-A = whole body contact recreation supporting swimming uses and has public access;
WBC-B = whole body contact recreation not included in WBC-A;
SCR = Secondary Contact Recreation (like fishing, wading, and boating)
10 CSR 20-7.031(1)(C)3. to 7.:
HHP (formerly HHF) = Human Health Protection as it relates to the consumption of fish and drinking of water;
IRR = irrigation for use on crops utilized for human or livestock consumption
LWW = Livestock and Wildlife Watering (current narrative use is defined as LWP = Livestock and Wildlife Protection);
DWS = Drinking Water Supply, includes aquifers per 10 CSR 20-7.031(5)
IND = industrial water supply
10 CSR 20-7.031(1)(C)8. to 11.: Wetlands (10 CSR 20-7.031 Tables A1-B3 currently does not have corresponding habitat use criteria for these defined uses): WSA = storm- and flood-water storage and attenuation; WHP = habitat for resident and migratory wildlife species; WRC = recreational, cultural, educational, scientific, and natural aesthetic values and uses; WHC = hydrologic cycle maintenance.
10 CSR 20-7.031(6): **GRW** = Groundwater
20 CSR 20-7.031(4): GEN = general criteria; acute toxicity criteria applicable to all waters even those lacking designated uses
n/a = not applicable

EXISTING WATER QUALITY:

The USGS has water quality data available for the Missouri River, but no readily available data was found for Labadie Creek. Please visit USGS.gov to view applicable data. The facility has completed stream surveys of aquatic species on the Missouri River for both the 316(a) and 316(b) sections of the Clean Water Act. See discussions below.

UPSTREAM OR DOWNSTREAM IMPAIRMENTS:

The permit writer has reviewed upstream and downstream stream segments of this facility for impairments.
- ✓ The permit writer has noted no upstream impairments near this facility.
- ✓ The permit writer has noted downstream of the facility one stream is on the 303(d) list and has a TMDL; see below.

303(D) LIST:

Section 303(d) of the federal Clean Water Act requires each state identify waters not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock, and wildlife. The 303(d) list helps state and federal agencies keep track of impaired waters not addressed by normal water pollution control programs. [HYPERLINK "http://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm"]
- ✓ Applicable; the Missouri River is listed on the Missouri 303(d) list for *E. coli* where the WBC-B use is impaired. This facility is not listed as a source *E. coli* but has the possibility to contribute to the impairment; outfall #02A is domestic wastewater discharge which exits plant property through outfall #002 historically and now through outfall #02B, through the channel, which flows into the Missouri River. *E. coli* limitations on domestic wastewater discharges will protect both river's recreational uses of WBC-B and also SCR.

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TOTAL MAXIMUM DAILY LOAD (TMDL):
A TMDL is a calculation of the maximum amount of a given pollutant a water body can absorb before its water quality is affected; hence, the purpose of a TMDL is to determine the pollutant loading a specific waterbody can assimilate without exceeding water quality standards. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan or TMDL may be developed. The TMDL shall include the WLA calculation. [HYPERLINK "http://dnr.mo.gov/env/wpp/tmdl/"]

- ✓ Applicable; the Missouri River is associated with the 2002 EPA approved TMDL for PCBs and chlordane. This facility is not considered to be a source of the above listed pollutants or considered to contribute to the impairment.

DESIGNATION OF WATERS OF THE STATE:
Per Missouri's technology-based effluent regulations [10 CSR 20-7.015], waters of the state are divided into seven categories [10 CSR 20-7.015(2) through (8)]. If the discharges at the site are stormwater only, effluent limitations may not be developed based on the designations of the receiving stream, rather are based on a best professional judgment evaluation, which takes the designation of the receiving water body into consideration. Effluent limitations derived on a site specific basis are discussed in PART IV: EFFLUENTS LIMITS DETERMINATIONS.

- ✓ Missouri or Mississippi River
- ✓ All other waters

RECEIVING WATERBODY MONITORING REQUIREMENTS:
This permit does not identify where instream/receiving stream monitoring will occur for the purposes of sampling for CWA §316(b) studies. The department will work with the permittee to review any proposed monitoring programs. Thermal temperature of the river may be measured at the intake or at a USGS gaging station, or by other, certified means where a QA/QC program has been established.

MIXING CONSIDERATIONS:
Certain outfalls receive mixing allowances, see below. Technology-based effluent regulations are not afforded mixing. Stormwater does not receive standard water quality mixing.

RECEIVING STREAM LOW-FLOW VALUES AND MIXING CONSIDERATIONS FOR TOXICS:

OUTFALL	RECEIVING STREAM	LOW-FLOW VALUES (CFS)			
		GAGING STATION/MIXING AFFORDED	1Q10	7Q10	30Q10
#02B	Mississippi River	Labadie MO #06935550 Gaging Station	32,778	34,760	37,593
		Zone of Initial Dilution (Acute)[10 CSR 20-7.031(5)(A)4.B.(III)(b)]	82	82	82
		Mixing Zone (Chronic) [10 CSR 20-7.031(5)(A)5.A.4.B.(III)(a)]	8194.5	8690	9398.25
#008	Labadie Creek	USGS StreamStats Tool	0.015*	0.021*	0.0752*
		Zone of Initial Dilution (Acute) [10 CSR 20-7.031(5)(A)4.B.(I)(b)]	0	0	0
		Mixing Zone (Chronic) [10 CSR 20-7.031(5)(A)5.A.4.B.(I)(a)]	0	0	0

Data were obtained since April 2015 for the Missouri River and were calculated using a Department-developed spreadsheet (available upon request); 20 years of data was not available at this site but the 4 complete years obtained is sufficient to determine reasonable potential for toxic parameters.
* Data were obtained for Labadie Creek using the USGS's StreamStats tool. [HYPERLINK "https://streamstats.usgs.gov/ss/"]. The marker was placed just above outfall #008's location prior to any influence of facility discharges, at latitude 38.54330 and longitude -90.84391. As the flow was less than 0.1 cfs, mixing is not available for discharges to this stream.

THERMAL MIXING CONSIDERATIONS:
This facility has thermal discharge limitations. See outfall #001 for thermal limitations and derivation. Missouri's Water Quality Standards [10 CSR 20-7.031(4)(A)1.] specifically state mixing considerations for toxics do not apply to thermal mixing considerations; thermal mixing considerations are located in [10 CSR 20-7.031(5)(D)6.], and are limited to 25% of the cross-sectional area or volume of a river, unless a biological survey performed in accordance with 316(a) of the Clean Water Act indicate no significant adverse effect on aquatic life. For the purpose of mixing considerations, the Department typically uses the 25% of the instantaneous flow volume. However, based on Thermal Plume Study information presented to the Department by Ameren, the permit is being reissued with thermal discharge parameter (TDP) effluent limits, as previously granted in the permit, which include a variance for the mixing size of the discharge.

RIVER MODELING, ALTERNATIVE EFFLUENT LIMITS, AND THERMAL WASTELOAD ALLOCATION (WLA) MODELING:
Permittees may submit site specific studies to better determine site specific wasteload allocations applied in permits. Missouri's standards provide this allowance in 10 CSR 20-7.031(5)(D)1. The TDP method of calculating compliance from Missouri's water quality standards is considered as the calculation of a site specific thermal wasteload allocation under this regulation. Additionally, the

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facility has applied for a thermal variance under CWA §316(b); this is considered a separate issue from the thermal wasteload allocation request.

This facility has completed a model to determine compliance with thermal in-stream water quality standards and a thermal variance effluent limit see Part II, Thermal Variance under CWA §316(b) for additional information. The modeling performed for outfall #001 was applied to allow a less conservative method of compliance with the water quality standard; as the Department's traditional calculation for thermal mixing is overly conservative in certain cases. The thermal discharge parameter was identified in the 2017 modification. Kleinfelder performed an extensive site-specific analysis of the thermal plume resulting from the discharge from outfall #001 into the Missouri River using FLOW3D software. The analysis and results presented an alternative method to evaluate compliance with the water quality standards for temperature at the edge of the mixing zone, maximum of 90 °F and maximum change of 5 °F, with a maximum mixing zone area of 25% of the river. The thermal plume model has been validated with real water temperature data, under a range of Missouri River conditions, through three dimensional sampling which included 323 points of data on July 25, 2017 by Amec Foster Wheeler, and was found to be representative. The model was also initially validated with data from five other sampling events as provided in Ameren's initial report from October 2016. Ameren collected new data under low flow and high temperature conditions as a further in-situ verification of the model. The results of these analyses support the continued use of the TDP for water quality compliance. The permit established site specific alternative water-quality based effluent limits based on this analysis.

The alternative effluent limit and equations can be found in the permit. The solution for any of the three equations, M2, represents the maximum ratio of effluent flow to total river flow (Qe / (Qs + Qe)), derived from the thermal plume model. The equations will determine compliance for any combination of effluent temperature (Te) and stream temperature (Ts). Conversely, M1 represents the actual ratio of effluent flow to total river flow, based on daily stream and effluent conditions. As M1 approaches M2, TDP will approach a value of 1. A value of 1 represents the condition as determined from model solutions where the thermal mixing zone is equal to 25% of the receiving stream's flow. A five percent margin of safety has been incorporated in the effluent limit, resulting in the 0.95 limit for TDP. These equations are carried over from the previous permit.

The permittee submitted an extensive site-specific analysis of the thermal plume resulting from the discharge of outfall #001 into the Missouri River. The analysis and results present an alternative method to evaluate compliance with the water quality standards for temperature at the edge of the mixing zone, maximum of 90 °F and maximum change of 5 °F. The thermal plume model has been validated with real water temperature data, under a range of Missouri River conditions and was found to be representative. Upon Department review, the equations and subsequent final water quality-based effluent limitations for the Thermal Discharge Parameter (TDP) adequately evaluate and control the thermal pollution from the discharge. The effluent limit and equations can be found in Part 1 of the permit. The solution for any of the three equations, M2, represents the maximum ratio of effluent flow to total river flow (Qe / (Qs + Qe)), derived from the thermal plume model, that will attain compliance for any combination of effluent temperature (Te) and stream temperature (Ts). Figure 18 from page 54 of Appendix I illustrates the relationship among the variables.

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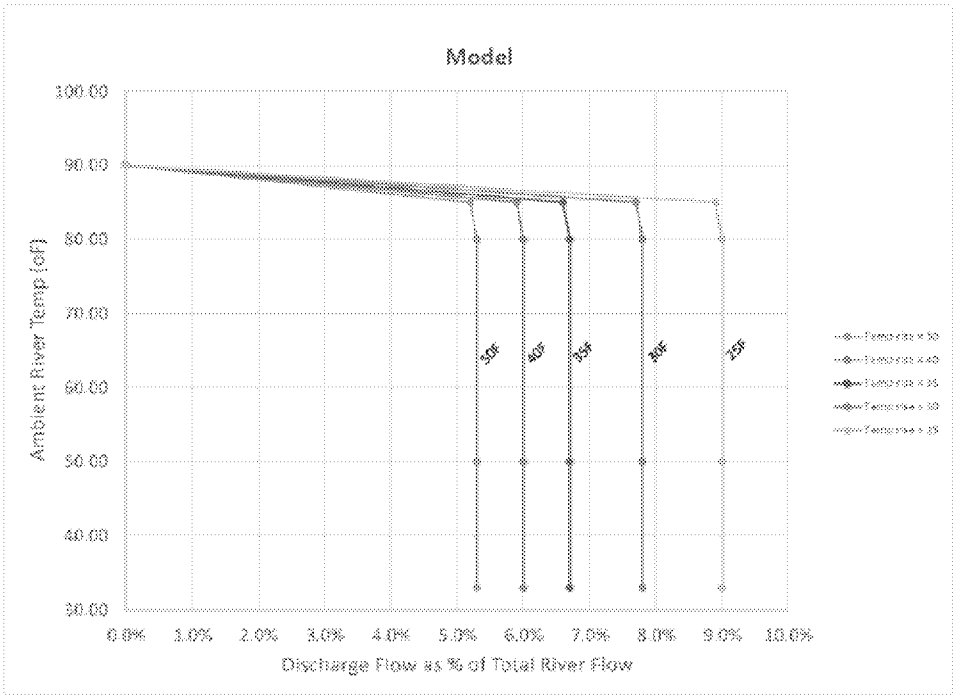
Figure 18: Graphical Solution of the Model for Combinations of River and Ameren Flow and Temperature



THERMAL VARIANCE UNDER CLEAN WATER ACT §316(a):
The facility completed an extensive study of the biological community above and below the facility during the last permit term to determine if the aquatic community was balanced and indigenous in the vicinity of the Labadie Energy Center. The facility provided evidence the ecologic metrics surrounding the facility are substantially equal above and below the mixing area of the facility. A variance was applied for in April 2020 and approved by the Department and Clean Water Commission for thermal discharges for outfall #001, a copy of the hearing's transcript is available by Sunshine Request. The facility has shown the thermal discharges have no discernable negative effect on the balanced and indigenous population of the Missouri River. This permit continues the Thermal Discharge Parameter (TDP) measurement as a surrogate for numeric effluent limits based in degrees Fahrenheit. The thermal variance allows for an expanded mixing zone up to 22 days of the year, never to exceed 40% of the river's volume. The thermal variance is necessary because it grants the facility the ability to continue operating and discharging when the river approaches 90 °F or greater, or the river flow is reduced during periods of drought. The in-stream standard is 90 °F; and the TDP is being used in place of degrees Fahrenheit. If a thermal variance were not granted, the facility would have to stop generating electricity to comply with Missouri's Water Quality Standards, even though the bioassessment has demonstrated that the discharge does not affect the beneficial uses of the waterbody.

Crosswalk between LEC Thermal Variance CWC-V-4-20 and 40 C.F.R. Part 125 Subpart H

40 C.F.R. Part 125 Subpart H	
40 C.F.R. § 125.72	
(a) Any initial application for a section 316(a) variance shall include the following early screening information: (1) A description of the alternative effluent limitation requested; (2) A general description of the method by which the discharger proposes to demonstrate that the otherwise applicable thermal discharge effluent limitations are more stringent than necessary; (3) A general description of the type of data, studies, experiments and other information	(a) the application included: (1) the facility will be complying with the "Thermal Discharge Parameter" (TDP) as provided by an approved model in lieu of numeric limits in degrees Fahrenheit. The Department has granted the TDP of 0.95; this includes a 0.05 TDP margin of safety. The TDP is a unitless parameter. The variance will provide a larger zone of mixing (greater than 25% of the river's volume or area) for 22 days per year based on a computer-generated model's output values. No upper TDP value is assigned when utilizing the thermal variance, although the mixing percentage will be increased from 25% up to 40% of the river. (2) Ameren has used a model to show the relationship between the thermal discharge component and the river's flow. Model output has provided the basis of the numeric TDP limits. The biotic sampling has shown the balanced and indigenous population is not adversely affected by the thermal discharge.

40 C.F.R. Part 125 Subpart H	
which the discharger intends to submit for the demonstration; and (4) Such data and information as may be available to assist the Director in selecting the appropriate representative important species.	(3) Ameren has provided the results of an extensive biotic community study and the results of the study concluded the aquatic species were balanced and indigenous in the vicinity of the LEC. (4) Ameren and the Department coordinated to select Representative Important Species (RIS); these species were selected for the justification listed. Channel catfish (recreational species); Emerald shiner (important food chain species); Gizzard shad (important food chain species); Pallid sturgeon (endangered species); Walleye/sauger (recreational and temperature sensitive species); White crappie (recreational and temperature sensitive species)
40 C.F.R. § 125.73	
(a) Thermal discharge effluent limitations or standards established in permits may be less stringent than those required by applicable standards and limitations if the discharger demonstrates to the satisfaction of the director that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made. This demonstration must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made.	(a) As demonstrated in the variance submittal, effluent limitations in the Labadie Energy Center permit for temperature in the summer months are more stringent than necessary to assure the protection and propagation of a balanced indigenous population of aquatic species. The Department has reviewed the 316(a) Demonstration Study, submitted by Ameren on April 8, 2020. The study met the requirements of demonstrating the balanced and indigenous populations are present and fecund in the vicinity of the Labadie Energy Center. During the summer, the thermally sensitive fish species tend to migrate from the vicinity of the Labadie Energy Center upstream into cooler waters, therefore are all but absent during the summer months; the expected time when the mixing zone will need to expand under the variance. For the rest of the year, fish species are expected to actively avoid the thermal plume. For life stages unable to swim (larva; fry) the time in contact with the thermal plume is minimal. When river flows are normal (38,000-68,000 cfs), floating organisms pass through the area in 1.5 hours. The 316(a) study comprised of monitoring, through various sampling techniques, different portions of the biotic community, including benthic, macroinvertebrates, phytoplankton, zooplankton, meroplankton, fish, and other vertebrates. Secondly, the thermal confirmation study was meant to assure the computer model numerically represented the discharge's effect on the receiving river. During the last permit term, conditions specified Ameren must sample during periods of low river flow, or high river temperature. On-site thermal sampling of the vicinity of the Labadie Energy Center during these conditions supported the computer modeling of the extent of the thermal plume. Alternative effluent limitations for the discharge is expressed as a Thermal Discharge Parameter, TDP. The facility will be afforded a TDP limit of 0.95 under normal conditions. This is a ratio of heat from the discharge to ambient heat in the river. The thermal variance allows for a mixing zone greater than 25%, which will not exceed 40% of the river's volume at any time. The variance is only granted for 22 days per year. • A TDP of greater than 0.95 will be allowed under conditions when the river flow is less than 40,000 cubic feet per second (cfs) <u>or</u> ambient river temperatures are greater than 87.0 °F; • A TDP of greater than 0.95 will be allowed in no more than 6 percent of the days in any calendar year (i.e., 22 days or 528 hours); and • On any day where the TDP is greater than 0.95, the mixing zone must be less than 40% of the volume of the river as calculated by the established equations.
(b) In determining whether or not the protection and propagation of the affected species will be assured, the Director may consider any information contained or referenced in any applicable thermal water quality criteria and thermal water quality information published by the Administrator under section 304(a) of the Act, or any other information he deems relevant.	(b) In the thermal variance request document, Ameren cited numerous other studies of the existing organisms (including endangered species), organismal habitat requirements (including thermal tolerances), and existing river conditions; these documents support the final decision. These studies include: *Pallid Sturgeon Population Assessment and Associated Fish Community Monitoring for the Missouri River: Segment 14.*, Spatiotemporal patterns and changes in Missouri River fishes. in *Historical changes in fish assemblages of large American rivers.*; *Laboratory vs. Field Thermal Tolerances: A Review and Mechanisms Explaining Thermal Tolerance Plasticity.*; and, *Predictive*

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40 C.F.R. Part 125 Subpart H	
	Biological Information to Demonstrate the Passage and Maintenance of Representative Important Species. Demonstration Type III, Section 316(a) of Federal Water Pollution Control Act Amendments of 1972, PL 92-500 for Essex Generating Station., among others. These are enumerated in the References section of the final report.
(c) (1) Existing dischargers may base their demonstration upon the absence of prior appreciable harm in lieu of predictive studies. Any such demonstrations shall show: (i) That no appreciable harm has resulted from the normal component of the discharge (taking into account the interaction of such thermal component with other pollutants and the additive effect of other thermal sources to a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge has been made; or (ii) That despite the occurrence of such previous harm, the desired alternative effluent limitations (or appropriate modifications thereof) will nevertheless assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is made.	(c)(1) The Ameren demonstration shows: (i) Ameren has demonstrated no appreciable harm has occurred from the thermal discharge at the Labadie Energy Center. The report details the presence of all trophic levels, the presence of necessary food chain species, the presence of diversity, the continued capability for a self-sustaining population, that heat tolerant species do not dominate the river in the vicinity of the LEC (outside of the allowed thermal mixing area), and, there is no increase of nuisance species due to the thermal discharge. The report also detailed there were no increase or decrease of indigenous species in the LEC vicinity, and there are no decrease in endangered species from the thermal discharge. Habitats were also identified as being maintained in the LEC vicinity, and the zone of passage (inverse of the mixing zone) is being maintained. The report also explains there is no noticeable change in commercial or sport species (upstream vs. downstream), no habitat former alterations, limited duration of any identifiable thermal effects, no sublethal or indirect effects, no presence of critical function zones within thermally exposed areas, and no negative interaction of the thermal discharge with other pollutants. There are no critical function zones (e.g., critical spawning and nursery areas) present within the Thermally Exposed and Downstream zones for any RIS. The predictive assessment also showed there would only be minor episodic exclusions from a small area of habitat within the thermally exposed zone and only under worst-case exposures. (ii) not applicable. The demonstration only needs to include (i) or (ii), and the facility chose (i).
(c)(2) In determining whether or not prior appreciable harm has occurred, the Director shall consider the length of time in which the applicant has been discharging and the nature of the discharge.	(c)(2) The Department has evaluated the historic thermal contribution of the Labadie Energy Center. Over time, the heat discharge has not changed significantly; all four units were installed in the 1970s and no additional units are planned for the LEC. The Department has reason to believe the effects of the Labadie Energy Center thermal discharge have no substantially greater effects in recent years as they have had on the past; and do not expect increased thermal components of future discharges. Air pollution control equipment is expected to be installed but the thermal component of the discharge used for cooling the condensers is not expected to increase.

See additional details regarding the entire assessment of the Clean Water Act Section 316, under Part III of the fact sheet TECHNOLOGY BASED EFFLUENT LIMITATIONS below.

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PART III. RATIONALE AND DERIVATION OF PERMIT CONDITIONS

ALTERNATIVE EVALUATIONS FOR NEW FACILITIES:
As per [10 CSR 20-7.015(4)(A)], discharges to losing streams shall be permitted only after other alternatives including land application, discharges to a gaining stream and connection to a regional wastewater treatment facility have been evaluated and determined to be unacceptable for environmental and/or economic reasons.
- ✓ Not applicable; the facility is an existing facility.

ANTIBACKSLIDING:
Federal Regulations [CWA §303(d)(4); CWA §402(c); 40 CFR Part 122.44(l)] require a reissued permit to be as stringent as the previous permit with some exceptions. Backsliding (a less stringent permit limitation) is only allowed under certain conditions.
- ✓ Limitations in this operating permit for the reissuance conform to the anti-backsliding provisions of Section 402(o) of the Clean Water Act, and 40 CFR Part 122.44.
  - ✓ Material and substantial alterations or additions to the permitted facility occurred and justify the application of a less stringent effluent limitation.
    - Outfall #02A discharges through outfall #02B; limitations for outfall #002 were removed as the outfall has been removed from permitting requirements. Outfall #02A remains an internal outfall; the parameters implemented on outfall #02A reflect the technology installed at the site and limitations required for optimal operations.
    - Ammonia monitoring was removed on outfall #02A. Outfall #02B is considered the water quality outfall for this arrangement, therefore, ammonia was assessed for #02B instead. This change is protective of water quality in the receiving stream, as it evaluates limits on the same discharge, simply earlier in the process. No additional inputs of waste expected to contain ammonia occur after this monitoring location.
  - ✓ Information is available which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) which would have justified the application of a less stringent effluent limitation.
    - Five years of DMR data were available to support removal of effluent monitoring and limitations for oil and grease from the domestic wastewater outfall, #02A. Data show there were no detections of this parameter, nor are oils and greases expected to be present in this type of domestic wastewater discharge.
    - Hardness sampling required to be collected on the intake was removed. The data may continue to be collected by the facility if desired, but is not required for permit compliance. There are no WQS for hardness, although certain metals limits are calculated using in-stream hardness. New WQS allows permit writers to use standard hardness for the area or site specific in-stream hardness. It is up to the facility to inform the Department if site specific in-stream hardness is to be used to calculate metals limits, and to supply the Department with in-stream monitoring data demonstrating site specific hardness.
    - The previous permit required completion of biotic sampling to formally request a CWA §316(a) thermal variance during this permit term. The facility has completed the studies and is no longer required to submit biotic sampling for the purposes of a thermal variance.
  - ✓ The Department determined technical mistakes or mistaken interpretations of law were made in issuing the permit under section 402(a)(1)(b).
    - Precipitation recording and reporting was required by the previous permit at the stormwater outfalls. However, due to sufficient online data, this permit no longer requires the facility report the data to the Department. The SWPPP may have differing requirements and should be maintained for BMP evaluation; but the data is not needed to be reported to the Department.
    - Settleable solids monitoring, benchmarks, and reporting was required at the stormwater outfalls in the previous permit, now listed as part of the Stormwater Area #S01. The permit writer has determined settleable solids is not an appropriate measure of solids discharges at this facility because this facility discharges to Labadie Creek and the Missouri River. Both waterbodies have swift moving water during storm events. The Missouri River is known for suspending solids and is quite turbid due to the fast movement in-stream. The other stream identified under #S01 will also have stormwater flowing into it from off site, therefore stormwater discharges from the #S01 area are protective. Because of the low potential for either stream to allow settling of solids, the settleable solids parameter removed and total suspended solids was implemented instead.
    - Per a memorandum issued by the EPA entitled *Interim Guidance for Performance-Based Reductions of NPDES Permit Monitoring Frequencies* (4/19/1996), the Department has found the permittee eligible for reduced monitoring frequency of oil and grease at outfall #02B.
    - The previous permit special conditions contained a specific set of prohibitions related to general criteria (GC) found in 10 CSR 20-7.031(4); however, there was no determination as to whether the discharges have reasonable potential to cause or contribute to excursion of those general water quality criteria in the previous permit. This permit assesses each general criteria as listed in the previous permit's special conditions. Federal regulations 40 CFR 122.44(d)(1)(iii) requires instances where reasonable potential (RP) to cause or contribute to an exceedance of a water quality standard exists, a numeric limitation must be included in the permit. Rather than conducting the appropriate RP determination, the previous permit simply placed the prohibitions in the permit. These conditions were removed from the permit. Appropriate reasonable potential determinations were conducted for each general criterion listed in 10 CSR 20-

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7.031(4)(A) through (I) and effluent limitations were placed in the permit for those general criteria where it was determined the discharge had reasonable potential to cause or contribute to excursions of the general criteria. Specific effluent limitations were not included for those general criteria where it was determined the discharges will not cause or contribute to excursions of general criteria. Removal of the prohibitions does not reduce the protections of the permit or allow for impairment of the receiving stream. The permit maintains sufficient effluent limitations, monitoring requirements and best management practices to protect water quality while maintaining permit conditions applicable to permittee disclosures and in accordance with 10 CSR 20-7.031(4):

(A) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses.
- For all outfalls, there is no RP for putrescent bottom deposits preventing full maintenance of beneficial uses; the permit writer could find no information indicating putrescent wastewater would be discharged from the facility.
- For all outfalls, there is no RP for unsightly or harmful bottom deposits preventing full maintenance of beneficial uses; the permit writer found no information indicating unsightly or harmful bottom deposits was caused by this facility's discharges. Data from stormwater outfalls shows suspended particles to be low or absent. Limitations for TSS in this permit are based on technology standards.

(B) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses.
- For outfall #02B, there is RP for oil in sufficient amounts to be unsightly preventing full maintenance of beneficial uses; data supplied by the permittee indicate oil and grease is present on an intermittent basis and water quality limits for oil and grease are retained on the outfall.
- For all other outfalls, there is no RP for oil in sufficient amounts to be unsightly preventing full maintenance of beneficial uses because nothing disclosed by the permittee or found by the permit writer indicates oil will be present in sufficient amounts to impair beneficial uses.
- For all outfalls, there is no RP for scum and floating debris in sufficient amounts to be unsightly preventing full maintenance of beneficial uses; the permit writer could find no information indicating scum and floating debris will be present in sufficient amounts to impair beneficial uses.

(C) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses.
- For all outfalls, there is no RP for unsightly color or turbidity in sufficient amounts preventing full maintenance of beneficial uses; the permit writer could find no information indicating unsightly color or turbidity will be present in sufficient amounts to impair beneficial uses.
- For outfall #001, information was supplied during the public meeting there may be RP for offensive odor in sufficient amounts preventing full maintenance of beneficial uses; the permit writer is requiring the facility study and submit results for odor on outfall #001; see special conditions.
- For all other outfalls, there is no RP for offensive odor in sufficient amounts preventing full maintenance of beneficial uses; the permit writer could find no information on the facility indicating offensive odor will be present in sufficient amounts to impair beneficial uses.

(D) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life.
- The permit writer considered specific toxic pollutants when writing this permit. Numeric effluent limitations are included for pollutants which may be discharged in toxic amounts using a reasonable potential analysis (RPA). These effluent limitations are protective of human health, animals, and/or aquatic life. See additional information in Part III REASONABLE POTENTIAL.

(E) Waters shall maintain a level of water quality at their confluences to downstream waters that provides for the attainment and maintenance of the water quality standards of those downstream waters, including waters of another state.
- This criteria was not assessed for antibacksliding, but was assessed for reasonable potential, as this is a new requirement in the regulations, approved by EPA on July 30, 2019.

(F) There shall be no significant human health hazard from incidental contact with the water.
- This criterion is very similar to (D) above. See Part IV, Effluent Limits Derivation below.

(G) There shall be no acute toxicity to livestock or wildlife watering.
- This criterion is very similar to (D) above. See Part IV, Effluent Limits Derivation below.

(H) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community.
- For outfall #001, there is no RP for physical changes impairing the natural biological community; see additional discussion regarding thermal limitations and compliance under a thermal variance in Part II THERMAL VARIANCE. While RP for thermal changes have been found, the discharge is granted a thermal variance to exceed Missouri's temperature criteria because the facility showed, through studies, the aquatic population was balanced and indigenous.

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- For all other outfalls, there is no RP for physical changes impairing the natural biological community because nothing disclosed by the permittee indicates this is occurring.
- It has been established any chemical changes are covered by the specific numeric effluent limitations established in the permit. See Part IV, Effluent Limits determinations for discussion of individual pollutants.
- For all outfalls, there is no RP for hydrologic changes impairing the natural biological community because information provided by the facility indicates the Missouri River maintains a balanced and indigenous population.

(I) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247.

- There are no solid waste disposal activities meeting the above definition or any operation which has reasonable potential to cause or contribute to the materials listed above being discharged through any outfall. While the facility operates a utility waste landfill, the wastes included at 10 CSR 80-11 are specifically excluded under municipal solid waste regulations. This permit requires litter and solid wastes be controlled on the site for aesthetic purposes, preventing it from entering the stream. This requirement is a BMP listed under special conditions for the entire site.

ANTIDEGRADATION REVIEW:
Process water discharges with new, altered, or expanding flows, the Department is to document, by means of antidegradation review, if the use of a water body's available assimilative capacity is justified. In accordance with Missouri's water quality regulations for antidegradation [10 CSR 20-7.031(3)], degradation may be justified by documenting the socio-economic importance of a discharge after determining the necessity of the discharge. Facilities must submit the antidegradation review request to the Department prior to establishing, altering, or expanding discharges. See [HYPERLINK "http://dnr.mo.gov/env/wpp/permits/antideg-implementation.htm"]

✓ Not applicable; the facility has not submitted new information proposing expanded or altered process water discharge; no further degradation proposed therefore no further review necessary.

This permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) which must include an alternative analysis (AA) of the BMPs. The SWPPP must be developed, implemented, updated, and maintained at the facility. Failure to implement and maintain the chosen alternative, is a permit violation. The AA is a structured evaluation of BMPs to determine which are reasonable and cost effective. Analysis should include practices designed to be 1) non-degrading, 2) less degrading, or 3) degrading water quality. The chosen BMP will be the most reasonable and cost effective while ensuring the highest statutory and regulatory requirements are achieved and the highest quality water attainable for the facility is discharged. The analysis must demonstrate why "no discharge" or "no exposure" are not feasible alternatives at the facility. Existing facilities with established SWPPPs and BMPs need not conduct an additional alternatives analysis unless new BMPs are established to address BMP failures or benchmark exceedances. This structured analysis of BMPs serves as the antidegradation review, fulfilling the requirements of 10 CSR 20-7.015(9)(A)5 and 7.031(3). For stormwater discharges with new, altered, or expanding discharges, the stormwater BMP chosen for the facility, through the AA performed by the facility, must be implemented and maintained at the facility. Failure to implement and maintain the chosen BMP alternative is a permit violation; see SWPPP.

✓ Applicable; the facility must review and maintain stormwater BMPs as appropriate.

BEST MANAGEMENT PRACTICES:
Minimum site-wide best management practices are established in this permit to ensure all permittees are managing their sites equally to protect waters of the state from certain activities which could cause negative effects in receiving water bodies. While not all sites require a SWPPP because the SIC codes are specifically exempted in 40 CFR 122.26(b)(14), these best management practices are not specifically included for stormwater purposes. These practices are minimum requirements for all industrial sites to protect waters of the state. If the minimum best management practices are not followed, the facility may violate general criteria [10 CSR 20-7.031(4)]. Statutes are applicable to all permitted facilities in the state, therefore pollutants cannot be released unless in accordance with RSMo 644.011 and 644.016 (17).

COST ANALYSIS FOR COMPLIANCE (CAFCOM):
Pursuant to Section 644.145, RSMo, when incorporating a new requirement for discharges from publicly owned facilities, or when enforcing provisions of this chapter or the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., pertaining to any portion of a publicly owned facility, the Department of Natural Resources shall make a "finding of affordability" on the costs to be incurred and the impact of any rate changes on ratepayers upon which to base such permits and decisions, to the extent allowable under this chapter and the Federal Water Pollution Control Act. This process is completed through a cost analysis for compliance. Permits not including new requirements may be deemed affordable.

✓ The Department is not required to complete a cost analysis for compliance because the facility is not publicly owned.

CHANGES IN DISCHARGES OF TOXIC POLLUTANT:

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This special condition reiterates the federal rules found in 40 CFR 122.44(f) and 122.42(a)(1). In these rules, the facility is required to report changes in amounts of toxic substances discharged. Toxic substances are defined in 40 CFR 122.2 as "…any pollutant listed as toxic under section 307(a)(1) or, in the case of "sludge use or disposal practices," any pollutant identified in regulations implementing section 405(d) of the CWA." Section 307 of the clean water act then refers to those parameters found in 40 CFR 401.15. The permittee should also consider any other toxic pollutant in the discharge as reportable under this condition.

COMPLIANCE AND ENFORCEMENT:
Enforcement is the action taken by the Water Protection Program (WPP) to bring an entity into compliance with the Missouri Clean Water Law, its implementing regulations, and/or any terms and conditions of an operating permit. The primary purpose of the enforcement activity in the WPP is to resolve violations and return the entity to compliance.

✓ Not applicable; the facility is not currently under Water Protection Program enforcement action.

DOMESTIC WASTEWATER, SLUDGE, AND BIOSOLIDS:
Domestic wastewater is defined as wastewater (i.e., human sewage) originating primarily from the sanitary conveyances of bathrooms and kitchens. Domestic wastewater excludes stormwater, animal waste, process waste, and other similar waste.

✓ Applicable, domestic wastewater is discharged from outfall #02A. The terms and conditions of this permit require compliance with Missouri Clean Water Law.

Sewage sludge is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works; including but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works. Biosolids are solid materials resulting from domestic wastewater treatment meeting federal and state criteria for productive use (i.e. fertilizer) and after having pathogens removed.
Additional information: [HYPERLINK "http://extension.missouri.edu/main/DisplayCategory.aspx?C=74"] (WQ422 through WQ449).

✓ Applicable, sludge/biosolids/septage are removed by contract hauler. The permitted management strategy must be followed, see FACILITY DESCRIPTION in the permit. If the described management strategy cannot be followed, the permittee must obtain a permit modification. See Standard Conditions Part III, incorporated into this permit.

EFFLUENT LIMITATIONS:
Effluent limitations derived and established for this permit are based on current operations of the facility and applied per 10 CSR 20-7.015(9)(A). Two general types of effluent limitations, technology-based effluent limits (TBELs) and water quality based effluent limits (WQBELs) are reviewed. If one limit does not provide adequate protection for the receiving water, then the other must be used per 10 CSR 20-7.015(9)(A). Any flow through the outfall is considered a discharge and must be sampled and reported as provided in the permit. Future permit action due to facility modification may contain new operating permit terms and conditions which supersede the terms and conditions, including effluent limitations, of this operating permit. Daily maximums and monthly averages are required per 40 CFR 122.45(d)(1) for continuous discharges (not from a POTW).

EFFLUENT LIMITATION GUIDELINE:
Effluent Limitation Guidelines, or ELGs, are found at 40 CFR 400-499. These are limitations established by the EPA based on the SIC code and the type of work a facility is conducting. Most ELGs are for process wastewater and some address stormwater. All are technology based limitations which must be met by the applicable facility at all times.

✓ The facility has an associated Effluent Limit Guideline (ELG) at 40 CFR 423 applicable to the wastewater and certain stormwater discharges at this site, and is applied under 40 CFR 125.3(a). Should Reasonable Potential be established for any particular parameter, and water-quality derived effluent limits are more protective of the receiving water's quality, the WQS will be used as the limiting factor in accordance with 40 CFR 122.44(d) and 10 CSR 20-7.015(9)(A). See Part IV: EFFLUENT LIMITS DETERMINATION.

ELECTRONIC DISCHARGE MONITORING REPORT (EDMR) SUBMISSION SYSTEM:
The U.S. Environmental Protection Agency (EPA) promulgated a final rule on October 22, 2015, to modernize Clean Water Act reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. The final rule requires regulated entities and state and federal regulators to use information technology to electronically report data required by the National Pollutant Discharge Elimination System (NPDES) permit program instead of filing paper reports. To comply with the federal rule, the Department is requiring all permittees to begin submitting discharge monitoring data and reports online.

Per 40 CFR 127.15 and 127.24, permitted facilities may request a temporary waiver for up to 5 years or a permanent waiver from electronic reporting from the Department. To obtain an electronic reporting waiver, a permittee must first submit an eDMR Waiver Request Form: [HYPERLINK "http://dnr.mo.gov/forms/780-2692-f.pdf"]. A request must be made for each facility. If more than one facility is owned or operated by a single entity, then the entity must submit a separate request for each facility based on its specific circumstances. An approved waiver is not transferable.

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The Department must review and notify the facility within 120 calendar days of receipt if the waiver request has been approved or rejected [40 CFR 124.27(a)]. During the Department review period as well as after a waiver is granted, the facility must continue submitting a hard-copy of any reports required by their permit. The Department will enter data submitted in hard-copy from those facilities allowed to do so and electronically submit the data to the EPA on behalf of the facility.

To assist the facility in entering data into the eDMR system, the permit describes limit sets in each table in Part A of the permit. The data entry personnel should use these identifiers to ensure data entry is being completed appropriately.

✓ The permittee/facility is currently using the eDMR data reporting system.

GENERAL CRITERIA CONSIDERATIONS:

In accordance with 40 CFR 122.44(d)(1), effluent limitations shall be placed into permits for pollutants determined to cause, have reasonable potential to cause, or to contribute to, an excursion above any water quality standard, including narrative water quality criteria. In order to comply with this regulation, the permit writer has completed a reasonable potential determination on whether discharges have reasonable potential to cause, or contribute to an excursion of the general criteria listed in 10 CSR 20-7.031(4). In instances where reasonable potential exists, the permit includes limitations within the permit to address the reasonable potential. In discharges where reasonable potential does not exist, the permit may include monitoring to later determine the discharge's potential to impact the narrative criteria. Additionally, RSMo 644.076.1, as well as Section D – Administrative Requirements of Standard Conditions Part I of this permit state it shall be unlawful for any person to cause or allow any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law or any standard, rule, or regulation promulgated by the commission. See Part IV for specific determinations.

GROUNDWATER MONITORING:

Groundwater is a water of the state according to RSMo 644.016(27), is subject to regulations at 10 CSR 20-7.015(7) and 10 CSR 20-7.031(6), and must be protected accordingly.

✓ Historical ponds contain ash. This permit does not address groundwater monitoring occurring for the permitted utility waste landfill under the Department's Waste Management Program. On March 14, 2019, the engineering firm representing Ameren, called and indicated Ameren will not have eight rounds of groundwater samples collected prior to the re-application being due. They projected to have 6 quarters completed. The timeframes in the previous permit were reviewed, and this was anticipated. On March 6, 2020, Ameren submitted the 7th round of groundwater sampling. The permit writer reviewed the seven rounds of data and found arsenic, boron, and sulfate present above Missouri's groundwater standards.

Data supplied under the previous permit requirements and found online at Ameren.com indicate the presence of the following parameters above the groundwater quality standard: arsenic (groundwater quality standard 50 µg/L), boron (groundwater quality standard 2000 µg/L), and molybdenum (40 CFR 257 requirement 100 µg/L). This permit establishes a schedule of compliance for the facility to meet the groundwater limits. The general flow of the groundwater is from south to north, inland towards the river. Groundwater flow direction within the alluvium flows from the south (bluffs area) to the north (Missouri River) under normal river conditions. However, during periods of high river levels, groundwater can temporarily reverse flow until such time as the river surface elevation decreases. During these times of high river stage and temporary flow direction changes, horizontal groundwater gradients generally decrease, and little net movement of groundwater occurs. Modelling performed by Golder confirms that even under the most extreme flood event (i.e. a flood of record lasting 55 days), such temporary reversal does not impact the bedrock aquifer from which residents withdraw water. The drinking water aquifer does not have coal combustion residual leachate contamination.

Reports completed under 40 CFR 257 for utility waste landfills require the facility to show statistically significant differences (or increases, SSI) between upgradient and downgradient wells. The 2019 Groundwater Corrective Action Report dated January 31, 2020 for the LCPA (historic bottom ash pond) indicate molybdenum is a parameter of concern and it will take about 22 years for natural attenuation of this parameter. Molybdenum does not have Missouri groundwater quality standards. The 2019 Groundwater Corrective Action Report dated January 31, 2020 for the LCPB (historic fly ash pond) indicated several parameters have SSI, however, the report continued by saying the parameters are from an alternative source; the bottom ash pond. Special conditions were developed for the groundwater at this site, see permit.

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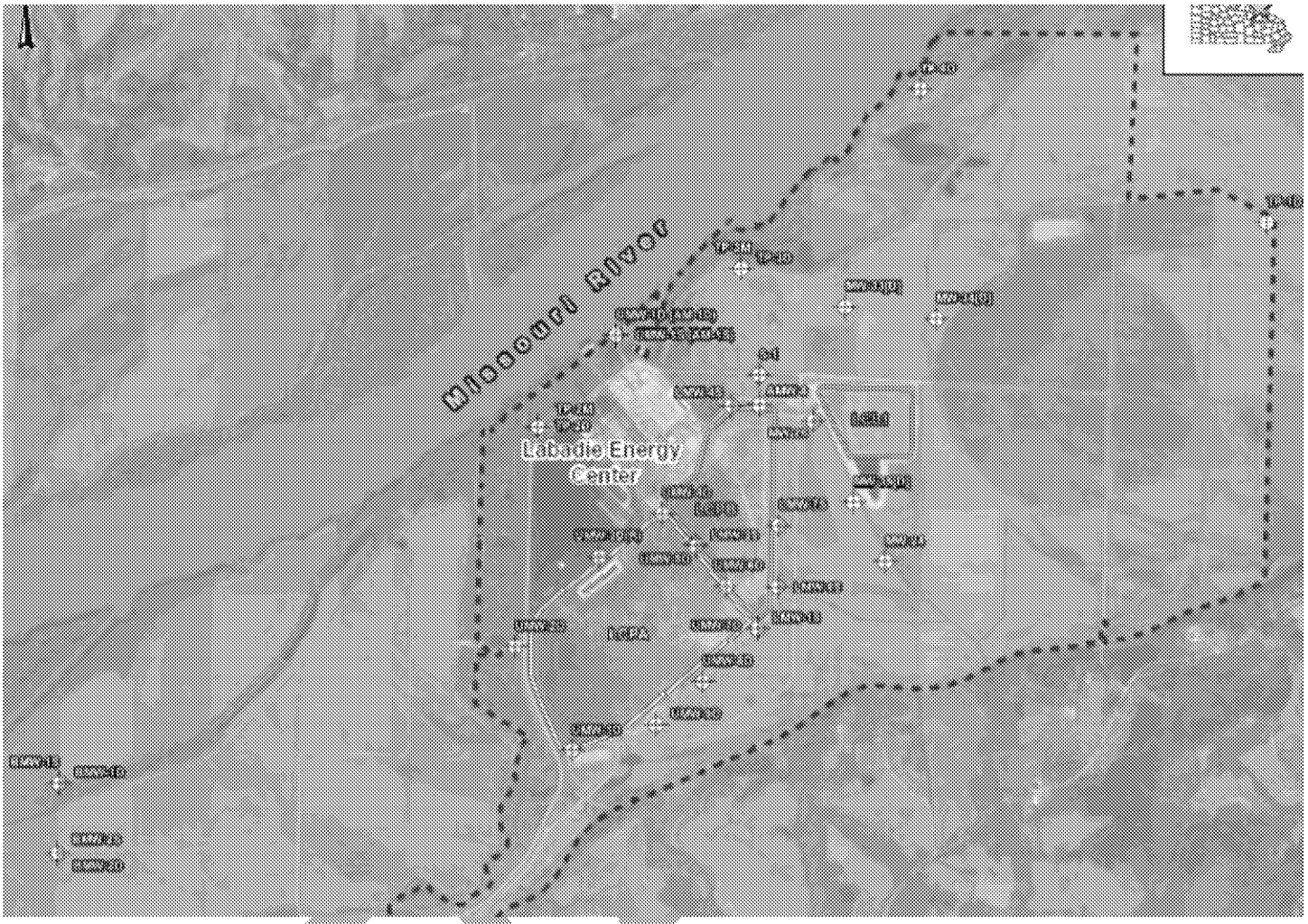

HYDRAULIC CONNECTION THROUGH GROUNDWATER TO SURFACE WATER:
The *County of Maui Hawaii v. Hawaii Wildlife Fund (Maui)* (140 S. Ct. 1462, 2020) case was reviewed. Environmental groups brought suit in federal court to challenge the county's partially treated unpermitted discharges through injection wells. Previously, the Ninth Circuit Court's 2018 decision of *Hawai'i Wildlife Fund v. Cty. of Maui*, (886 F.3d 737) indicated NPDES permits were required for facilities discharging from injection wells, because the path to the ocean is clearly ascertainable and the discharge from wells into groundwater is functionally into navigable waters. This was an opposite conclusion from the Sixth Circuit courts 2018 decisions in *Kentucky Waterways Alliance v. Kentucky Utilities Co.*, (905 F.3d 925) and *Tenn. Clean Water Network v. TVA*, (905 F.3d 436) indicating discharges through groundwater do not trigger the NPDES permit requirement, because they are not "direct discharges" into waterways. This created a circuit split, meaning the controlling case law in two or more federal appellate courts was conflicting. The U.S. Supreme Court granted review of the split circuit decisions in 2020 in order to resolve the inconsistencies and establish consistent, nationwide case law.

In a 6-3 majority decision, the 2020 Supreme Court certiorari ultimately concluded NPDES permitting requirements apply when there is a direct discharge from a point source into navigable waters, as was always the circumstance, *or* when there is "*the functional equivalent of a direct discharge*." The majority opinion noted the interpretation advanced by the 2018 Maui decision would allow a permittee to avoid a permit by simply moving its outfall a few yards away from a waterbody. The Court concluded Congress could not have intended to create "such a large and obvious loophole" under a fundamental provision of the Clean Water Act.

The majority opinion offered some guidance to lower courts when applying the new "functional equivalent" test. The opinion stated: "The object in a given scenario will be to advance, in a manner consistent with the statute's language, the statutory purposes that Congress sought to achieve." The majority interpreted Congressional intent as requiring an NPDES permit for discharges from a point source directly into navigable waters, "or when the discharge reaches the same result through roughly similar means." The Court then opined: "Time and distance are obviously important. Where a pipe ends a few feet from navigable waters and the pipe emits pollutants that travel those few feet through groundwater (or over the beach), the permitting requirement clearly applies. If the pipe ends 50 miles from navigable waters and the pipe emits pollutants that travel with groundwater, mix with much other material, and end up in navigable waters only many years later, the permitting requirements likely do not apply."

The Court acknowledged other instances would be more difficult, and were too many potentially relevant factors applicable to factually different cases for the Court to establish a test more specific than the "functional equivalent" standard. The Court offered seven non-exclusive, non-exhaustive factors as conceivably relevant examples, depending on the circumstances of a particular case. Those examples of "functional equivalent" factors are: (1) transit time, (2) distance traveled, (3) the nature of the material through which the pollutant travels, (4) the extent to which the pollutant is diluted or chemically changed as it travels, (5) the amount of pollutant entering the navigable waters relative to the amount of the pollutant that leaves the point source, (6) the manner by or area in which the pollutant enters the navigable waters, or (7) the degree to which the pollution (at that point) has maintained its specific identity. Time and distance will be the most important factors in most cases, but not necessarily every case.

The finding maintains a point source does not need to *directly* discharge into a regulated waterbody to be considered a discharge. The Department continues to permit both direct discharges, as well as discharges that are the "functional equivalent" of a direct discharge under the NPDES, UIC, and State program to protect the beneficial uses of Missouri's regulated surface and groundwater.

This decision does clarify discharges to or into groundwater must also consider hydraulic connections to surface water, meaning discharges to the subsurface in areas of regular surface water interaction (e.g. large river alluvial areas, discharges percolating subsurface, and losing stream situations) may require evaluation of groundwater and surface water protection standards for all pollutants. Additionally, in Missouri's karst geology, areas of losing streams, and sinkholes may need to be evaluated both for groundwater protection, but also for potential nearby areas where this groundwater may re-surface, if a connection to the surface waterbody is suspected.

In the EPA summary document [HYPERLINK "https://www.epa.gov/sites/production/files/2021-01/documents/final_ow_maui_guidance_document_-_signed_1.14.21.pdf"] the EPA provided the following: The mere allegation (i.e., without supporting evidence) a point source discharge of pollutants is or may be reaching a water of the United States via groundwater is not sufficient to trigger NPDES requirements. An allegation alone, for example, one made in a public comment on a draft NPDES permit for a surface water discharge from the same facility, typically would not trigger a requirement for the permitting authority to investigate the unsupported comment. Neither the "functional equivalent" analysis set out by the Supreme Court nor the CWA itself requires a facility or a permitting authority to prove the *absence* of a discharge. At the same time, it would be prudent for facility owners or operators to obtain a permit before they initiate a discharge of pollutants to avoid potential CWA or Missouri Clean Water Law (MCWL) liability for unpermitted discharges.

As Missouri already has laws and regulations protecting both groundwater and surface water, and as the Department already permits no-discharge facilities, underground injection, surficial discharging facilities, discharges to losing streams, and potential groundwater impacts, this Supreme Court decision will not likely result in dramatic differences in permitting pertaining to groundwater protection and groundwater conveyance into surface waters in Missouri. Department permit writers already evaluate protection of all potentially impacted waters of the state. The 2020 *Maui* decision simply clarifies the obligation on facilities and the Department to fully evaluate wastewater generated, stored, discharged, or land applied; and the potential impacts to regulated waters of the state, both surface waters as well as groundwater, and the hydraulic connections between them.

Because of this decision, and because Missouri's definitions of pollutants includes water contaminant 644.016(24) RSMo, and water contaminant source 644.016(25) RSMo, the facility is required to analyze if there is a connection to the nearby surface waterways for pollutants from potential sub-surface discharges. See the special conditions under Renewal Requirements.

LAND APPLICATION:
Land application, or surficial dispersion of wastewater and/or sludge, is performed by facilities to maintain a basin as no-discharge. Requirements for these types of operations are found in 10 CSR 20-6.015; authority to regulate these activities is from RSMo 644.026.

- ✓ Not applicable; this permit does not authorize operation of a surficial land application system to disperse wastewater or sludge.
- ✓ This permit does not authorize land disposal or the application of hazardous waste.

LAND DISTURBANCE:
Land disturbance, sometimes called construction activities, are actions which cause disturbance of the root layer or soil; these include clearing, grading, and excavating of the land. 40 CFR 122.26(b)(14) and 10 CSR 20-6.200(3) requires permit coverage for these activities. Coverage is not required for facilities when only providing maintenance of original line and grade, hydraulic capacity, or to continue the original purpose of the facility.

- ✓ Not applicable; this permit does not provide coverage for land disturbance activities. The facility may obtain a separate land disturbance permit (MORA) online at [HYPERLINK "https://dnr.mo.gov/env/wpp/stormwater/sw-land-disturb-permits.htm"]; MORA permits do not cover disturbance of contaminated soils, however, site specific permits such as this one can be modified to include appropriate controls for land disturbance of contaminated soils by adding site-specific BMP requirements and additional outfalls.

MAJOR WATER USER:

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Any surface or groundwater user with a water source and the equipment necessary to withdraw or divert 100,000 gallons (or 70 gallons per minute) or more per day combined from all sources from any stream, river, lake, well, spring, or other water source is considered a major water user in Missouri. All major water users are required by law to register water use annually (Missouri Revised Statues Chapter 256.400 Geology, Water Resources and Geodetic Survey Section). [HYPERLINK "https://dnr.mo.gov/pubs/pub2236.htm"]

✓ Applicable; this facility is a major water user and is registered with the state as a major water user #071300005.

MODIFICATION REQUESTS:

Facilities have the option to request a permit modification from the Department at any time under RSMo 644.051.9. Requests must be submitted to the Water Protection Program with the appropriate forms and fees paid per 10 CSR 20-6.011. It is recommended facilities contact the permit writer early so the correct forms and fees are submitted, and the modification request can be completed in a timely fashion. Minor modifications, found in 40 CFR 122.63, are processed without the need for a public comment period. Major modifications, those requests not explicitly fitting under 40 CFR 122.63, do require a public notice period. Modifications to permits should be completed when: a new pollutant is found in the discharge; operational or functional changes occur which affect the technology, function, or outcome of treatment; the facility desires alternate numeric benchmarks; or other changes are needed to the permit.

Modifications are not required when utilizing or changing additives in accordance with the publication [HYPERLINK "https://dnr.mo.gov/pubs/pub2653.htm"] nor are required when a temporary change or provisional discharge has been authorized by the regional office. While provisional discharges may be authorized by the regional office, they will not be granted for more than the time necessary for the facility to obtain an official modification from the Water Protection Program. Temporary provisional discharges due to weather events or other unforeseen circumstances may or may not necessitate a permit modification. The facility may ask for a Compliance Assistance Visit (CAV) from the regional office to assist in the decision-making process; CAVs are provided free to the permitted entity.

NET LIMITS AND INTAKE WATER CREDITS:

In accordance with federal regulation 40 CFR 122.45(g), technology-based effluent limitations or standards shall be adjusted to reflect credit for pollutants in the discharge's intake water if: (1) The applicable effluent limitations and standards contained in 40 CFR subchapter N specifically provide they are applied on a net basis; or (2) The discharger demonstrates the control system it proposes or uses to meet applicable technology-based limitations and standards would, if properly installed and operated, meet the limitations and standards in the absence of pollutants in the intake waters. Additionally, credit for conventional pollutants such as biochemical oxygen demand (BOD) or total suspended solids (TSS) should not be granted unless the permittee demonstrates that the constituents of the generic measure in the effluent are substantially similar to the constituents of the generic measure in the intake water or unless appropriate additional limits are placed on process water pollutants either at the outfall or elsewhere. Credit shall be granted only to the extent necessary to meet the applicable limitation or standard, up to a maximum value equal to the influent value. Additional monitoring may be necessary to determine eligibility for credits and compliance with permit limits.

✓ This permit allows intake water credits for outfall #02B. Net limit and intake water credit is only applicable to the total suspended solids parameter, and only for the portion of the solids originating from the river.

NUTRIENT MONITORING AND LAKE NUMERIC NUTRIENT CRITERIA:

Nutrient monitoring is required for facilities characteristically or expected to discharge nutrients (nitrogenous compounds and/or phosphorus) when the design flow is equal to or greater than 0.1 MGD per 10 CSR 20-7.015(9)(D)8. Water quality standards per 10 CSR 20-7.031(5)(N) describe nutrient criteria requirements assigned to lakes (which include reservoirs) in Missouri, equal to or greater than 10 acres during normal pool conditions. The Department's Nutrient Criteria Implementation Plan (NCIP) may be reviewed at: [HYPERLINK "https://dnr.mo.gov/env/wpp/rules/documents/nutrient-implementation-plan-final-072618.pdf"] Discharges of wastewater in to lakes or lake watersheds designated as L1 (drinking water use) are prohibited per 10 CSR 20-7.015(3)(C).

✓ The total design flow for this facility exceeds 1 MGD and the facility discharges nutrients from certain outfalls, therefore nutrient monitoring is required on a monthly basis per 10 CSR 20-7.015(9)(D)8.B. for discharges equal to or greater than 1 MGD and on a quarterly basis per 10 CSR 20-7.015(9)(D)8.A. for discharges equal to or greater than 0.1 MGD but less than 1 MGD. This facility is required to monitor for ammonia, total Kjeldahl nitrogen, nitrate plus nitrite, and phosphorus; see Part IV under specific outfall discussion for additional information.

✓ Outfall #001 is single pass cooling water. While this discharge has nutrients, nutrients are not added by the facility. The permit writer has reviewed the EPA nutrient model, and determined states should only consider additive loading. Because the facility is not adding nutrients, and the nutrients found in the discharge pass through the cooling system unchanged, monitoring for nutrients is not required. [HYPERLINK "https://echo.epa.gov/help/loading-tool/hypoxia-task-force-search-help/about-the-nutrient-model"]

✓ Nutrient monitoring is not established on outfalls classified as stormwater only; 10 CSR 20-7.015(1)(C) excludes stormwater from this rule.

✓ This facility does not discharge in a lake watershed.

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OIL/WATER SEPARATORS:
Oil water separator (OWS) tank systems are frequently found at industrial sites where process water and stormwater may contain oils and greases, oily wastewaters, or other immiscible liquids requiring separation. Food industry discharges typically require pretreatment prior to discharge to municipally owned treatment works. Per 10 CSR 26-2.010(2)(B), all oil water separator tanks must be operated according to manufacturer's specifications and authorized in NPDES permits per 10 CSR 26-2.010(2) or may be regulated as a petroleum tank.

✓ Not applicable; the permittee confirmed on May 1, 2020 no oil water separators should be included under the NPDES permit at this facility and therefore oil water separator tanks are not authorized by this permit.

PRETREATMENT:
This permit does not regulate pretreatment requirements for facilities discharging to an accepting permitted wastewater treatment facility. If applicable, the receiving entity (the publicly owned treatment works - POTW) is to ensure compliance with any effluent limitation guidelines for pretreatment listed in 40 CFR Subchapter N per 10 CSR 20-6.100. Pretreatment regulations per RSMo 644.016 are limitations on the introduction of pollutants or water contaminants into publicly owned treatment works or facilities.

✓ Not applicable, this facility does not discharge wastewater to a POTW.

REASONABLE POTENTIAL (RP):
Federal regulation [40 CFR Part 122.44(d)(1)(i)] requires effluent limitations for all pollutants which are (or may be) discharged at a level causing or have the reasonable potential to cause (or contribute to) an in-stream excursion above narrative or numeric water quality standards. Per 10 CSR 20-7.031(4), general criteria shall be applicable to all waters of the state at all times; however, acute toxicity criteria may be exceeded by permit in zones of initial dilution, and chronic toxicity criteria may be exceeded by permit in mixing zones. If the permit writer determines any given pollutant has the reasonable potential to cause or contribute to an in-stream excursion above the WQS, the permit must contain effluent limits for the pollutant per 40 CFR Part 122.44(d)(1)(iii) and the most stringent limits per 10 CSR 20-7.031(9)(A). Permit writers may use mathematical reasonable potential analysis (RPA) using the Technical Support Document for Water Quality Based Toxics Control (TSD) methods (EPA/505/2-90-001) as found in Section 3.3.2, or may also use reasonable potential determinations (RPD) as provided in Sections 3.1.2, 3.1.3, and 3.2 of the TSD.

✓ Applicable; an RPA was conducted on appropriate parameters and was conducted as per (TSD Section 3.3.2). A more detailed version including calculations of this RPA is available upon request. See Wasteload Allocations (WLA) for Limits in this section.

✓ Outfall #02B

Parameter:	CMC Acute	CCC Chronic	Listing	Daily Max	Monthly Average	n#	CV	n Max	MF	RWC Acute	RWC Chronic	RP
Aluminum, TR	750	n/a	AQL	8250.00	4112.27	1	0.60	321	13.19	385	3.99	No
Arsenic	340	150	AQL	3740.00	1864.23	1	0.60	8	13.19	9.60	0.10	No
Beryllium, TR	n/a	5	AQL	8712.03	4342.57	1	0.60	1	13.19	1.20	0.01	No
Boron, TR	n/a	2000	IRR	3369691.23	1775255.60	18	0.53	1499	2.19	298	3.10	No
Cadmium, TR	11.34	1.49	AQL	124.70	62.16	1	0.60	1	13.19	1.20	0.01	No
Chloride	860	230	AQL	9460	6771	18	0.241	32.7	1.45	4.32	0.04	No
Chromium III, TR	3459.85	165.38	AQL	38058.40	18970.49	1	0.60	6	13.19	7.20	0.07	No
Cyanide	22	5	AQL	242.00	120.63	1	0.60	4.2	13.19	5.04	0.05	No
Fluoride	n/a	4	LWP	6969.6	3474.1	1	0.60	0.33	13.19	0.40	0.00	No
Lead, TR	224.72	8.76	AQL	2471.94	1232.16	1	0.60	7	13.19	8.40	0.09	No
Mercury, Total	1.65	0.8	AQL	18.12	9.03	1	0.60	0.000059	13.19	0.00	0.00	No
Nickel, TR	920.38	102.26	AQL	10124.18	5046.47	1	0.60	3	13.19	3.60	0.04	No
Phenol-warm water	5293	2560	AQL	58223.00	29021.69	1	0.60	23	13.19	27.6	0.29	No
Selenium, TR	n/a	5	AQL	8712.03	4342.57	1	0.60	6	13.19	7.20	0.07	No
Silver, TR	14.90	n/a	AQL	163.90	81.70	1	0.60	1	13.19	1.20	0.01	No
Thallium, TR	n/a	6.3	HHP	14497.99	7226.63	1	0.60	1	13.19	1.20	0.01	No
Zinc, TR	235.62	233.70	AQL	2591.78	1291.89	1	0.60	4	13.19	4.80	0.05	No

Units are (µg/L) unless otherwise noted.

n/a Not Applicable
n number of samples; if the number of samples is 10 or greater, then the CV value must be used in the WQBEL for the applicable constituent.
CV Coefficient of Variation (CV) is calculated by dividing the Standard Deviation of the sample set by the mean of the same sample set.
CCC continuous chronic concentration
CMC continuous maximum concentration
RWC Receiving Water Concentration: concentration of a toxicant or the parameter in the receiving water after mixing (if applicable)
MF Multiplying Factor; 99% confidence level and 99% probability basis
RP Reasonable Potential: an effluent is projected or calculated to cause an excursion above a water quality standard based on a number of factors including, as a minimum, the four factors listed in 40 CFR 122.44(d)(1)(ii).

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- ✓ An RPA was not conducted on outfall #001; the only pollutant of concern is temperature; temperature is addressed in the effluent limits determination below.
- ✓ An RPA was not conducted on outfall #02A; domestic wastewater is well defined in Missouri's regulations and further analysis for reasonable potential is not necessary at this time.
- ✓ The permit writer conducted an RPD on all applicable parameters within the permit. See Part IV: Effluent Limits Determinations below.
- ✓ A mathematical RPA was not conducted for the stormwater outfalls. This permit establishes alternative requirements for stormwater. The Department has determined stormwater is not a continuous discharge and is therefore not dependent on mathematical RPAs. However, the permit writer completed an RPD, a reasonable potential determination, using best professional judgment for all of the appropriate parameters in this permit. An RPD consists of reviewing application data and/or discharge monitoring data for the last five years and comparing those data to narrative or numeric water quality criteria.
- ✓ Permit writers use the Department's permit writer's manual ([HYPERLINK "http://dnr.mo.gov/env/wpp/permits/manual/permit-manual.htm"]), the EPA's permit writer's manual ([HYPERLINK "https://www.epa.gov/npdes/npdes-permit-writers-manual"]), program policies, and best professional judgment. For each parameter in each permit, the permit writer carefully considers all applicable information regarding: technology based effluent limitations, effluent limitation guidelines, water quality standards, stream flows and uses, and all applicable site specific information and data gathered by the permittee through discharge monitoring reports and renewal (or new) application sampling. Best professional judgment is based on the experience of the permit writer, cohorts in the Department and resources at the EPA, research, and maintaining continuity of permits if necessary. For stormwater permits, the permit writer is required per 10 CSR 6.200(6)(B)2 to consider: A. application and other information supplied by the permittee; B. effluent guidelines; C. best professional judgment of the permit writer; D. water quality; and E. BMPs. Part IV provides specific decisions related to this permit.

SAMPLING FREQUENCY JUSTIFICATION:
Sampling and reporting frequency was generally retained from previous permit. 40 CFR 122.45(d)(1) indicates all continuous discharges shall be permitted with daily maximum and monthly average limits. Minimum sampling frequency for all parameters is annually per 40 CFR 122.44(i)(2).

Sampling frequency for stormwater-only outfalls is typically quarterly even though BMP inspection occurs monthly. The facility may sample more frequently if additional data is required to determine if best management operations and technology are performing as expected.

SAMPLING TYPE JUSTIFICATION:
Sampling type was continued from the previous permit. The sampling types are representative of the discharges, and are protective of water quality. Discharges with altering effluent should have composite sampling; discharges with uniform effluent can have grab samples. Grab samples are usually appropriate for stormwater. Parameters which must have grab sampling are: pH, ammonia, *E. coli*, total residual chlorine, free available chlorine, hexavalent chromium, dissolved oxygen, total phosphorus, volatile organic compounds, and others.

SCHEDULE OF COMPLIANCE (SOC):
A schedule of remedial measures included in a permit, including an enforceable sequence of interim requirements (actions, effluent limits, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit. SOCs are allowed under 40 CFR 122.47 and 10 CSR 20-7.031(11) providing certain conditions are met.
A SOC is not allowed:

- For effluent limitations based on technology-based standards established in accordance with federal requirements, if the deadline for compliance established in federal regulations has passed. 40 CFR 125.3.
- For a newly constructed facility in most cases. Newly constructed facilities must meet applicable effluent limitations when discharge begins, because the facility has installed the appropriate control technology as specified in a permit or antidegradation review. A SOC is allowed for a new water quality based effluent limit not included in a previously public noticed permit or antidegradation review, which may occur if a regulation changes during construction.
- To develop a TMDL, UAA, or other study associated with development of a site specific criterion. A facility is not prohibited from conducting these activities, but a SOC may not be granted for conducting these activities.

In order to provide guidance in developing SOCs, and to attain a greater level of consistency, the Department issued a policy on development of SOCs on October 25, 2012. The policy provides guidance to permit writers on standard time frames for schedules for common activities, and guidance on factors to modify the length of the schedule.

- ✓ Not applicable; this permit does not contain an SOC for numeric effluent limitations for outfalls. However, schedules for groundwater and installation of technology is found in the permit.

SPILLS, OVERFLOWS, AND OTHER UNAUTHORIZED DISCHARGE REPORTING:
Per 260.505 RSMo, any emergency involving a hazardous substance must be reported to the Department's 24 hour Environmental Emergency Response hotline at (573) 634-2436 at the earliest practicable moment after discovery. The Department may require the

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submittal of a written report detailing measures taken to clean up a spill. These reporting requirements apply whether or not the spill results in chemicals or materials leaving the permitted property or reaching waters of the state. This requirement is in addition to the noncompliance reporting requirement found in Standard Conditions Part I. [HYPERLINK "http://dnr.mo.gov/env/esp/spillbill.htm"]

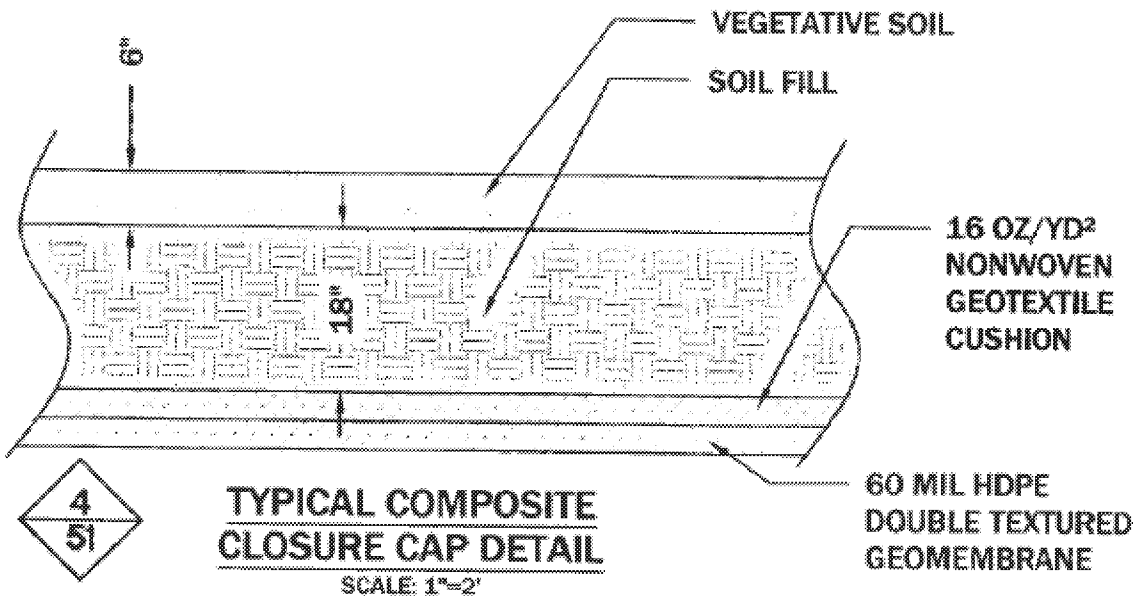
Any other spills, overflows, or unauthorized discharges reaching waters of the state must be reported to the regional office during normal business hours, or after normal business hours, to the Department's 24 hour Environmental Emergency Response spill line at 573-634-2436.

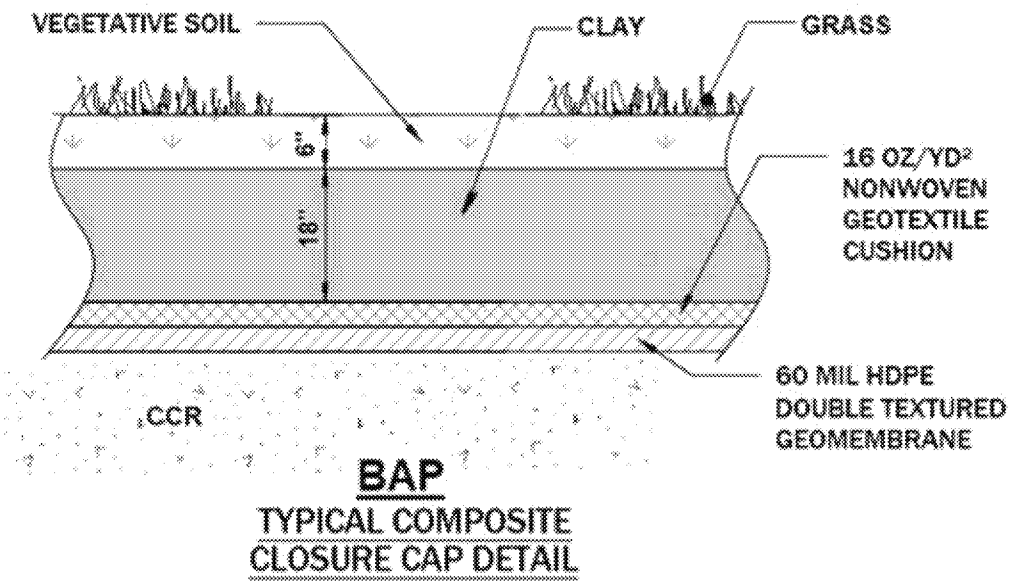
SLUDGE – INDUSTRIAL:
Industrial sludge is solid, semi-solid, or liquid residue generated during the treatment of industrial process or non-process wastewater in a treatment works; including but not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment process; scum and solids filtered from water supplies and backwashed; and any material derived from industrial sludge.
✓ Not applicable; industrial sludge is not generated at this facility.

STANDARD CONDITIONS:
The standard conditions Part I attached to this permit incorporate all sections of 40 CFR 122.41(a) through (n) by reference as required by law. These conditions, in addition to the conditions enumerated within the standard conditions should be reviewed by the permittee to ascertain compliance with this permit, state regulations, state statues, federal regulations, and the Clean Water Act. Standard Conditions Part III, if attached to this permit, incorporate requirements dealing with domestic wastewater, sludge, and land application.

STORMWATER INFILTRATION BASINS:
This facility is installing two stormwater infiltration basins, new to this permit, to be completed by the end of 2020. These basins will serve the former fly ash and bottom ash ponds; the ponds have multiple discharge points into the basins and the basins then allow the stormwater to infiltrate into the ground, and under normal circumstances do not have a stormwater discharge to the surface. This permit implements best management practices in the special conditions for these basins. Stormwater discharges from the closed ash ponds are not expected to have any contaminants of concern related to ash, as the ash pond covers will be stabilized with vegetation. Below are the diagrams supplied by the facility on May 21, 2020. Both infiltration basins were changed from the original proposed design to be larger and deeper to take advantage of the available vegetative soil. Infiltration basin #1 is for the bottom ash pond (BAP), the current plan is 588,993 square feet (SF), or 96,892 cubic yards (CY). Infiltration basin #2 for the Fly Ash Pond (FAP), the current plan: 208,787 SF, 27,908 CY. According to the design, these are not considered injection wells; see UNDERGROUND INJECTION CONTROL section in this part of the fact sheet.

The pond cover caps on both the FAP (fly ash pond) and BAP (bottom ash pond) are similar but, not exactly the same. The original BAP cover cap design was 18" of clay and 6" of vegetative soil. After the pond closure projects were underway a design change was made to add the same HDPE cover cap, as was designed for the FAP, to the BAP. The FAP is grass on 24" of vegetative soil on a geotextile fabric on a 60 mil HDPE membrane installed on the graded, contoured, and compacted CCR. The BAP is grass on 6" of vegetative soil on 18" of clay on a geotextile fabric, on a 60 mil HDPE membrane installed on the graded, contoured, and compacted CCR.





STORMWATER PERMITTING: LIMITATIONS AND BENCHMARKS:
Because of the fleeting nature of stormwater discharges, the Department, under the direction of EPA guidance, has determined monthly averages are capricious measures of stormwater discharges. The *Technical Support Document for Water Quality Based Toxics Control* (EPA/505/2-90-001; 1991) Section 3.1 indicates most procedures within the document apply only to water quality based approaches, not end-of-pipe technology-based controls. Hence, stormwater-only outfalls will generally only contain a maximum daily limit (MDL), benchmark, or monitoring requirement as dictated by site specific conditions, the BMPs in place, past performance of the facility, and the receiving water's current quality.

Sufficient rainfall to cause a discharge for one hour or more from a facility would not necessarily cause significant flow in a receiving stream. Acute Water Quality Standards (WQSs) are based on one hour of exposure, and must be protected at all times. Therefore, industrial stormwater facilities with toxic contaminants present in the stormwater may have the potential to cause a violation of acute WQSs if toxic contaminants occur in sufficient amounts. In this instance, the permit writer may apply daily maximum limitations or require specific best management practices.

Conversely, it is unlikely for rainfall to cause a discharge for four continuous days from a facility; if this does occur however, the receiving stream will also likely sustain a significant amount of flow providing dilution. Most chronic WQSs are based on a four-day exposure with some exceptions. Under this scenario, most industrial stormwater facilities have limited potential to cause a violation of chronic water quality standards in the receiving stream.

A standard mass-balance equation cannot be calculated for stormwater because stormwater flow and flow in the receiving stream cannot be determined for conditions on any given day or storm event. The amount of stormwater discharged from the facility will vary based on current and previous rainfall, soil saturation, humidity, detention time, BMPs, surface permeability, etc. Flow in the receiving stream will vary based on climatic conditions, size of watershed, area of surfaces with reduced permeability (houses, parking lots, and the like) in the watershed, hydrogeology, topography, etc. Decreased permeability may increase the stream flow dramatically over a short period of time (flash).

Numeric benchmark values are based on site specific requirements taking in to account a number of factors but cannot be applied to any process water discharges. First, the technology in place at the site to control pollutant discharges in stormwater is evaluated. The permit writer also evaluates other similar permits for similar activities. A review of the guidance forming the basis of Environmental Protection Agency's (EPA's) *Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity* (MSGP) may also occur. Because precipitation events are sudden and momentary, benchmarks based on state or federal standards or recommendations use the Criteria Maximum Concentration (CMC) value, or acute standard may also be used. The CMC is the estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The CMC for aquatic life is intended to be protective of the vast majority of the aquatic communities in the United States. If a facility has not disclosed BMPs applicable to specific pollutants for the site, the permittee may not be eligible for benchmarks.

40 CFR 122.44(b)(1) requires the permit implement the most stringent limitations for each discharge, including industrially exposed stormwater; and 40 CFR 122.44(d)(1)(i) and (iii) requires the permit to include water-quality based effluent limitations where reasonable potential has been found. However, because of the non-continuous nature of stormwater discharges, staff are unable to

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perform statistical Reasonable Potential Analysis (RPA) under most stormwater discharge scenarios. Reasonable potential determinations (RPDs; see REASONABLE POTENTIAL above) using best professional judgment are performed.

Benchmarks require the facility to monitor, and if necessary, replace and update stormwater control measures. Benchmark concentrations are not effluent limitations. A benchmark exceedance, therefore, is not a permit violation; however, failure to take corrective action is a violation of the permit. Benchmark monitoring data is used to determine the overall effectiveness of control measures and to assist the permittee in knowing when additional corrective actions may be necessary to comply with the conditions of the permit.

BMP inspections typically occur more frequently than sampling. Sampling frequencies are based on the facility's ability to comply with the benchmarks and the requirements of the permit. Inspections should occur after large rain events and any other time an issue is noted; sampling after a benchmark exceedance may need to occur to show the corrective active taken was meaningful.

To meet the goals of EPA's memo and provide clear, specific and measurable elements for BMP installation and supports an adaptive management approach to meeting water quality at a large industrial facility, as discussed in EPA's November 26, 2014 Revisions to the November 22, 2002 *Memorandum Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on those WLAs* states: "Permits should contain clear, specific, and measurable elements associated with BMP implementation (e.g., schedule for BMP installation, frequency of a practice, or level of BMP performance), as appropriate, and should be supported by documentation that implementation of selected BMPs will result in achievement of water quality standards. When permits contain a numeric benchmark, the facility is measuring the BMPs effectiveness based on the numeric benchmark. Permitting authorities also consider including numeric benchmarks for BMPs and associated monitoring protocols for estimating BMP effectiveness in stormwater permits. Benchmarks can support an adaptive approach to meeting applicable water quality standards. While exceeding the benchmark is not generally a permit violation, exceeding the benchmark requires the permittee to take additional action, such as evaluating the effectiveness of the BMPs, implementing and/or modifying BMPs, or providing additional measures to protect water quality." ([HYPERLINK "http://water.epa.gov/polwaste/npdes/stormwater/upload/EPA_SW_TMDL_Memo.pdf"])

Under EPA's Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits (EPA 833-D-96-001), it is stated that "If the permitting authority determines that, through implementation of appropriate BMPs required by the NPDES stormwater permit, the discharges have the necessary controls to provide for attainment of WQS and any technology-based requirements, additional [specific] controls need not be included in the permit."

When a permitted feature or outfall consists of only stormwater, a numeric benchmark may be implemented at the discretion of the permit writer, if there is no RP for water quality excursions.

- ✓ Applicable, this facility has stormwater-only outfalls where benchmarks, limitations, or operational controls were deemed appropriate contaminant measures. Additionally, this permit contains specific visual monitoring and operational controls the facility must adhere to, to protect receiving streams from contaminated stormwater runoff.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):
In accordance with 40 CFR 122.44(k), Best Management Practices (BMPs) must be used to control or abate the discharge of pollutants when: 1) Authorized under section 304(e) of the Clean Water Act (CWA) for the control of toxic pollutants and hazardous substances from ancillary industrial activities; 2) Authorized under section 402(p) of the CWA for the control of stormwater discharges; 3) Numeric effluent limitations are infeasible; or 4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA. In accordance with the EPA's *Developing Your Stormwater Pollution Prevention Plan, A Guide for Industrial Operators*, (EPA 833-B-09-002) published by the EPA in 2015 [HYPERLINK "https://www.epa.gov/sites/production/files/2015-11/documents/swppp_guide_industrial_2015.pdf"], BMPs are measures or practices used to reduce the amount of pollution entering waters of the state from a permitted facility. BMPs may take the form of a process, activity, or physical structure. Additionally in accordance with the Stormwater Management, a SWPPP is a series of steps and activities to 1) identify sources of pollution or contamination, and 2) select and carry out actions which prevent or control the pollution of stormwater discharges. Additional information can be found in *Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006; September 1992).

A SWPPP must be prepared by the permittee if the SIC code is found in 40 CFR 122.26(b)(14) and/or 10 CSR 20-6.200(2). A SWPPP may be required of other facilities where stormwater has been identified as necessitating better management. The purpose of a SWPPP is to comply with all applicable stormwater regulations by creating an adaptive management plan to control and mitigate stream pollution from stormwater runoff. Developing a SWPPP provides opportunities to employ appropriate BMPs to minimize the risk of pollutants being discharged during storm events. The following paragraph outlines the general steps the permittee should take to determine which BMPs will work to achieve the benchmark values or limits in the permit. This section is not intended to be all encompassing or restrict the use of any physical BMP or operational and maintenance procedure assisting in pollution control. Additional steps or revisions to the SWPPP may be required to meet the requirements of the permit.

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Areas which should be included in the SWPPP are identified in 40 CFR 122.26(b)(14). Once the potential sources of stormwater pollution have been identified, a plan should be formulated to best control the amount of pollutant being released and discharged by each activity or source. This should include, but is not limited to, minimizing exposure to stormwater, good housekeeping measures, proper facility and equipment maintenance, spill prevention and response, vehicle traffic control, and proper materials handling. Once a plan has been developed the facility will employ the control measures determined to be adequate to achieve the benchmark values discussed above. The facility will conduct monitoring and inspections of the BMPs to ensure they are working properly and re-evaluate any BMP not achieving compliance with permitting requirements. For example, if sample results from an outfall show values of TSS above the benchmark value, the BMP being employed is deficient in controlling stormwater pollution. Corrective action should be taken to repair, improve, or replace the failing BMP. This internal evaluation is required at least once per month but should be continued more frequently if BMPs continue to fail. If failures do occur, continue this trial and error process until appropriate BMPs have been established.

For new, altered, or expanded stormwater discharges, the SWPPP shall identify reasonable and effective BMPs while accounting for environmental impacts of varying control methods. The antidegradation analysis must document why no discharge or no exposure options are not feasible. The selection and documentation of appropriate control measures shall serve as an alternative analysis of technology and fulfill the requirements of antidegradation [10 CSR 20-7.031(3)]. For further guidance, consult the antidegradation implementation procedure ([HYPERLINK "http://dnr.mo.gov/env/wpp/docs/AIP050212.pdf"]).

Alternative Analysis (AA) evaluation of the BMPs is a structured evaluation of BMPs which are reasonable and cost effective. The AA evaluation should include practices designed to be: 1) non-degrading; 2) less degrading; or 3) degrading water quality. The glossary of AIP defines these three terms. The chosen BMP will be the most reasonable and effective management strategy while ensuring the highest statutory and regulatory requirements are achieved and the highest quality water attainable for the facility is discharged. The AA evaluation must demonstrate why "no discharge" or "no exposure" is not a feasible alternative at the facility. This structured analysis of BMPs serves as the antidegradation review, fulfilling the requirements of 10 CSR 20-7.031(3) Water Quality Standards and *Antidegradation Implementation Procedure* (AIP), Section II.B.

If parameter-specific numeric benchmark exceedances continue to occur and the permittee feels there are no practicable or cost-effective BMPs which will sufficiently reduce a pollutant concentration in the discharge to the benchmark values established in the permit, the permittee can submit a request to re-evaluate the benchmark values. This request needs to include 1) a detailed explanation of why the facility is unable to comply with the permit conditions and unable to establish BMPs to achieve the benchmark values; 2) financial data of the company and documentation of cost associated with BMPs for review and 3) the SWPPP, which should contain adequate documentation of BMPs employed, failed BMPs, corrective actions, and all other required information. This will allow the Department to conduct a cost analysis on control measures and actions taken by the facility to determine cost-effectiveness of BMPs. The request shall be submitted in the form of an operating permit modification, which includes an appropriate fee; the application is found at: [HYPERLINK "https://dnr.mo.gov/forms/" \l "WaterPollution"]

✓ Applicable; a SWPPP shall be developed and implemented for this facility.

STORMWATER MANAGEMENT AREAS:

The Department is required to implement stormwater requirements for facilities listed in 40 CFR 122.26(b)(14) or 10 CSR 20-6.200(2) performing specified activities. Steam-electric power generating facilities are emphasized in 40 CFR 122.26(b)(14)(vii) and 10 CSR 20-6.200(2)(B)3.D. Included in these regulations is a requirement for the Department to implement permit conditions applicable to areas at facilities classified as or engaged in: industrial plant yards; immediate access roads and rail lines used, or traveled by carriers of raw materials, manufactured products, waste material, or byproducts used or created by the facility; material handling sites; sites used for the application or disposal of process wastewaters; sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials and intermediate and finished products unless material is in closed cars or trailers and the loading/unloading operation does not expose material to stormwater.

Stormwater requirements differ from effluent discharges primarily by their intermittent nature, and pollutant loading is tied to exposure to precipitation, not pollutants added or removed in expected measures like wastewater. Additionally, the EPA has allowed agencies to develop, through permit requirements, alternatives to numeric effluent limits for stormwater discharges. See additional sections in this Part; STORMWATER PERMITTING: LIMITATIONS AND BENCHMARKS, and STORMWATER POLLUTION PREVENTION PLANS.

40 CFR 122.44(k) describes the availability of BMPs available to the permitting authority to utilize in place of numeric limitations. While BMPs can be applied in wastewater, the BMPs developed in this section are only being applied to stormwater. Utilizing the EPA documents developed and referenced in the regulation, the Department, in conjunction with the facility, developed SMART objectives. SMART goals are, Specific, Measurable, Achievable, Relevant, and Time-Oriented. Each BMP fulfills these requirements, and the facility will have reasonable autonomy to change these goals depending on specific conditions, seasonal requirements, or relevance. Because only the permit section of this document is enforceable, a list of prescribed minimum BMPs is incorporated into the special conditions.

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Steam electric facilities have coal delivered by open-top rail cars, which is a raw material used to fire the boilers to produce electricity. Rail lines and paralleling access roads therefore need coverage under this permit; but due to the sinuous linear nature, have numerous stormwater runoff points or could exhibit sheet runoff in some areas. The pollutants of concern in these areas are also limited; primarily to oil and greases, and secondarily, solids. Oils and greases and solids are visible to the vigilant observer and management controls can be effectively deployed in areas where oils, greases, or solids may leave the facility. The facility is responsible to employ the proper controls, whether they be temporary or permanent, to achieve minimal runoff of these identified pollutants.

Additionally, the facility is tasked with ensuring the streams remain free of siltation or oils. The facility should include an observational schedule for the receiving streams, and include visual stream surveys at all times of year to develop a representative baseline condition of the natural state of the streams during all flow regimes, so any possible problem is easily recognized.

All rain water around the immediate vicinity of the utility waste landfill goes to landfill recycle pond; all other utility roads drain west to outfall #011 which is why the Department did not need to establish a second stormwatershed for this area.

The minimum BMPs and practices established in this permit have been determined to achieve the purposes and intent of the CWA for management of stormwater at industrial sites per implementing regulations for CWA §402(p).

SUFFICIENTLY SENSITIVE ANALYTICAL METHODS:
Please review Standard Conditions Part 1, section A, number 4. The analytical and sampling methods used shall conform to the reference methods listed in 10 CSR 20-7.015 and/or 40 CFR 136 unless alternates are approved by the Department and incorporated within this permit. The facility shall use sufficiently sensitive analytical methods for detecting, identifying, and measuring the concentrations of pollutants. The facility shall ensure the selected methods are able to quantify the presence of pollutants in a given discharge at concentrations low enough to determine compliance with Water Quality Standards in 10 CSR 20-7.031 or effluent limitations unless provisions in the permit allow for other alternatives. A method is "sufficiently sensitive" when; 1) the method quantifies the pollutant below the level of the applicable water quality criterion or; 2) the method minimum level is above the applicable water quality criterion, but the amount of pollutant in a facility's discharge is high enough the method detects and quantifies the level of pollutant in the discharge, or 3) the method has the lowest minimum level of the analytical methods approved under 10 CSR 20-7.015 and or 40 CFR 136. These methods are also required for parameters listed as monitoring only, as the data collected may be used to determine if numeric limitations need to be established. A permittee is responsible for working with their contractors to ensure the analysis performed is sufficiently sensitive.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS (TBEL):
One of the major strategies of the Clean Water Act (CWA) in making "reasonable further progress toward the national goal of eliminating the discharge of all pollutants" is to require effluent limitations based on the capabilities of the technologies available to control those discharges. Technology-Based Effluent Limitations (TBELs) aim to prevent pollution by requiring a minimum level of effluent quality attainable using demonstrated technologies for reducing discharges of pollutants or pollution into the waters of the United States. TBELs are developed independently of the potential impact of a discharge on the receiving water, which is addressed through water quality standards and water quality-based effluent limitations (WQBELs). The NPDES regulations at Title 40 of the Code of Federal Regulations (CFR) 125.3(a) instructs NPDES permit writers to develop technology-based treatment requirements, consistent with CWA §301(b) and §402(a)(1), to represent the minimum level of control imposed in a permit when categorical standards do not exist for the waste stream. The regulation also indicates that permit writers must include in permits, additional or more stringent effluent limitations and conditions, including those necessary to protect water quality. Regardless of the technology chosen to be the basis for limitations, the facility is not required to install the technology, only to meet the established numeric TBEL.

TBEL SUBSECTION 1. NUMERIC TECHNOLOGY EFFLUENT LIMITS
Case-by-case numeric TBELs are developed pursuant to CWA §402(a)(1), which authorizes the state to issue a permit meeting either, 1) all applicable requirements developed under the authority of other sections of the CWA (e.g., technology-based treatment standards, water quality standards) or, 2) before taking the necessary implementing actions related to those requirements, "such conditions as the administrator determines are necessary to carry out the provisions of this Act." The regulation at §125.3(c)(2) specifically cite this section of the CWA, stating technology-based treatment requirements may be imposed in a permit "on a case-by-case basis under section 402(a)(1) of the Act, to the extent that EPA-promulgated effluent limitations are inapplicable." Further, §125.3(c)(3) indicates "where promulgated effluent limitations guidelines only apply to certain aspects of the discharger's operation, or to certain pollutants, other aspects or activities are subject to [this BPJ] regulation on a case-by-case basis to carry out the provisions of the act." When establishing case-by-case effluent limitations using best professional judgment, the permit writer should cite in the fact sheet or statement of basis both the approach used to develop the limitations, discussed below, and how the limitations carry out the intent and requirements of the CWA and the NPDES regulations. However, when the EPA has promulgated a standard applicable to the category, the permit writer must adhere to 40 CFR 125.3(c)(1) which states: "Application of EPA-promulgated effluent limitations developed under section 304 of the Act to dischargers by category or subcategory. These effluent limitations are not applicable to the extent that they have been remanded or withdrawn. However, in the case of a court remand, determinations underlying effluent limitations shall be binding in permit issuance proceedings where those determinations are not required to be

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reexamined by a court remanding the regulations. In addition, dischargers may seek fundamentally different factors variances from these effluent limitations under §122.21 and subpart D of this part." When a permit writer considers evaluation of numeric and non-numeric technology-based effluent limits, the onus for the evaluation stems from those specific waste-streams or pollutants having not been considered under the ELG category.

The US EPA *Steam Electric Power Generating Point Source Category: Final Detailed Study Report* (EPA 821-R-09-008) October 2019, utilized available data to characterize the waste streams discharged from steam electric facilities, as well as the technologies and practices used in the industry to control the discharge of waste pollutants. The Department has reviewed the Labadie Energy Center's discharges individually and comprehensively to determine compliance with all possible water quality and technology limitations found in 10 CSR 20 and 40 CFR 423, however, this section only relates to technological effluent regulations.

40 CFR 125.30(a) Subpart D, [for establishing criteria in permits under fundamentally different factors under §301(b) of the Act] establishes baseline criteria and standards to be used in determining whether effluent limitations alternative to those required by promulgated EPA effluent limitations guidelines (under sections 301 and 304 of the Act; hereinafter referred to as "national limits") should be imposed on a discharger because factors relating to the discharger's facilities, equipment, processes, or other factors related to the discharger are fundamentally different from the factors considered by EPA in development of the national limits. Subpart D of 40 CFR 125 applies to all national limitations promulgated under sections 301 and 304 of the Act, *except for the BPT limits contained in 40 CFR 423.12 (steam electric generating point source category)*. Therefore, the Department need not further evaluate previously categorized waste streams of: low volume waste sources (40 CFR 423.12(b)(3)), fly ash and bottom ash transport water (40 CFR 423.12(b)(4)), metal cleaning wastes (40 CFR 423.12(b)(5)), once through cooling (40 CFR 423.12(b)(6)), cooling tower blowdown (40 CFR 423.12(b)(7)), coal pile runoff (40 CFR 423.12(b)(9)), and flue gas desulphurization wastewater, flue gas mercury control wastewater, combustion residual leachate, or gasification wastewater (40 CFR 423.12(b)(11)), as they are not applicable for further BPT review. Certain requirements, found in 40 CFR 423.12 are superseded in the following sections of the regulation (423.13 et seq.), such as those for new sources, and are applied based on site specific assessments of the specific wastewater streams. Additionally, the EPA has promulgated revised standards for 40 CFR 423 effective January 4, 2016 and December 14, 2020 which eliminate the need for any potential interim review for these types of discharge under CWA §402(a)(1)(A), where all conditions of 33 USC 1311 (CWA §301, technology-based effluent limits), 33 USC 1312 (CWA §302, water quality-based effluent limits), 33 USC 1316 (CWA §306, categorical national standards of performance), 33 USC 1318 (CWA §308 records, reports, and inspections) and, 33 USC 1343 (CWA §403, ocean discharges - not applicable for Missouri Facilities) are being met. When applying all applicable regulations under the above Act, the Department has no obligation to scrutinize categorical standards already evaluated by the EPA under CWA §304 [33 USC 1314(i)(2)] for information and guidelines.

During the drafting of this permit, the EPA Office of Water published the Effluent Guidelines Program Plan 14 (EPA-821-R-21-001); January 2021. [HYPERLINK "https://www.epa.gov/sites/production/files/2021-01/documents/eg-plan-14_jan-2021.pdf"] In this plan, the Office of Water fulfilled its biennial requirement under CWA §304(m) to publish expected revisions to ELGs, or propose new ELGs. Plan 14 includes a schedule to reevaluate landfill leachate and legacy wastewater. However, at the Labadie Energy Center, the facility does not discharge landfill leachate (leachate is tanked and applied to the cap as dust suppression), and has completed closure of the ash ponds therefore no additional ash sluice legacy wastewater will be discharged. Since all of the previous wastewater was drained prior to installation of the cap, and the design engineers did not envision a need for draining any additional water, there were no provisions made for additional draining of legacy wastewater.

The permit writer did not determine the necessity to further evaluate the domestic wastewater outfall, #02A. The technology-based effluent limits contained in this permit for domestic wastewater are established in 10 CSR 20-7.031; this specific type of wastewater is well categorized and further technology evaluations would be inconsistent with the determinations provided in 40 CFR 125.3(c)(1) when the permit writer considers the categories stipulated in 10 CFR 20-7.015 to fall within the purview of (c)(1) which states: "Application of EPA [or state] promulgated effluent limitations developed under section 304 of the Act to dischargers by category or subcategory..." therefore no further technological review is necessary.

Except for temperature, discussed later at depth, the permit writer did not evaluate the pollutant discharges from outfall #001; outfall #001 is single pass cooling water. Any metals, nutrients, or other contaminants present in outfall #001's discharge are withdrawn from the Missouri River. The permit writer compared the Missouri River levels of pollutants to the discharge values and noted no contaminants of concern were discharged into the river by the facility.

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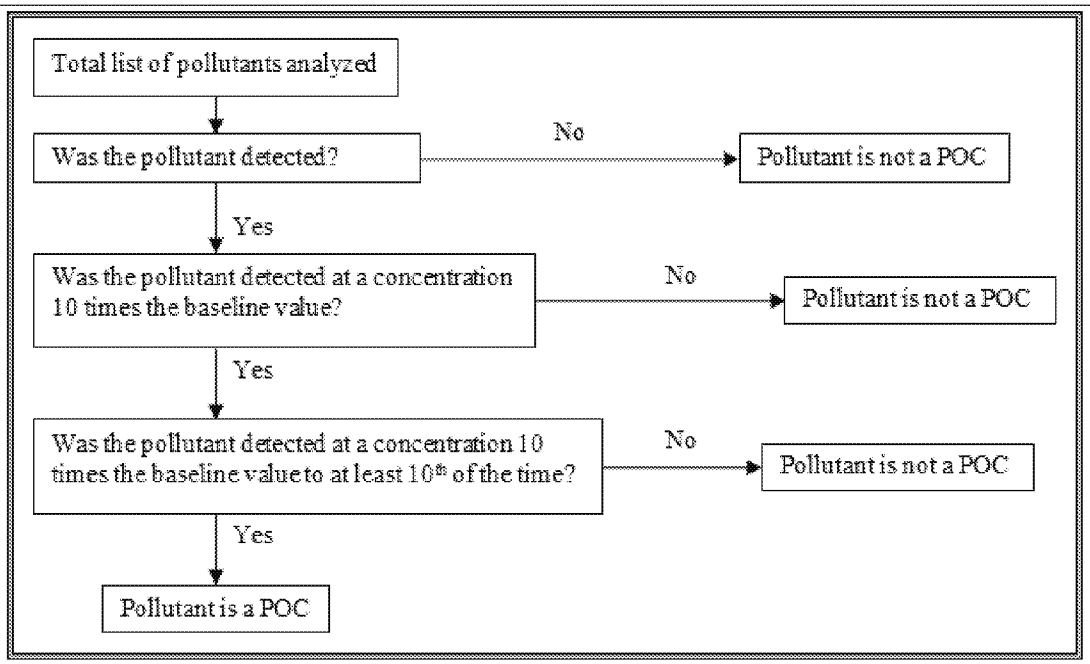
GENERAL OVERVIEW OF NUMERIC POLLUTANT DETERMINATIONS



POC = Pollutant(s) of Concern

BPT = Best Practicable Control Technology Currently Available is defined at CWA section 304(b)(1)

BCT = Best Conventional Pollutant Control Technology, defined at CWA section 304(b)(4)

BAT = Best Available Technology Economically Achievable is defined at CWA section 304(b)(2)

Of notice is the lack of inclusion of the BTA standard in this section, §304, of the Clean Water Act. The BTA standard only applies to cooling water intakes in the permit application section of 40 CFR 122.21(r) and 40 CFR 125 Subpart J.

Technological assessment of the power plant cooling discharges are to occur under CWA §316. In review of the requirements to evaluate technology, there is no onus for the Department to evaluate thermal discharges pursuant to technological fundamentally different factors under §§ 301 and 304, because thermal discharges do not fall under either of those sections. In fact, CWA §304 specifically directs administrators to not consider thermal discharges as conventional pollutants for the purposes of developing water quality standards. Missouri's regulations, therefore, treat thermal discharges as a stand-alone requirement under 10 CSR 20-7.031(5)(D)6. Because thermal discharges are not conventional, the Department has therefore determined only application of technologies which are not for conventional pollutants can apply; specifically, the only available consideration is BAT for best available technology, keeping in mind that thermal discharges are also not classified as toxic pollutants. Therefore, the TBEL Subsections 3 through 6 in this fact sheet only evaluate BAT (Best Available Treatment Technology Economically Achievable) requirements for the thermal discharges in combination with BTA (Best Technology Available) for the cooling intake.

The site-specific TBELs reflect the Best Professional Judgment (BPJ) of the issuing authority, taking into account the same statutory factors EPA would use in promulgating a national effluent guideline regulation, but they are applied to the circumstances relating specifically to the applicant. The permit writer also should identify whether state laws or regulations govern TBELs and might require more stringent performance standards than those required by federal regulations. In some cases, a single permit could have TBELs based on effluent guidelines, best professional judgment, state law, and WQBELs based on water quality standards.

TBEL SUBSECTION 2. NUMERIC TBEL POC TABLE FOR BPT, BCT, AND BAT:
Best Practicable Control Technology Currently Available (BPT) is the first level of technology-based effluent controls for direct dischargers and it applies to all types of pollutants (conventional, nonconventional, and toxic). The Federal Water Pollution Control Act (FWPCA) amendments of 1972 require when EPA establishes BPT standards, it must consider the industry-wide cost of implementing the technology in relation to the pollutant-reduction benefits. EPA also must consider the age of the equipment and facilities, the processes employed, process changes, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and such other factors as the EPA Administrator deems appropriate [CWA §304(b)(1)(B)]. Traditionally, EPA establishes BPT effluent limitations on the basis of the average of the best performance of well-operated facilities in each industrial category or subcategory. Where existing performance is uniformly inadequate, BPT may reflect higher levels of control than currently in place in an industrial category if the agency determines the technology can be practically applied. See CWA §§301(b)(1)(A) and 304(b)(1)(B). Because the EPA has not promulgated TBELs for the cooling water waste stream or pollutants identified as POCs, the permit writer follows the same format to establish site-specific TBELs. Although the numerical effluent limitations and standards are based on specific processes or treatment technologies to control pollutant discharges, EPA does not require dischargers to use these technologies. Individual facilities may meet the numerical requirements using whatever types of treatment technologies, process changes, and waste management practices they choose.

This method of analysis is one of several which could be utilized, and is only to assist the permit writer in determining possible contaminants of concern. This evaluation does not indicate actual effluent limitations the permit writer could establish in the permit.

PARAMETER	Units	Outfall #02B	Baseline	Baseline x 10	POC
FORM C OF APPLICATION FOR PERMIT RENEWAL: PART A					
Biochemical Oxygen Demand$_5$	mg/L	2.1	2	20	no
Chemical Oxygen Demand	mg/L	19	5	50	no
Total Organic Carbon	mg/L	4.2	1	10	no
Total Suspended Solids	mg/L	4	4	40	*
NUTRIENTS:					
Ammonia as N	mg/L	0.2	0.05	0.5	no
Nitrate + Nitrite as N	mg/L	1.4	0.05	0.5	‡
Nitrogen, Total N	mg/L	0.6	none	none	n/a
Phosphorus, Total P	mg/L	<0.05	0.01	0.1	no
FORM C OF APPLICATION FOR PERMIT RENEWAL: OTHER					
Bromide	mg/L	1.3	none	none	n/a
Chlorine, Total Residual	mg/L	<0.05	none	none	n/a
Cyanide, Total	µg/L	4.2	20	200	no
Fluoride	mg/L	0.33	0.1	1	no
Oil and Grease	mg/L	<1	5	50	no
Phenols, Total	µg/L	23	50	500	no
Sulfate as SO_4^{2-}	mg/L	586	none	none	n/a
Sulfide as S^{2-}	mg/L	NR	1	10	no
Sulfite as SO_3^{2-}	mg/L	NR	none	none	n/a
Surfactants	mg/L	0.1	none	none	n/a
METALS (AS TOTAL RECOVERABLE - UNLESS SPECIFIED):					
Aluminum	µg/L	321	200	2,000	no
Antimony	µg/L	NR	20	200	no
Arsenic	µg/L	<8	10	100	no
Barium	µg/L	138	200	2,000	no
Beryllium	µg/L	NR	5	50	no
Boron	µg/L	511.9 ǂ	100	1,000	no
Cadmium	µg/L	<1	5	50	no
Chromium	µg/L	6	10	100	no
Cobalt	µg/L	<1	50	500	no
Copper	µg/L	5	25	250	no
Iron	µg/L	134	100	1,000	no
Lead	µg/L	<7	50	500	no
Magnesium	µg/L	20,640	5,000	50,000	no
Manganese	µg/L	17	15	150	no
Mercury	µg/L	NR	0.2	2	no
Molybdenum	µg/L	50	10	100	no
Nickel	µg/L	3	40	400	no
Selenium	µg/L	NR	5	50	no
Silver	µg/L	1	10	100	no
Thallium	µg/L	NR	10	100	no
Tin	µg/L	<3	30	300	no
Titanium	µg/L	2	5	50	no
Zinc	µg/L	4	20	200	no

NR not reported

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* Addressed by 40 CFR 423

‡ Pass through from the domestic wastewater outfall; not identified as coming from any process associated with the steam-electric category applicable to this discharge at this outfall. While nitrate plus nitrite is identified as present in flue gas desulphurization wastewater, the facility did not identify wet scrubbers present at the site pursuant to 40 CFR 423.11(n) as flue gas desulfurization (FGD) wastewater means any wastewater generated specifically from the wet flue gas desulfurization scrubber system that comes into contact with the flue gas or the FGD solids, including but not limited to, the blowdown from the FGD scrubber system, overflow or underflow from the solids separation process, FGD solids wash water, and the filtrate from the solids dewatering process. Wastewater generated from cleaning the FGD scrubber, cleaning FGD solids separation equipment, cleaning FGD solids dewatering equipment, FGD paste equipment cleaning water, treated FGD wastewater permeate or distillate used as boiler makeup water, or water that is collected in floor drains in the FGD process area is not considered FGD wastewater

< Reported below quantifiable analytical limits

ǂ The facility reported sampling data was available from outfall #002; the average was used, 511.9 µg/L. Because this data was not completely from the UWL basin, the permit continues monitoring for the parameter to determine the isolated concentration of boron.

For each parameter, group of parameters, or outfall treatment process, the facility will summarize the relevant factors below in facility-specific (or waste-stream specific) case-by-case TBEL development. The permittee will supply the required information to the Department so a technology based effluent limitation can be applied in the permit if applicable.

✓ This permit does not identify any pollutants as 10x above baseline therefore no additional submission is required for these listed pollutants.

Nation-Wide Site Specific Evaluation Requirements

For BPT Requirements (all pollutants)

1. Age of equipment and facilities involved
2. Process(es) employed
3. Process changes
4. Engineering aspects of the application of various types of control techniques
5. Non-water quality environmental impact including energy requirements
6. Total cost of application of technology in relation to the effluent reduction benefits to be achieved from the technology

For BCT requirements (conventional pollutants)

- Items 1 through 5 in BPT; and
- Reasonableness of the relationship between the costs of attaining a reduction in effluent and the derived effluent reduction benefits
- Comparison of the cost and level of reduction of such pollutants from the discharge of POTWs to the cost and level of reduction of such pollutants from a class or category of industrial sources

For BAT requirements (toxic and non-conventional pollutants)

- Items 1 through 6 in BPT; and
- The cost of achieving such effluent reduction

TBEL SUBSECTION 3. NON-NUMERIC TECHNOLOGY EVALUATIONS

It could be argued, because once through cooling was considered under BPT through 40 CFR 423.12(b)(6), additional review for this wastewater stream is not required by the Department. However, the permit writer has noted additional technologies and methodologies of control per CWA §316(a) and (b) for thermal discharges and intake structures are available, and are therefore described below.

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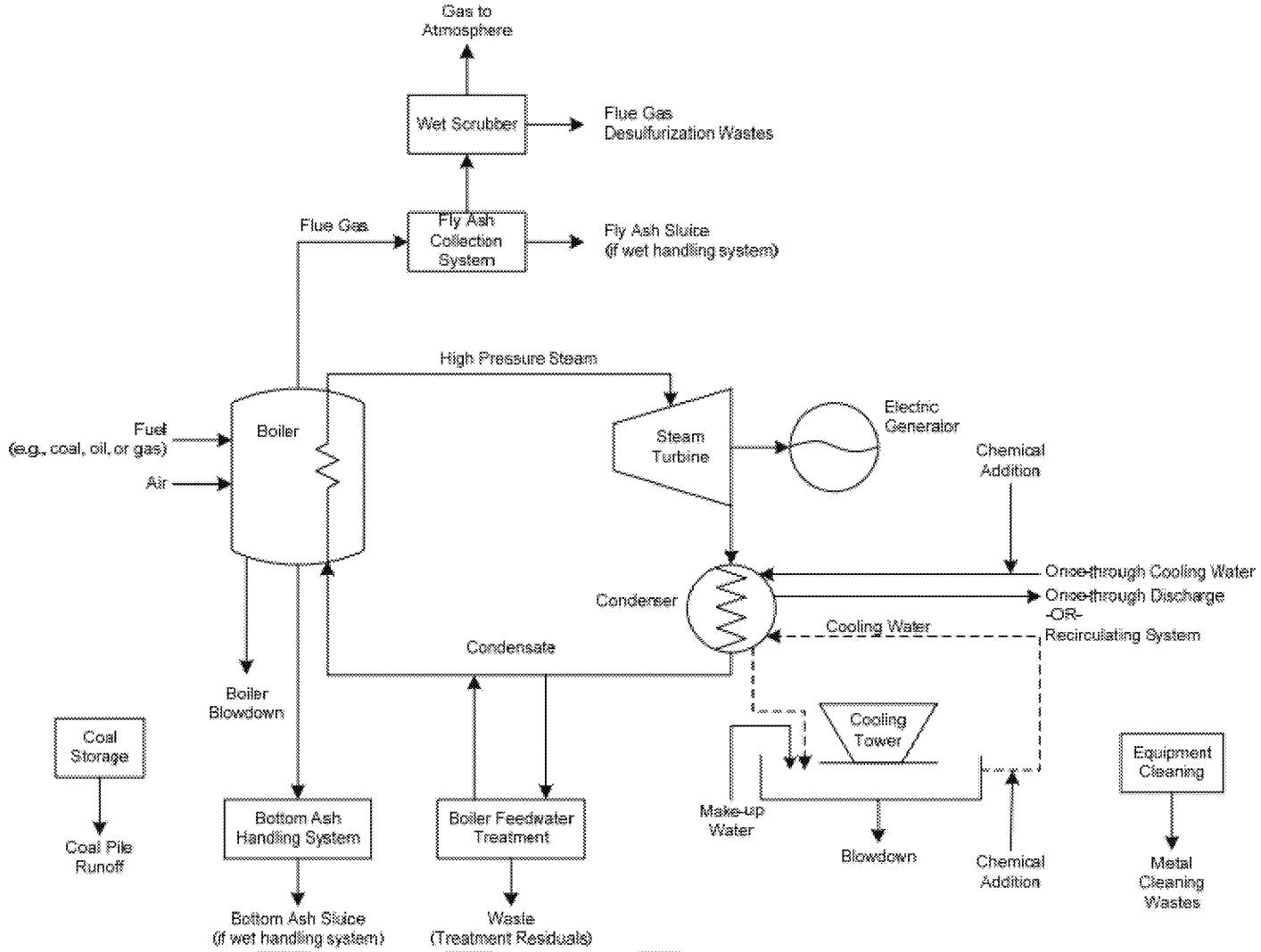
Typical Steam-Electric Plant and Wastes Identified:



Combusting coal in steam electric boilers produces a residue of noncombustible fuel constituents, referred to as ash. Depending on the boiler design, as much as 70 to 80 percent of the ash from a pulverized coal furnace will consist of very fine particles that are light enough to be entrained in the flue gas and carried out of the furnace. This portion of the ash is commonly known as fly ash. The remaining 20 to 30 percent of the heavier ash that settles in the furnace or dislodged from furnace walls is collected at the bottom of the boiler and is referred to as bottom ash. Certain boiler designs, such a cyclone boilers, will produce relatively small amounts of fly ash, on the order of 20 to 30 percent, and upwards of 70 to 80 percent bottom ash.

The facility indicated there are many factors which contribute to the ratio of fly to bottom ash. However, generally and currently, the Labadie Energy Center's ash is approximately 65% fly ash and 35% bottom ash by volume, per an email dated 1/25/2021.

Some of the fly ash will be collected in hoppers located under the economizer and air heaters as the coarser particles drop out of suspension as the flue gas flow changes direction. The fly ash particles remaining entrained in the flue gases are carried to the particulate control equipment, such as baghouses and electrostatic precipitators, for removal. The captured fly ash is collected in hoppers and then either pneumatically transferred as dry ash to silos for temporary storage or sluiced with water to a surface impoundment (i.e., ash pond). Dry fly ash stored in the silos is periodically transferred, usually by truck, to either a landfill or for use offsite.

Bottom ash was typically historically hydraulically conveyed (i.e., sluiced with water) to either an ash pond or dewatering bin. In dewatering systems, the hot bottom ash drops to the bottom of the furnace where it is quenched in a water-filled hopper. The ash sent to a dewatering bin is separated, then sent to a landfill or transported offsite. Quench water is recycled.

The Labadie Energy Center utilizes a dewatering bin as the facility no longer sluices ash (former outfall #002); and now maintains a utility waste landfill on-site. The facility utilizes trucks to haul the dried ash to the landfill.

Once-through cooling water is the largest volume wastewater discharge at coal-fired power plants across the nation. EPA's data request obtained information on once-through cooling water flows from 15 plants. The once-through cooling water flow rates at these plants ranged from 178 to 1,860 million gallons per day (MGD), with an average discharge rate of 720 MGD. Recirculating cooling water systems minimize the amount of water used by steam electric plants. On average, recirculating cooling water systems reduce the cooling water flow rate between 92 and 95 percent, compared to once-through cooling systems, depending on the water source. According to information obtained through the EPA data request, the average cooling tower blowdown flow rate (for 16 coal-fired power plants and 39 recirculating cooling water systems) is 37.7 MGD. The recirculating cooling water flow rates for these plants ranged from 0.89 to 512 MGD. These data generally compare to the cooling water flow rate data presented in the 1996 Preliminary Data Study and the 1982 Development Document.

Labadie intakes approximately 1,377 MGD, and historically discharged about 941 MGD. Some intake water, about 436 MGD was historically used in plant processes and released as steam heat; the rest is returned to the Missouri River. The Department requires all facilities utilizing high-draw pumps to register with the state, see MAJOR WATER USER in Part III of this fact sheet. Currently, the facility no longer sluices ash therefore less intake water is utilized in plant processes at this time and more is returned to the river. Recent flow rates from outfall #001 were analyzed and noted the facility discharged an average of 1,334 MGD.

Several best management practices and treatment technologies are available to reduce the discharge of chlorine and other biocides from steam electric plants. The 1982 Development Document describes the following four biocide management practices in use at steam electric plants for once-through and/or recirculating cooling systems [U.S. EPA, 1982; UWAG, 2006]:
1. Low-level biocide application. Perform optimization study to determine minimum amount of biocide needed to control biofouling;
2. Natural decay of total residual oxidants (TRO)/free available oxidants. Isolate (i.e., shut off) blowdown from cooling system after biocide application until the biocide has naturally decayed to an acceptable level;
3. Dechlorination (Dehalogenation). Add reducing agent, typically sulfur dioxide (could also be sodium thiosulfate), to the cooling water stream prior to discharge to consume the oxidizing biocide present; and
4. Mechanical cleaning. Clean the condenser tubes using a mechanical operation (e.g., circulate oversized sponge rubber balls through the condenser tubes) instead of using biocides, or to allow for reduced use of biocides

- ✓ This permit has numeric limitations for chlorine (oxidants) and biocides. This permit does not indicate which method is required to be used to meet the numeric limits, only that the numeric limits are met at all times; further technology evaluation is not required under CWA §402(a)(1)(B).

Coal-fired power plants typically receive the coal via train or barge; however, depending on the location of the mine, trucks may also be used to transport the coal to the plant. The coal is unloaded in a designated area and conveyed to an outdoor storage area, referred to as the coal pile. Power plants generally store between 25 and 40 days-worth of coal in the coal pile, but this varies by plant. Some coal-fired plants may operate more than one coal pile depending on the location of the boilers and whether different types of coal are used or blended. Rainwater and melting snow contacting the coal pile generates a waste stream that contains pollutants associated with the coal, referred to as coal pile runoff. The quantity of runoff depends upon the amount of precipitation, the physical location and layout of the pile, and the extent to which water infiltrates the ground underneath the pile. Coal pile runoff is usually collected in a runoff pond during or immediately after times of rainfall. This waste-stream has been enumerated in the ELG at 40 CFR 423.12, therefore, will not undergo further TBEL scrutiny in this permit.

- ✓ The Labadie facility is typical of the above operations.

Coal combustion residues/residuals (CCR) comprise a variety of wastes from the coal combustion process, including fly ash, bottom ash, boiler slag, and FGD solids (e.g., gypsum and calcium sulfite). CCR may be stored at the plant in on-site landfills or surface impoundments. Leachate is the liquid that drains or leaches from a landfill or an impoundment. The two sources of landfill leachate are precipitation that percolates through the waste deposited in the landfill and the liquids contained within the CCR when it was placed in the landfill. Surface runoff is precipitation that contacts the landfill wastes and flows over the landfill. Landfills typically have some sort of stormwater drainage to minimize the amount of rainwater entering the landfill.

- ✓ The Labadie Energy Center does not discharge utility waste landfill CCR leachate, therefore this wastewater stream does not require evaluation.

Low volume wastes, as defined by the effluent guidelines, include a variety of waste streams, such as wastewater associated with wet scrubber air pollution control systems, ion exchange water treatment systems, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes, and recirculating house service water systems. See 40 CFR 423.11 for a full definition. The 1982 ELG Development Document presents information on the generation and characteristics of boiler blowdown, boiler feed water treatment wastewaters, drains, and spills. For example, the 1982 Development Document describes that boiler blowdown can be discharged continuously or intermittently to control the build-up of suspended and dissolved solids in the boiler water and that the average blowdown flow rate is 33,000 gpd/plant (for 231 coal-fired power plants) [U.S. EPA, 1982]. Low volume wastes are typically combined with other plant wastewaters for treatment, often in settling ponds. In some cases, low volume wastewaters can be recycled within the plant. One data request plant reported using untreated low volume wastewater as a source for bottom ash sluicing and another reported using it as a source for FGD make-up water. Some plants also

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report reusing settling pond effluent from systems that receive a variety of wastewaters including ash transport water and low volume wastes.
Additionally, the 2020 revision of 40 CFR 423 incorporates allowable discharge of an engineered percentage of bottom ash transport wastewater and flue gas desulphurization (FGD) wastewater.

- ✓ The Labadie Energy Center is authorized to operate under the Clean Air Act; permitted under RSMo 643 and OP2017-048.
- ✓ Low volume wastes are combined, treated in the LVW system, and discharged from outfall #02B.
- ✓ The facility reported continuous boiler blowdown, with an average daily rate of 0.05 MGD.
- ✓ The facility did not report the need for an allowance to discharge bottom ash transport water or FGD wastewater under this regulation.

Permitted Feature #010 is the intake structure, discussed below. There are no numeric limitations on the intake to be evaluated. Outfall #001, for single pass condenser cooling water is discussed below. Any pollutants found in the discharge, aside from temperature, are directly withdrawn from the Missouri River and discharged unchanged to the same body of water. As a note, the EPA has provided some input on a possible reason the discharge may have an odor in the discharge from #001. EPA stated in an email on 9/22/2020, "During the recent hearing on the Labadie variance there were a number of complaints about odor and floating substances at the Labadie discharge. I have observed this first-hand and believe I can describe what is occurring. River water comes into the plant saturated with atmospheric gases. As the water comes through the plant it is warmed about 25 degrees F. At this higher temperature the water has less capacity to hold gases and they bubble off as fine bubbles. As the bubbles rise, they capture river solids and float them to the surface as a floc. (This is similar to the industrial process of Dissolved Air Flotation (DAF) used to float off oil and grease, or alternately, like soda bubbles.) When the heated water enters the river it gets rapid initial mixing of about 5-6 to one, with more dilution in the mixing zone: so the volume of river water affected is large. Where these river solids collect on the bank, they will pile up and decompose. I have seen this many times at this location, but never at any other power plant. I think this is based on the high solids content in the lower Missouri River and the large volume of water going through the plant."

- ✓ Criteria found at 10 CSR 20-7.031(5)(F) for odor causing substances and criteria found at 10 CSR 20-7.031(5)(F) for odor producing substances will be evaluated be the facility per the special conditions in the permit. The data supplied in the 316(a) report indicate the outfall #001 discharge has not adversely affected the biotic community, therefore no limitations for these criteria are implemented at this time.

Outfall #02A is domestic wastewater; Missouri's regulations at 10 CSR 20-7.015 are technology based, therefore do not require additional review for technology as domestic wastewater has been evaluated sufficiently in both state and federal regulations. Outfall #02C is no discharge, therefore is already held to the most stringent limitations any permit could implement.

Stormwater runoff is not subject to individual numerical technology evaluations as shown below at this time per 10 CSR 20-7.015(1)(C), although benchmarks, a numerically-driven technology-based implementation of controls, are required in this permit for certain parameters and outfalls. Individual analysis is not being performed at this time because the Department has, over time, established minimum controls for basic parameters (TSS and oil and grease) in many operating permits. These stormwater parameters, when controlled effectively, and in conjunction with frequent observational patterns (permit and SWPPP-driven inspections), allow the Department to ensure protection of receiving waters. Additionally, federal regulations require the Department perform a reasonable potential analysis for all stormwater discharges; because the stormwater at this site has no reasonable potential to cause or contribute to in-stream water quality exceedances, the Department has authority to implement operational controls and have the facility take responsibility for maintaining minimum best management practices. See more under STORMWATER PERMITTING in this part; Part III of the fact sheet.

TBEL SUBSECTION 4. TECHNOLOGY REQUIREMENTS REVIEW

Ameren provided a comprehensive report to comply with 40 CFR 122.21(r) application requirements for cooling water intake structures with the application for permit renewal as was required in the special conditions implemented in the previous permit. The conditions necessary for any additional requirements will again be included in the special conditions section of the permit.

As with all technology requirements, effluent guidelines do not require facilities to install the particular technology identified by EPA as the best available technology; however, the regulations do require facilities to achieve the regulatory standards, typically defined numerically, which were developed based on a particular model technology. Because the EPA has not developed minimum technological temperature or entrainment requirements, the Department, as agent for the EPA, is required to develop an individual assessment of the technology and implement the technology requirement in the operating permit.

CWA §316(a) allows facilities to surpass thermal limitations imposed by states if the facility can demonstrate the maintenance of a balanced and indigenous population within the receiving waterbody. Over the course of the last permit term, Ameren has monitored, sampled, and provided reports to the Department showing the maintenance of a balanced and indigenous population of aquatic organisms.

CWA §316(b) requires regulators establish standards for cooling water intake structures reflecting the "best technology available for minimizing adverse environmental impact." However, the statute is silent with respect to the factors the permit writers should consider

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in determining BTA, but courts have held that §316(b)'s reference to CWA §§301 and 306 is an invitation to look to the factors considered in those sections while establishing standards for §316(b). (The factors specifically delineated in CWA §§301 and 306 include: cost of the technology, taking into account the age of the equipment and facilities, process employed, engineering aspects associated with a particular technology, process changes, and non-water quality environmental impact, including energy requirements.) It is the permit writer's opinion, these conditions are similar to the factors listed in the above BAT requirements implemented for thermal discharges.

When considering such factors, the permit writer is not bound to evaluate these in precisely the same way the EPA considers them in establishing effluent limitations guidelines under CWA §304. As the Supreme Court noted, given the absence of any factors specified in §316(b), administrative directors have much more discretion in its standard setting under section 316(b) than under the effluent guidelines provisions. Therefore, the statute bestows the Department with broad discretion in determining the "best" technology "available" for minimizing adverse environmental impact. As the Supreme Court further explained, under §316(b), the "best" technology "available" may reflect a consideration of a number of factors and "best" does not necessarily mean the technology purported to achieve the greatest reduction in environmental harm the facility can afford. Rather, the "best" (or "most advantageous" in the court's words) technology may represent a technology which *efficiently* reduces harm.

Therefore, §316(b) requires the EPA to establish a standard to minimize impingement and entrainment—the main adverse effects of cooling water intake structures not otherwise addressed by the other sections of the CWA (e.g., thermal discharges). Several important considerations underpin EPA's decisions. First, its BTA determination should be consistent with, and reflective of, the goals of CWA §101: "to restore and maintain the physical, chemical, and biological integrity of the Nation's waters" with the interim goal of "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water."

Second, the 2011 Executive Order (E.O.) 13563 directs EPA and other Federal agencies (and states tasked with implementing federal regulations) to identify and use the best, most innovative and least burdensome tools for achieving regulatory ends. In its regulatory actions, agencies "must take into account benefits and cost, both quantitative and qualitative,'' and to the extent permitted by law, only promulgate regulations that are based on "a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify)." In selecting a regulatory approach, agencies must tailor regulations to impose the least burden on society and, in choosing among regulatory alternatives, select ''those approaches maximizing net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity)" to the extent permitted by law.

In 1974, the EPA promulgated initial federal regulations for the Steam-Electric category in Federal Register Vol. 39 No. 196, October 8, 1974. This ELG required facilities to install or retrofit to closed-cycle cooling by July 1, 1981. On July 16, 1976, the Fourth Circuit Court of Appeals remanded the thermal limitations of the 1974 regulations under *Appalachian Power v. Train* [545 F.2d 1351 (4th Cir. 1976)]. Cause for the cooling standards removal was cited by petitioners as restrictively rigid, and because petitioners did not believe the EPA correctly weighed societal costs against societal benefits for requiring closed-cycle cooling. Therefore the 1982 reissued ELG removed content regarding thermal moderation requirements. No such cooling standard was sought in future ELGs, transferring the regulatory burden to the issuing authority to decide if any additional cooling controls are warranted on a site-specific basis. By this remand, the regulatory burden of closed cycle cooling was determined to not be applicable to all facilities, and is therefore not a foundationally required technology at this facility.

As stated in the June 11, 2012 notice of data availability (NODA), EPA does not intend for facilities to install closed-cycle cooling solely for the purpose of meeting the impingement (IM) requirements either. In fact, EPA expects all facilities could comply with IM requirements without relying on retrofitting to closed-cycle cooling. If a facility chooses to comply with the BTA IM standard by installing and operating traveling screens, the screens must meet the definition of modified traveling screens provided at § 125.92(s). These may include, for example, modified Ristroph screens with a fish handling and return system, dual flow screens with smooth mesh, and rotary screens with fish returns such as vacuum pumps. EPA based the regulatory definition on the commonly found features of modified traveling screens used in developing the BTA impingement mortality standard.

Impingement requirements, for either the specified screens or system of technologies, a two year study must be completed in which biological data collection is used to make site-specific adjustments to screens or the combination of technologies in order to optimize performance at that facility per 40 CFR 122.21(r). Those optimal operating parameters then become permit conditions. For facilities that have already installed traveling screens or the technologies associated with the system approach, EPA has combined the two year biological study with the other permit application and rule requirements for biological data collection, including the Source Water Baseline Biological Characterization Data. In this manner, EPA is establishing a consistent set of biological study requirements, with an overall reduction in the burden of the required level of biological monitoring.

Generally, two basic approaches can be used to reduce impingement mortality and entrainment concurrently. The first approach is flow reduction, where the facility installs a technology or operates in a manner to reduce or eliminate the quantity of water being withdrawn. Closed cycle cooling is discussed elsewhere. Reduced volumes of cooling water produce a corresponding reduction in

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impingement and entrainment and, therefore, reduced impingement mortality and entrainment mortality. It should be noted that, at electric generators, flow reduction could be achieved, perhaps most effectively, by installing more energy efficient production, thereby requiring less cooling per unit of electricity generated. The second way to reduce impingement and entrainment is to install technologies or operate in a manner that either (1) gently excludes organisms or (2) collects and returns organisms without harm. Exclusion technologies or practices divert those organisms that would have been subject to impingement and entrainment away from the intake. Collection and return technologies are designed to allow impingement to occur but possibly preventing impingement mortality. Although not available to all facilities, two other approaches to reducing impingement and entrainment are (1) relocating the facility's intake to a less biologically rich area in a waterbody, and (2) reducing the intake velocity.

The most frequently employed exclusion and collection technologies at Missouri facilities are traveling screen systems. These systems only exclude organisms of a particular size, depending on the screen mesh weave chosen. Conventional traveling screens were not designed initially with the intention of protecting fish and aquatic organisms that become impinged against them. The organisms were often handled in the same manner as debris on the screens. Marine life can become impinged against the screens because of high intake velocities that prevent their escape. Prolonged contact with the screens can suffocate organisms that are unable to escape or result in descaling injury and latent mortality. Organisms that survive initial impingement and removal are not always provided with a specifically designed mechanism to return them to the waterbody and are often handled in the same way as other screening debris, like leaves and trash: This debris collected on the screen is typically removed with a high-pressure spray and deposited in a dumpster or debris return trough for disposal. Exposure to high pressure sprays and other screening debris can cause significant injuries that result in latent mortality or increase the susceptibility to predation or re-impingement. Screens are historically rotated periodically on a set time interval or when the pressure differential between the upstream and downstream faces exceeds a set value. Screen rotation in the future is required to be maintained at a sufficient velocity to safely return aquatic organisms unharmed to the waterbody.

Conventional traveling screen systems are modified to reduce impingement-related mortalities with collection and return systems. In its simplest form, these systems are composed of a return flume or trough with sufficient water volume and flow to enable impinged organisms to return to the source water. Return systems should be designed to avoid predation and latent mortality while organisms are in the flume, maintain an appropriate water depth in the flume for high survival of the organisms, located at an appropriate elevation to avoid large drops of the organisms back to the surface water (or large hydraulic jumps if the end of the return is below the water's surface), and sited to avoid repeated impingement of the organisms by the intake structure.

From an assessment of all factors, EPA identified one technology as the best technology available for minimizing the adverse impacts of impingement mortality at existing facilities: modified traveling screens with a fish-friendly fish return. EPA identified no single best technology is available for minimizing entrainment.

TBEL SUBSECTION 5. SITE ANALYSIS

TECHNOLOGY ANALYSIS FOR THERMAL DISCHARGE AT OUTFALL #001, CWA §316(A); ANALYSIS FOR ENTRAINMENT PROCESSES; FOR THE INTAKE AS PERMITTED FEATURE #010, CWA §316(B); AND ANALYSIS FOR IMPINGEMENT MORTALITY:

Much of the information contained below is found in the 2019 application for renewal and associated documents.

For BAT requirements, the following section is outlined following the requirements found in 40 CFR 125.3(d)(3):
1. Age of equipment and facility;
2. Processes employed;
3. Process changes;
4. Engineering aspects of the application of various types of control techniques;
5. Non-water quality environmental impact including energy requirements;
6. Total cost of application of technology in relation to the effluent reduction benefits to be achieved from the technology, and the reasonableness of the cost of achieving such effluent reduction;
7. And any actions the Department deems necessary per CWA §402(a)(1)(B) and 40 CFR 125.3(c)(2)(ii).

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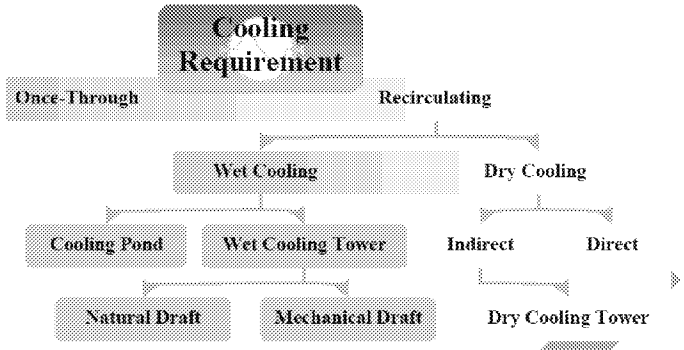
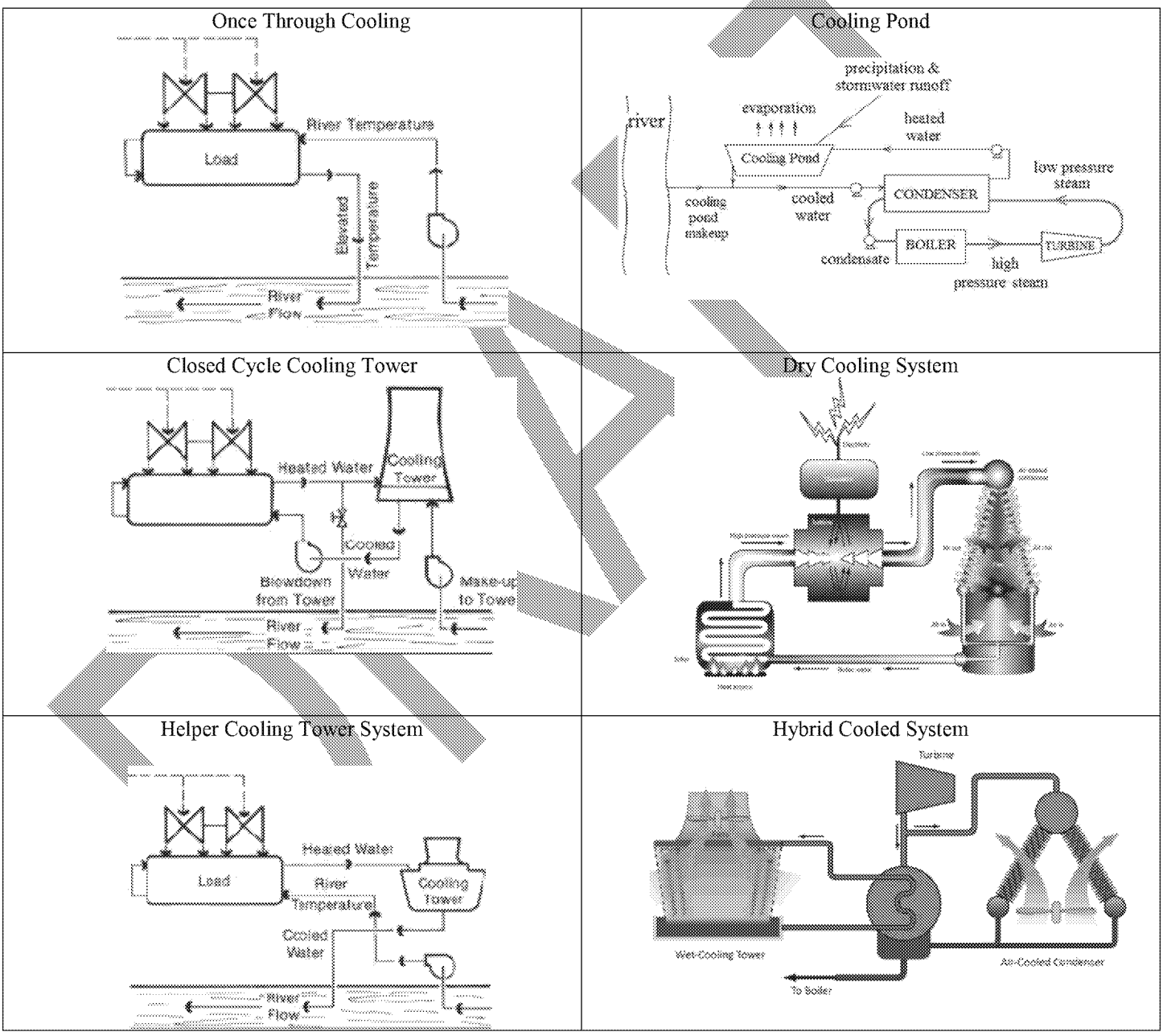
VARIOUS TYPES OF COOLING TECHNOLOGIES





All of the following information was found in historical permits, the renewal application, or supplemental information provided by the permittee, and is available upon sunshine request.

BAT REQUIREMENT #1: AGE OF EQUIPMENT AND FACILITY:
The Labadie Energy Center (Labadie) consists of four generating units with a net capability of 2,407 megawatts (MW). The first unit started operating in May 1970 and the plant was fully operational in June 1973. The typical annual generation capacity is between eighteen and nineteen million megawatt hours (18,000,000-19,000,000 MWHR). Labadie was designed as a base load (runs at all times of the year, as a main supplier of energy) plant with once-through cooling. The original NPDES operating permit was issued October 3, 1975 with temperature limit of 118 °F. No impingement or entrainment controls were included in the original design. The traveling water screens (TWS) were installed in 2008.

The July 15, 1977 permit, established the alternate effluent limit of 10.63 x10^9 Btus/hr and included a §316(a) thermal variance. The §316(a) thermal variance was recommended for approval by EPA on February 14, 1977. Implementing this alterative effluent limit, the temperature requirement of 118° F and the special condition requiring off stream cooling was removed, as the federal rule requiring cooling towers as best available technology (BAT) was remanded by the Fourth Circuit Court of Appeals in 1976. No subsequent regulations required the implementation of cooling towers as BAT. The plant's end of useful life was determined to occur in 2042.

BAT REQUIREMENT #2: PROCESS [CURRENTLY] EMPLOYED
The current processes employed is once-through cooling (no treatment for entrainment or heat) with 3/8 inch (9.5 mm) traveling screens rotated as needed (these are not designated as fish-friendly). The plant's cooling water intake structure is located along the Missouri River shoreline and consists of four cells, one for each unit. Within each cell are 2 bays containing a 10 foot wide vertical conventional traveling screen for a total of eight traveling screens for the entire intake. There is a 10x9 (height x width) foot upper opening and a 9x7 lower opening to each bay. At the mouth of the openings there are steel trash rack bars with 2.5 inch openings. A warming line recirculates heated water back to the intake to prevent ice buildup in the winter if necessary.

Heated water is discharged back in to the Missouri River through an 8 foot diameter pipe leading to a seal well, over a weir, into a 0.22 mile discharge canal located 0.31 miles downstream from the intake structure. Once-through cooling is the technology currently in use.

The current Best Technology Available (BTA) for entrainment is single pass cooling. Interestingly, BTA is not a recognized technology assessment type in 40 CFR 125.3; BTA assessments are only for impingement and entrainment in 40 CFR 125 Subpart J. In this part, certain assessments have been made under Best Available Technology (BAT); however, for the purposes of this fact sheet, the BAT for cooling discharges also applies to the BTA for entrainment as these are intrinsically tied to the water utilized by the facility.

The current impingement technology is conventional traveling water screens (TWSs) with 3/8-inch mesh. The current TWSs are comprised of 3/8-inch mesh screen panels. The mesh is estimated to have an open area of approximately 68% when free of debris. The through-screen velocities are idealized values based on one-dimensional flow rate calculations assuming clean screens. The screens currently function in a capacity that would be described as a "debris screen" where the screens are rotated periodically on a consistent schedule (e.g., once per shift or once daily) or as head loss develops to ensure spray cleaning with a high-pressure spray system. Organisms and debris sprayed off the screens are returned to the river via the debris trough. Under current operations, the system is not optimized for the protection of impinged fish.

BAT REQUIREMENTS #3, #4. #5, #6 AND #7.
These are discussed together below for each technology.

Requirement #3: Process changes. The consideration of process changes modified to improve the system. This includes changes from operations and maintenance to a complete retrofit of the entire system.

Requirement #4: Engineering Aspects of Application of Various Types of Control Techniques. While the potentially available cooling technologies may be employed at any given facility, are generally well established, their suitability and successful application at individual facilities is strongly dependent on the site specific conditions associated with each facility. Entrainment technologies also vary by facility and can be tied to some cooling technologies.

Requirement #5: Non-Water Quality Environmental Impacts Including Energy Requirements. All cooling and entrainment technologies have non-water quality environmental impacts, including impacts to energy requirements. Because impacts at the Labadie Energy Center would entail a retrofit, the non-water quality impacts would include changes to the existing system, which could result in energy production loss.

Requirement #6: Total cost of application of technology in relation to reduction in effluent. The total cost of the application of the technology evaluates the 1) benefits of reduction of heat in the effluent and entrainment at the intake, 2) the social benefits such as fisheries, 3) the capital and construction costs, 4) the costs in loss generation and electricity for sale, and 5) the overall environmental impact. The overall environmental cost needs to include the cost of additional chemicals, impacts to waste streams being handled, and

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impacts to the air quality. The reasonableness of the costs associated with the technology. The reasonableness of the cost of the application of each technology based on the level of heat removal and entrainment reduction (combined harm reduction) and the societal and monetary cost of achieving the harm reductions, and the comparison of all factors together.

Requirement #7: Any additional requirements as seen necessary by the permitting authority would include additional confirmatory sampling, or other submission requirements not otherwise required by regulation.

The technologies discussed below are established technologies throughout the country; however, the construction and establishment of any technology at the Labadie Energy Center (LEC) requires a detailed engineering evaluation. The reasonableness of the application of the technology needs to account for the ability of the technology to be constructed and used on site and to produce a benefit of removing the parameter of concern (heat) and reduction of entrainment. The installation of the technology (or a mix thereof) must be reasonable, exhibiting a logical and cost effective solution.

SINGLE PASS COOLING:
Once-through systems are less expensive to build than closed cycle systems. Single pass systems have a simpler infrastructure requirement (than construction of a cooling tower or cooling pond) and maintenance and operational upkeep are generally cheaper throughout the plant life. Once-through systems consume less water than closed cycle cooling systems; once-through systems withdraw a greater amount of water, most of it is returned to the water source.

Once-through cooling systems take water from nearby sources, such as the Missouri River, circulate it through pipes to absorb heat from the steam in systems called condensers, and discharge warmer water to the local source. Once-through systems were initially the most common cooling technology because of their simplicity, efficiency, low cost, and the possibility of sighting power plants in places with abundant supplies of cooling water. Once through cooling provides the best power plant efficiency of the alternatives, because the source water tends to be the lowest temperature heat sink available for most of the year.

Non-water quality impacts include the impact of the intake and the discharge on aquatic communities. Intake impacts are to be evaluated under CWA Section 316(b). While once-through cooling withdraws high volumes of Missouri River water, it returns nearly all of those withdrawals to the river. Once-through cooling is the existing technology in use. This is what Labadie Energy Center was constructed with and the cost for this technology is the cost to continue operating and maintaining the system. The level of reduction is what the thermal studies of the 1970s set as the operating conditions is the level of reduction. Under the new §316(b) intake structure rule, the facility will face upgrades to reduce the number of aquatic larval and fish being impinged and entrained on the intake structure.

Under the §316(a) studies, the facility has evaluated thermal discharges from outfall #001. In the thermal variance request dated April 2020, the facility has shown the balanced and indigenous population of fish, shellfish, and other aquatic organisms is not being negatively affected from the heated discharge. As Missouri's water quality standards allow for a zone of mixing, where effectively the standards do not apply, the facility has met the onus of showing that the BIP is maintained, even with the ongoing thermal discharge. The facility has also shown the thermal discharge does not occupy the entire stream width which allows for an adequate zone of passage. Further, in the study report, it was shown thermally sensitive species migrate out of the area or use the zone of passage, therefore have the ability to avoid the thermal discharge. Floating organisms are only exposed to the thermal discharge, should they encounter it, for about 90 minutes.

Additionally, the §316(a) study found no prior appreciable harm occurred in accordance with 40 CFR 125.73(c)(1)(i) meaning over the span of the last 50 years the facility has been operating, the BIP has not been negatively affected by the thermal discharge. The report details the presence of all trophic levels, the presence of necessary food chain species, the presence of diversity, the continued capability for a self-sustaining population, that heat tolerant species do not dominate the river in the vicinity of the LEC (outside of the allowed thermal mixing area), and, there is no increase of nuisance species due to the thermal discharge. The report also detailed there were no increase or decrease of indigenous species in the LEC vicinity, and there are no decrease in endangered species from the thermal discharge. Habitats were also identified as being maintained in the LEC vicinity, and the zone of passage (inverse of the mixing zone) is being maintained. The report also explains there is no noticeable change in commercial or sport species (upstream vs. downstream), no habitat former alterations, limited duration of any identifiable thermal effects, no sublethal or indirect effects, no presence of critical function zones within thermally exposed areas, and no negative interaction of the thermal discharge with other pollutants. There are no critical function zones (e.g., critical spawning and nursery areas) present within the thermally exposed and downstream zones for any RIS. The predictive assessment also showed there would only be minor episodic exclusions from a small area of habitat within the thermally exposed zone and only under worst-case exposures. Again, the Department allows for degradation of stream quality in mixing areas therefore this minutiae was not considered critical for additional thermal protective controls. If historic harm would have been found, the Department could weigh the assessment factors differently, and more broadly consider other options for condenser cooling.

There would be no additional monetary or societal costs or societal or environmental benefits associated with this technology; this is the technology currently employed at the site.

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Water quality standards for thermal discharges are established in Missouri's regulations at 10 CSR 20-7.031(5)(D). These standards apply to this facility; however, as discussed in the THERMAL VARIANCE section, the Department has provided a thermal variance to the facility. See Section II in the fact sheet above. There are no water quality limits or standards established for entrainment.

COOLING PONDS:
Cooling Ponds are an established technology in Missouri for plants located in watersheds with small streams able to be dammed to create a cooling pond, such as in Springfield or outside Montrose, MO; both of these facilities have since closed however. Cooling ponds typically consist of artificially constructed bodies of water which may be created by damming a natural stream, utilizing an existing impounded body of water, or creating a new impoundment. Such is not the case in the Missouri River floodplain. The Missouri River is controlled by the US Army Corps of Engineers and establishment of a large dam to operate as a cooling pond would jeopardize other uses of the Missouri River including navigation, flood control, and the propagation of species. Labadie Creek is a small stream located near the power plant; however damming it to create a cooling pond is not feasible as it is heavily influenced by the Missouri River, acts as backwater flood area, and the watershed draining to the creek is not large enough to support a cooling pond necessary to serve Labadie's water needs. Also, by damming Labadie Creek to create a cooling pond, farmland would need to be purchased and flooded. Creation of a cooling pond would require retrofitting the existing plant's piping, controls, and operations. Additional permitting would be required from the Department's Water Resources Center and the US Corps of Engineers 401/404 program. Portions of Labadie Creek would need to be excavated and covered with lake water thus eliminating the designated uses of impacted portions of water of the state. Water requirements for pond cooling systems are typically higher than tower systems and are much more variable, they are operated based on ambient temperatures which dictate if they are operated as systems resembling recirculating closed systems, or a once-through system.

The condenser water is fed back into the cooling pond or lake, cooled through evaporation and then typically recycled to the condenser. While such ponds and lakes are established technologies at historic Missouri power plants, they have not been established for power plants located in the Missouri and Mississippi River floodplains. To be an effective cooling component, ponds must be sized at between 0.5 to 2 acres/MW (and usually closer to the 2 acre figure). Using this range, a cooling pond for Labadie would need to be between 1,200 and 4,800 acres to address the cooling needs of all four units.

Cooling pond construction would entail non-water quality and water quality impacts. Construction of a cooling pond would require retrofitting the existing facility, construction of a pond would require the removal of existing farmland and flood control structures. Space and Missouri River issues preclude this as a viable technology for the Labadie Energy Center. A cooling pond is not a reasonable alternative for the Labadie Energy Center as the location is not appropriate and the heat would continue discharge to the environment, just would be recirculated through the pond first. Removal of additional farm land from productive use and changes in the flood controls in Franklin County would not be a socially supported alternative.

CLOSED CYCLE COOLING SYSTEMS:
Recirculating systems only withdraw enough water needed to maintain the required water level of the system, and consume water through evaporation. To build a wet, dry, or hybrid cooling system, a water treatment plant would need to be constructed to clean the Missouri River intake water to a cleanliness appropriate for recirculation through the plant. The retrofit installation of closed-cycle cooling at a plant originally built with once-through cooling is complex. It is not simply a matter of installing a cooling tower in the existing circulating water system for several reasons. Often the plan is to retain as much of the original piping as possible: the existing condenser, circulating water flow rate, and as much of the existing circulating water pumps, lines, and intake/discharge structure.

Wet closed cycle cooling systems are designed to minimize the amount of water withdrawn from the river. In a wet closed cycle cooling system, condenser water still exchanges heat with water in a heat exchanger, however the cooling water is recycled between a cooling tower and a heat exchanger until system chemistry dictates the concentrations of solids are too high, and are discharged in a "blowdown" event. In this system, the cooling water is cooled by evaporating a percentage of the water to the environment and requires make-up water to account for the consumed water. In the case of the Labadie Energy Center, the make-up water would come from the Missouri River. Wet closed cycle cooling systems consume much more water than once-through cooling systems as the entire energy exchange is through evaporation of the water, however wet closed cycle cooling systems withdraw much less water than once through cooling systems. Wet closed cycle cooling systems can use natural draft or mechanical draft to accomplish cooling. The most common option available for replacing a once-through cooling system is a wet closed cycle cooling system.

Dry closed cycle cooling systems rely on air flow in cooling towers rather than water to cool the steam produced during electricity generation. Steam from the boiler is routed through a heat exchanger. Air is blown across the heat exchanger to condense the steam back into liquid, which is then returned to the boiler and is reused. Plants using dry cooling withdraw and consume a small amount of water to maintain and clean the boiler, including replacing boiler water lost through evaporation. Dry cooling has a higher capital cost than wet cooling, reduces the overall efficiency of the power plant, and does not operate effectively at high ambient temperatures. Installation of dry cooling is more common on new plants rather than as a retrofit to an existing plant, this option is more complex and expensive. Existing plants originally designed for once-through cooling are equipped with older turbines with much more stringent limitations on exhaust pressure than those for modern turbines designed for use with dry cooling. Per Burns, 2018, Dry cooling towers

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are not a viable alternate technology for Labadie. Dry cooling towers use giant, inefficient radiators. In the case of direct dry designs, their heat exchangers must be connected with huge steam ducts to the turbine exhaust. Indirect dry designs are additionally inefficient compared to the direct type and have never been utilized in the U.S.

Hybrid cooling systems are a combination of the wet and dry cooling systems, where a water condenser runs with an air-cooled condenser. This process combines-two established cooling processes, uses the advantages of dry and wet cooling by reducing water consumption compared to wet cooling, and does not require an air cooled condenser as large as may otherwise be needed.

The site-specific considerations are dependent on a number of variables, including:

1. A suitable location with enough room for the tower must be found on or adjacent to the plant site. This may place the tower far from the turbine hall and require very long circulating water lines; energy expenditure from shuttling water would decrease available energy for output to customers.
2. The discharge head from the circulating water pump must be increased in order to get the water to the top of the cooling tower and to overcome any additional head loss in the new circulating water lines. Increasing water pressure also requires additional energy. This additional head may be obtained by replacing or modifying the existing pump to obtain higher discharge head. This would involve diverting the condenser discharge flow from its current route, installing a new line to the cooling tower and a new return line back to the existing intake. Additionally, new make-up and blowdown lines and pumps would need to be installed as described above for new installations.
3. The existing inlet and discharge structures were designed for much higher flows than necessary for a closed-cycle system. This may lead to silting or fouling and will require either they be modified to restrict the flow area or be replaced with smaller, more suitable structures.
4. For cooling towers, the pressure in the condenser water boxes and any remaining discharge lines from the existing condenser will be subject to much higher pressure. This may require reinforcement or replacement in order to avoid leakage or damage.
5. Wet and hybrid cooling systems introduce additional chemicals to the system to prevent fouling and scaling of the system. While heated water discharges would decrease, additional heat would be released to the atmosphere and new pollutants of concern would be introduced to waters of the state.

Entrainment losses could be reduced most significantly by conversion to a closed-cycle cooling system (CCRS). However, this option requires disproportionately high initial capital and ongoing operating costs, and would slightly reduce plant generation capacity. While all cooling tower types pose challenges during construction, during operations, the cost evaluation found that mechanical draft cooling towers would pose the fewest challenges at the LEC. The capital cost to retrofit all four LEC units to closed-cycle cooling was estimated to be approximately $432 million with annual Operations & Maintenance (O&M) costs of approximately $15 million. The present value of social costs (compliance and power system costs) to retrofit to a CCRS were estimated over a 30-year period to be approximately $592 million using a three percent discount rate and $307 million using a seven percent discount rate.

Biological benefits are defined as the predicted increases in annual fishery yield (in weight) resulting from reduced losses associated with each technology alternative. Separate measures are calculated for species of commercial/recreational fishing importance and forage species using methods based in well-established fishery management techniques. The total biological benefits of reduced entrainment for the technology alternatives considered at the LEC, estimated as the increased fishery yield, ranged from 1,772 to 21,721 pounds (lbs) depending on study year and alternative. The total biological benefits of reduced impingement for the technology alternatives ranged from 13,719 to 27,798 lbs depending on study year and alternative. Given the high mass of Asian carp in the vicinity of the LEC, take of these species could be viewed as beneficial to the natural ecology of the river.

Testimony by John Burns, and Exhibit GG entered into evidence at the 2018 Clean Water Commission hearing indicated it could take up to 5 years to install wet cooling towers. (*Assessment of Alternative Cooling Technologies for Potential Retrofitting At The Labadie Energy Center*, J.M. Burns, P.E. March 19, 2018.) The assessment concluded with; although both the mechanical draft cooling towers and permanent helper tower alternatives are potentially viable at Labadie from an engineering perspective, both alternatives would be very costly and difficult to implement. Based on Mr. Burns' experience, neither alternative technology would be reasonable for Labadie and are not recommended. Rather, Mr. Burns recommended continued use of the facility's existing cooling technology, once-through cooling with discharge channel, for Labadie's thermal discharges.

The facility supplied detailed information relating to the cost of operating closed cycle mechanical draft cooling towers in an email dated 2/1/2021. To meet 90 °F discharge, the facility would require one cooling tower for each unit; four total. A mechanical draft cooling tower would require 7.2 megawatts per hour of power, or 68.9 mmBtu/hr, to operate. This would require 7696 pounds per hour of coal to be utilized which would generate 368 lbs/hour of coal combustion residuals. Over the course of one year, an additional 67.4 million pounds of coal waste (33,708.5 tons) would be generated.

HELPER COOLING SYSTEMS:

These intermittent systems supplement an open-cycle cooling system by removing a portion of the heat energy discharged in a plant's effluent and transferring it directly to the atmosphere. Ameren estimated the cost of constructing a helper cooling tower at $112 million. The construction of a helper cooling tower, pond, spray modules or other technique will still have the impact to aquatic life on

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the intake structure with impingement and entrainment, it will still have water with high temperature being discharged, it will require retrofits to the existing system resulting in a loss of energy production, it will introduce additional chemicals to the process to prevent fouling and scaling, and it will release more heat into the atmosphere.

At the Brayton Point Power Plant, which is 1500 MW plant, the construction cost estimate from 2002 was $98.9 million, with estimated annual maintenance costs of $300,000 per year. In addition, the Brayton Point facility estimated combined lost annual generation to be 152,148 MW-hr/year. This consists of 112,875 MW-hr/yr of additional auxiliary power consumption and 39,275 MW-hr/yr of steam turbine operating penalties. Helper cooling systems would have the same impacts of both closed cycle cooling system and the once through system. While it would reduce the discharge of heat into the Missouri River, intake water would require treatment at the water treatment plant, retrofitting the system to handle at least partial flow through a cooling tower for recirculation, along with additional chemicals to prevent fouling and scaling in the tower.

The facility supplied detailed information relating to the cost of operating permanent helper cooling systems in an email dated 2/1/2021. To meet 90 °F discharge, the facility would require one cooling tower for each unit, four total. A mechanical draft cooling tower would require 6.95 megawatts per hour of power, or 66.2 mmBtu/hr, to operate. This would require 7400 pounds per hour of coal to be utilized which would generate 354 lbs/hour of coal combustion residuals. Over the course of one year, an additional 3.1 million pounds of coal waste (1550.5 tons) would be generated.

MECHANICAL CHILLERS:
Mechanical Chillers operate with heat exchangers and pumps to control the temperature of the discharge. Mechanical chillers work best when the wastewater temperature and volume is lower than what is discharged from Labadie Energy Center. Corrosion protection chemicals would also be required. The installation of mechanical chillers would require energy to operate, have a large withdrawal of water from the river, would transfer the heat from the water to the atmosphere. Additional concerns are clogging and flooding due the Missouri River's flow, increased air pollution, negative water quality such as turbidity and biocides, and noise pollution. While mechanical chillers are sometimes used elsewhere in the Midwest, the usage at such a large power plant (such as the Labadie Energy Center) on a large river subject to Corps of Engineers jurisdiction, fluctuating river levels and flooding would limit the effectiveness of this technology.

FINE MESH SCREENS:
As stated in the Rule, engineering analyses under 40 CFR 122.21(r)(10) must evaluate the potential feasibility of fine mesh screens (≤ 2.0 mm) for entrainment purposes (these screens have no direct effect on heat discharge). Screen technologies provide entrainment protection through exclusion and survivability. Exclusion of an organism is based on the screen mesh dimensions and the size of the organism. Survivability is based on the force with which the organisms are pushed against the screen (through-screen velocity) and the handling characteristics of the system that removes the organism from the screen and returns it to the source waterbody. Survivability can be difficult to evaluate as it is dependent on many variables. Factors for exclusion and survivability play important roles when evaluating entrainment reduction screen technologies.

The improvements needed to provide BTA for impingement mortality reduction at the LEC CWIS are described in 40 CFR 125.94(c)(5). For this study it is assumed any alternative including procuring and operating new TWSs would also include all necessary BTA improvements described in §125.94(c)(5). The design of the existing CWIS and the use of constant speed vertical circulating pumps to draw water out of an open well would result in higher through-screen velocities if modified fine mesh TWSs are installed in the existing intake. The increase in through-screen velocity would likely increase impingement rates and negatively impact impingement survivability. As such, a key assumption is that the increases in through-screen velocity, for the sake of installing smaller mesh screens, is counterproductive to the intent of the rule and is unlikely to yield a reduction in entrainment losses.

As a component of the feasibility review of technology options, the effectiveness of a range of fine mesh screens was evaluated. While the Rule calls for the consideration of several fine mesh options (e.g. TWS and wedge-wire), actual practicality is contingent on whether or not the technology is effective in enhancing biological survival of potentially entrained organisms. This section evaluated the biological effectiveness of several fine mesh TWS alternatives (i.e., 2.0, 1.0, and 0.5 mm mesh sizes) given that wedge-wire cylindrical T-screens are not considered a practical alternative at the LEC.

Length frequency data from 2016 entrainment sampling at the LEC were used along with predicted percent retention (exclusion) estimates derived using head capsule depth methods (EPRI 2010a; EPRI 2014) to estimate the numbers of individuals excluded on three mesh sizes. Retention was maximized by the 0.5 mm screen mesh (71.8 to 98.8 percent). The 1.0 mm mesh size had the second highest overall retention, but retention was notably reduced 91.8 to 6.1 percent. Notably, the 2 mm screen mesh resulted in the poorest retention (0.3 percent overall) as compared to other mesh sizes which are smaller

Overall, the 0.5-mm screen mesh size demonstrates the highest retention (and likely the highest potential survival benefit) for all life stages and dominant taxa collected at the LEC. Larger larvae (> 12.0 mm total length (TL)) have shown higher retention survival rates regardless of species, screen type, or approach velocity and higher survival rates through fish return systems.

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However, very few larger (> 12.0 mm TL) larvae were collected in 2016 entrainment samples at the LEC that would have been excluded by larger screen mesh sizes. Based on observed length frequency data of larvae entrained at the LEC, the 0.5-mm screen mesh size is considered to be the mesh dimension with the overall greatest retention (and likely survival benefit) across a range of species encountered at the LEC. Considerations of the differential benefits of each screen mesh option will be evaluated separately in (r)(11).

To maintain the current flow rate and through-screen velocity using a 2.0 mm x 2.0 mm fine mesh screen with an open area of 51%, the gross screen area would need to be increased by 33%. Preliminary analysis of available screen alternatives indicates that is possible, with significant structural changes to the intake structure, to install dualflow conversion screens in the existing CWIS and increase screen surface area by an additional 20-30%. The design of dual-flow conversion TWSs offers greater screen surface area by allowing water to enter two opposing sides of the same TWS. Conversion units are designed to be installed into an existing CWIS with through-flow TWSs. Further analysis would be required to determine the precise extent of additional screen surface area that could be provided, and it would be limited by vendor design and dimensional constraints of the existing intake channel. A preliminary design for a dual-flow unit provided to Wood by a reputable TWS vendor was five and one half feet of screen surface per side, for a total of 11 feet of screen width. A larger screen may be attainable with a more refined design. For the purpose of this study, installation of dual-flow conversion TWSs is considered conceptually feasible and would provide sufficient cooling water flow and through-screen velocity to sustain current plant operations. However, more detailed analysis may invalidate this alternative.

At the LEC the presence of the two stop gates further complicates the flow characteristics. Therefore, there are notable uncertainties regarding the ability to implement this technology based on the above referenced flow characteristics within the existing CWIS, complex hydraulics and the resultant through-screen velocity.

The research presented indicates that potential entrainment reduction (via exclusion) by adding 2.0 mm fine mesh is minimal because the vast majority of eggs and larvae are smaller than 2.0 mm and would continue to be entrained. However, 2.0 mm mesh is considered "fine mesh" by the Rule and the conversion of the TWS to dual-flow with 2.0 mm fine mesh is retained as a technically feasible alternative because it represents the greatest potential entrainment reduction possible within the physical limits of the existing CWIS. Therefore, this technical alternative is retained for further consideration in the (r)(11) and (r)(12) studies.

There are no water quality standards established in Missouri for entrainment of aquatic organisms.

MODIFIED TRAVELING INTAKE WATER SCREENS WITH FISH FRIENDLY RETURN:
Per 40 CFR 125 Subpart J, the facility is required to choose a method of compliance with the impingement standard, and provide the choice to the permitting authority. The Department then assesses the choice, and affirms or denies the choice, and implements the requirement into the permit. As this technology assessment is outlined in 40 CFR 122.21(r) et seq and 40 CFR 125 Subpart J, the best professional judgment outlined by the permit is the BTA decision.

The facility has provided their chosen method of compliance with the impingement standard which is Compliance Alternative 5 (modified traveling screens and fish-friendly return system). The permit writer agrees this is the best technology for the facility and a compliance schedule is established for implementation. Additionally, the facility will need to rotate the screens constantly, or near-constantly to provide for safe fish return to the river. The facility will need to implement the technology and provide a complete optimization, entrainment, and impingement sampling studies at the next renewal to comply with the 40 CFR 122.21(r)(6) impingement mortality reduction standard. Given the age, condition, and arrangement of the existing TWSs, an investigation into the potential to retrofit the existing screens for impingement and entrainment protection by installing fine mesh panels was not performed; instead the assessment considers complete replacement. As such, implementation cost, compliance cost and social cost were not developed for this alternative and all TWS alternatives in this study assume the procurement of new TWSs.

There are no water quality standards established in Missouri specifically for impingement of aquatic organisms. However, general criteria in 10 CSR 20-7.031(4)(H) prohibit negative physical or hydraulic changes which would impair the biological community. While diversion of river water would be considered a hydraulic change in the flow, the permit writer will rely on the requirements in 40 CFR 125 Subpart J to achieve the reduction necessary to offset the negative hydraulic changes.

TBEL SUBSECTION 6. CONCLUSIONS
The Labadie Energy Center has been in operation since 1970; the end of useful life for this plant is expected to occur in 2042. Outfall #001 was constructed as, and continues to operate as, a once-through cooling system. In evaluation of the other heat-reducing technologies available, there are technically feasible options available that could reduce the discharge of heat to the Missouri River; however those options increase the chemicals in the discharge, release the heat to the atmosphere, decrease energy available for output to customers, and provide operational and maintenance issues. The Department may weigh each factor in the BAT determination for technology requirements differently; there is no requirement to weigh societal costs (those such as fishing or swimming) greater than actual costs in dollars to the facility. The permit writer has determined, because the facility also completed an in-depth assessment of the local aquatic population in accordance with CWA §316(a), the choice to weigh the presence of a balanced and indigenous population (BIP), and absence of habitat suitable for endangered species breeding, as paramount to the BAT determination.

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In an email dated April 20, 2020, the Service lodged their concerns regarding impingement and entrainment at the LEC. Stating: "The Service is concerned about the impacts of the LEC operations on the federally endangered pallid sturgeon (*Scaphirhynchus albus*). Data collected for Ameren Missouri and other entities indicate that pallid sturgeon, shovelnose sturgeons (*Scaphirhynchus platorynchus*), sturgeon chub (*Macrhybopsis gelida*), and sicklefin chub (*Macrhybopsis meeki*) are present in multiple sampling events and studies in the LEC's vicinity. The 2005-2006 impingement monitoring study collected 11 shovelnose sturgeons (7% of impinged biomass) and 1 sturgeon chub (<0.1% of impinged biomass). The U.S. Army Corps of Engineers' (Corps) Pallid Sturgeon Population Assessment Program focused on native fish species presence during their 2013-2015 study. During this study, the Corps researchers collected 53 pallid sturgeons within Segment 14 of the Missouri River, the same segment in which the LEC is located. Shovelnose sturgeon was the most numerous fish species collected (24.2% abundance) which can reflect the use of appropriate benthic sampling gear. Biological abundance of pertinent fish species detected in the study were: sicklefin chub 3.2%; sturgeon chub 0.5%; pallid sturgeons 0.1%; and pallid x shovelnose sturgeon hybrids 0.1%."

The Department's review of the Service's information found supporting information in "Overview and Progress of the Pallid Sturgeon Assessment Framework Redesign Process", USGS item 2018-1166 [HYPERLINK "https://pubs.usgs.gov/of/2018/1166/ofr20181166.pdf"] and "Asian Carp in the Missouri River: Analysis from Multiple Missouri River Habitat and Fisheries Programs" March 2009 [HYPERLINK "https://www.fws.gov/mountain-prairie/fisheries/gpFWCODocs/AsianCarpintheMissouriRiverReport2003-2007.pdf"] Segment 14 of the Missouri River is from the mouth of the Osage River (river mile 134), to the mouth of the Missouri River (river mile 0), is designated interior highlands, and is about 134 miles, with the Labadie facility at about river mile marker 53. Given the span of this segment is 134 miles, the river's function for aquatic species is varied, along with substrate, spawning habitats, and differences in velocity. The Department is requiring the facility monitor the impingement and entrainment during the screen optimization studies required by 40 CFR 125.98(e) and 122.21(r)(9) and will review data for any endangered species caught by the facility. 53 pallid sturgeon, over 134 miles, and sampled of the course of three years, indicate that the pallid sturgeon may not actually be present in the vicinity of the LEC; but requirements to determine genetic analysis is considered. By the law of averages, in the mile of riverfront the LEC occupies, the chance of a pallid sturgeon occurring there seems minimal.

Across all technological alternatives, estimates of the annual economic benefits from reductions in entrainment loss ranged from approximately $700 to slightly more than $10,000 per year, depending on study year and alternative. Estimates of annual economic benefits from reductions in impingement loss ranged from just over $2,000 to almost $5,000 per year across the alternatives and study years. Finally, total annual benefits from reductions in entrainment and impingement combined ranged from just over $3,000 to just over $15,000 per year across the alternatives and study years. Net present value (NPV) of lifetime benefits of entrainment and impingement reductions over the 30-year period used for the analysis ranged from just over $18,000 to almost $208,000, depending on study year, alternative and assumed discount rate (three vs seven percent). Most of this benefit was a result of reductions in entrainment loss of the forage base.

The Department is tasked with underscoring unintended consequences from implementing new technologies. Unintended consequences are those not relating to water pollution but consequences such as increased landfill waste, reduced air quality, higher electrical costs passed on to customers, or requiring additional fuel (coal) to be transported from off-site to the facility. Sometimes identified as societal costs, these were determined to be, as a whole, greater than the loss of larvae or small fish entrained in to the cooling system. The second main consideration in determining BAT for cooling wastewater was the factor of additional energy use if cooling towers were installed and operated. The facility would not be able to send as much electricity to customers which may necessitate the need to supplement energy from other sources to fulfil the needs of the consumers.

As John Hanlon, former Director of the Office of Wastewater Management with the EPA, with almost 40 years of experience, testified on October 24, 2018 at the Labadie Hearing, 15-1362 CWC, the Department followed the correct procedures with respect to issuing the 2015 renewal permit and the 2017 modification in regards to the thermal limitations and BAT determinations. To paraphrase, he opined, BAT determinations in NPDES permits are case by case. There does not exist a national regulation covering power plant thermal discharges. And so the permitting decisions for those facilities must be done on a case-by-case basis and each of those are done are unique to the facility. Each power plant is different. Each environment that they sit in, the receiving water is different, available makeup water is different. So each is truly case-by-case determination. And because of that, a BAT determination for a thermal discharge made on one power plant does not set a precedent for a BAT determination on a following permitting decision. Basically they're independent and one does not materially affect the next. Additionally, heat is treated differently in the CWA by virtue of the provisions of §316(a) and it allows the permitting authority to determine when a 316(a) variance is appropriate. To compete the assessment, the permit writer utilized the required procedures, found at CWA 304(b)(2)(B), regulated per 40 CFR 125.3, as described by expert testimony. Additionally, Hanlon described the detailed process, where there are no limitations or standards by which the Department is to perform an evaluation or what procedural specifics the Department is to consider, other than the factors listed in the regulation. Hanlon also testified he believed the BAT for Labadie was single pass cooling.

The entrainment BTA assessment considers changes in pollutant emissions in the *§ 122.21(r)(12) Non-Water Quality Environmental and Other Impacts Study* submittal report. There are two types of emissions associated with the operation of a cooling tower: (1)

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particulate matter (PM) emissions directly from the cooling tower, and (2) stack emissions associated with the replacement energy generation (to operate cooling tower fans and pumps, and overcome backpressure energy penalty of the turbine). Under the first factor, the operation of cooling towers at the LEC is estimated to increase total PM emissions by a maximum of 20 tons per year (TPY). Under the second factor, the increased emissions associated with replacement energy generation following the complete conversion to closed-cycle cooling is estimated to be approximately 221,600 tons of CO_2, 490 tons of SO_2, 124 tons of NOx, and 9,290 tons of PM annually.

After applying factors listed above, and considering the technologies and unique circumstances discussed, the Department has determined, based on its best professional judgment, that the current once-through cooling system is the best available technology at this time as additional measures would not provide societal benefits. For CWA §316(a), and in response to the requirements set forth in the last permit renewal, the facility supplied a study to the Department an evaluation of the balanced and indigenous population (BIP) of aquatic species around the LEC. The study outlined the LEC does not negatively impact the BIP and a thermal variance for thermal pollution (CWA §316(a)) was identified as appropriate for consideration.

Additionally, for CWA §316(b), there is no statutory deadline for meeting the BTA requirement for entrainment, therefore, the end of life of the plant would be considered as a highly weighted factor for installation of any thermal abatement devices. Given the end of life projected for 2042, recouping the costs of installation of cooling towers, after an extensive outage and years of construction, the installation of closed cycle cooling would not be advisable due to additional societal costs; the BTA decision of single pass cooling for entrainment could be extended if necessary. This permit does not require the facility to commit to an end of life discharge scenario, but given advancing technology in alternative, more environmentally friendly generating technologies such as wind and solar, battery or storage advancements, and future more restrictive air regulations, it is the expectation this facility will retire during the timeframe established by Ameren in the [HYPERLINK "https://www.ameren.com/-/media/Missouri-Site/Files/environment/renewables/irp/irp-chapter4.pdf?la=en"] document.

The evaluation of the net social benefit of a potential activity is an appropriate mechanism to evaluate alternatives for entrainment reduction. Under the Rule, permitting authorities "reject otherwise available entrainment controls if the costs of the controls are not justified by their associated benefits (taking into account monetized, quantified, and qualitative benefits), and the other factors discussed in the final Rule." In the event the net social benefits of a proposed set of activities are negative (i.e., social costs outweigh social benefits such that expenditures to install and operate the measure do not result in a commensurate social benefit), there is no reasonable justification for that activity to represent entrainment BTA and doing so is expected to leave society worse off.

Based on the high social costs and low social benefits documented in the § 122.21(r)(9) through (12) submittal reports for closed-cycle cooling, thru-flow 0.5 mm modified traveling screens, and modified dual-flow 2 mm traveling screens, the estimated social costs outweigh the social benefits of entrainment reductions at the LEC. The substantial uncertainty of the successful implementation of the dual flow 2 mm traveling screens is another important factor in making fine mesh screens an inappropriate entrainment reduction technology. Selection of any of these technologies to meet entrainment BTA would result in social costs which are not justified by the social benefits. Considering that each of the candidate entrainment measures results in negative net social benefits, the Department is not requiring specific entrainment controls at this time. The BTA for entrainment is thereby single pass cooling with 3/8 inch traveling screens with optimization for fish-friendly return to the river.

Per 40 CFR 125.73(c)(2), the Department has evaluated the historic thermal contribution of the Labadie Energy Center. Over time, the heat discharge has not changed significantly; all four units were installed in the 1970s and designed to output 600 MW each. And while upgrades have occurred over the years, the upgrades were designed to improve fueling efficiency (such as better coal pulverization) and decrease air pollution (through better firing systems ensuring all coal is burned). No additional units are planned for the LEC. The Department has reason to believe the effects of the Labadie Energy Center thermal discharge have no substantially greater effects in recent years as they have had on the past; and do not expect increased thermal components of future discharges. Air pollution control equipment is expected to be installed but the thermal component of the discharge used for cooling the condensers is not expected to increase. This will be confirmed at subsequent permit renewals by utilizing data submitted for the thermal discharge parameter for outfall #001 and permitted feature #010 (intake) and this data includes stream temperatures.

This permit continues the BTA/BAT decision of single pass cooling from the previous permit. Any alternate analysis, showing an alternative conclusion, should be submitted to the Department during the Public Notice period and must be as rigorous as the EPA's requirement for technology assessment such as this permit illustrated. The alternate analysis must be in a format as required by the regulations for establishing technological limitations by developing a decision using the appropriate TBEL BAT factors to be considered as appropriate mechanism to reverse this permit's determinations. Replacement BAT decisions are only implemented in permits when there is a need for the technology; when a problem is identified. At this site, the demonstrations and data have shown additional technologies would not provide benefits without costs; these costs outweigh the benefits.

Upon implementing the BAT of single pass cooling, a determination as to the level of performance this technology must achieve is stated as thermal TDP limitations in the permit for thermal discharges for outfall #001 based on the 316(a) thermal variance, and for

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the impingement and entrainment standard, the achievable performance levels are included in the narrative special conditions of the permit.

UNDERGROUND INJECTION CONTROL (UIC):
The UIC program for all classes of wells in the State of Missouri is administered by the Missouri Department of Natural Resources and approved by EPA pursuant to section 1422 and 1425 of the Safe Drinking Water Act (SDWA) and 40 CFR 147 Subpart AA. Injection wells are classified based on the liquids which are being injected. Class I wells are hazardous waste wells which are banned by RSMo 577.155; Class II wells are established for oil and natural gas production; Class III wells are used to inject fluids to extract minerals; Class IV wells are also banned by Missouri in RSMo 577.155; Class V wells are shallow injection wells; some examples are heat pump wells and groundwater remediation wells. Domestic wastewater being disposed of sub-surface is also considered a Class V well. In accordance with 40 CFR 144.82, construction, operation, maintenance, conversion, plugging, or closure of injection wells shall not cause movement of fluids containing any contaminant into Underground Sources of Drinking Water (USDW) if the presence of any contaminant may cause a violation of drinking water standards or groundwater standards under 10 CSR 20-7.031, or other health based standards, or may otherwise adversely affect human health. If the director finds the injection activity may endanger USDWs, the Department may require closure of the injection wells, or other actions listed in 40 CFR 144.12(c), (d), or (e). In accordance with 40 CFR 144.26, the permittee shall submit a Class V Well Inventory Form for each active or new underground injection well drilled, or when the status of a well changes, to the Missouri Department of Natural Resources, Geological Survey Program, P.O. Box 250, Rolla, Missouri 65402. The Class V Well Inventory Form can be requested from the Geological Survey Program or can be found at the following web address: [HYPERLINK "http://dnr.mo.gov/forms/780-1774-f.pdf"] Single family residential septic systems and non-residential septic systems used solely for sanitary waste and having the capacity to serve fewer than 20 persons a day are excluded from the UIC requirements (40 CFR 144.81(9)).

- ✓ Not applicable; the permittee has not submitted materials indicating the facility will be performing UIC at this site and UIC is not authorized under this permit.

UTILITY WASTE LANDFILL:
A permit, Number: 0907101, was issued to the facility by the Waste Management Program within the Department on October 27, 2016. The landfill is 813 acres, with a useable area of 166.5 acres. The Water Protection Program does not have jurisdiction over the landfill. Those requirements are found under solid waste regulations at 10 CSR 80-11.

WASTELOAD ALLOCATIONS (WLA) FOR LIMITS:
As per [10 CSR 20-2.010; definitions], the WLA is the amount of pollutant each discharger is allowed to discharge into the receiving stream without endangering water quality.

- ✓ Applicable; wasteload allocations for toxic parameters were calculated using water quality criteria or water quality model results and by applying the dilution equation below; WLAs are calculated using the *Technical Support Document For Water Quality-Based Toxics Control* or TSD EPA/505/2-90-001; 3/1991.

[EMBED Equation.3] (EPA/505/2-90-001, Section 4.5.5)

Where C = downstream concentration
Cs = upstream concentration
Qs = upstream flow
Ce = effluent concentration
Qe = effluent flow

- ✓ Acute wasteload allocations designated as daily maximum limits (MDL) were determined using applicable water quality criteria (CMC: criteria maximum concentration) and stream volume of flow at the edge of the zone of initial dilution (ZID).
- ✓ Chronic wasteload allocations designated as monthly average limits (AML) were determined using applicable chronic water quality criteria (CCC: criteria continuous concentration) and stream volume of flow at the edge of the mixing zone (MZ).
- ✓ Number of Samples "n": effluent quality is determined by the underlying distribution of daily values, determined by the Long Term Average (LTA) associated with a particular Wasteload Allocation (WLA) and by the Coefficient of Variation (CV) of the effluent concentrations. Increasing or decreasing the monitoring frequency does not affect this underlying assumption which should be, at a minimum, targeted to comply with the values dictated by the WLA. Therefore, it is recommended the actual planned frequency of monitoring be used to determine the value of "n" for calculating the AML. However, in situations where monitoring frequency is once per month or less, a higher value for "n" must be assumed for AML derivation purposes. Thus, the statistical procedure being employed uses an assumed number of samples "n = 4".

WATER QUALITY STANDARD REVISION:
In accordance with section 644.058, RSMo, the Department is required to utilize an evaluation of the environmental and economic impacts of modifications to water quality standards of twenty-five percent or more when making individual site-specific permit decisions.

- ✓ This operating permit does not contain requirements for a water quality standard changing twenty-five percent or more since the previous operating permit.

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PART IV. EFFLUENT LIMITS DETERMINATIONS

OUTFALL #001 – SINGLE PASS COOLING WASTEWATER

EFFLUENT LIMITATIONS TABLE:

PARAMETERS	UNIT	DAILY MAX	MONTHLY AVG.	PREVIOUS PERMIT LIMITS	MINIMUM SAMPLING FREQUENCY	REPORTING FREQUENCY	SAMPLE TYPE
PHYSICAL							
FLOW, EFFLUENT (QE)	MGD	*	*	SAME	CONTINUOUS	MONTHLY	24 HR. TOT
FLOW, EFFLUENT (QE)	cfs	*	*	SAME	CONTINUOUS	MONTHLY	MEASURED
FLOW, STREAM (QS-QI)	cfs	*	*	SAME	CONTINUOUS	MONTHLY	CALC.
TEMPERATURE, EFFLUENT (TE)	°F	*	*	SAME	CONTINUOUS	MONTHLY	MEASURED
THERMAL DISCHARGE (TDP)	value	*	*	SAME	DAILY	MONTHLY	CALC.
TIME OF THERMAL VARIANCE USED	hours	-	TOTAL -	NEW	DAILY	MONTHLY	CALC.
TIME OF THERMAL VARIANCE USED	hours	-	528	NEW	RECORD	ANNUAL TOTAL	CALC.
MZ – NORMAL (M1)	%	*	*	NEW	DAILY-NORMAL	MONTHLY	CALC.
MZ – THERMAL VARIANCE (M1)	%	40	*	NEW	DAILY-VARIANCE	MONTHLY	CALC.
OTHER							
WET TEST - ACUTE	TUa	3.3	-	TUc	UNSCHEDULED	UNSCHEDULED	GRAB

PERMITTED FEATURE #010 –INTAKE TABLE:

PARAMETERS	UNIT	DAILY MAX	MONTHLY AVG.	PREVIOUS PERMIT LIMITS	MINIMUM SAMPLING FREQUENCY	REPORTING FREQUENCY	SAMPLE TYPE
PHYSICAL							
FLOW, INTAKE (QI)	MGD	*	*	SAME	CONTINUOUS	MONTHLY	24 HR. TOT
FLOW, INTAKE (QI)	cfs	*	*	SAME	CONTINUOUS	MONTHLY	MEASURED
FLOW, STREAM (QS)	cfs	*	*	SAME	CONTINUOUS	MONTHLY	MEASURED
TEMPERATURE, STREAM (TS)	°F	*	*	SAME	CONTINUOUS	MONTHLY	MEASURED

* monitoring and reporting requirement only
† report the minimum and maximum pH values; pH is not to be averaged
new parameter not established in previous state operating permit
TR total recoverable
calc calculation

DERIVATION AND DISCUSSION OF LIMITS:

PHYSICAL:

Flow
In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to ensure compliance with permitted effluent limitations. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the Department, which may require the submittal of an operating permit modification. The facility will report the total flow in millions of gallons per day (MGD) and cubic feet per second (cfs), continuous monitoring continued from previous permit.

Temperature
The facility has completed a complex model where the output is a derived unitless value, the Thermal Discharge Parameter (TDP). Thermal Discharge Parameter (TDP) is a derivation from site-specific model solutions of the thermal plume created by the discharge from outfall #001 into the Missouri River. TDP solution values represents a combination of stream flow, stream temperature, effluent flow, and effluent temperature, as defined by the equations below. Additionally, the facility completed an extensive thermal variance §316(a) study, see fact sheet Part II, THERMAL VARIANCE UNDER CWA §316(b) and Part III – WASTELOAD ALLOCATION WLA MODELING, and TECHNOLOGY BASED EFFLUENT LIMITS. The Clean Water Commission has granted the facility the requested §316(a) thermal variance because the §316(a) study supported a balanced and indigenous population therefore is allowing an exceedance over traditional mixing zone areas and temperature. When the receiving stream is

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87.0 °F or above or the stream flow is below 40,000 cfs, the 25% mixing area may be exceeded; never to exceed 40% of the river even under the §316(a) thermal variance. The equations each derivate the basis of the modeling program outputs and the facility shall use each equation when the corresponding conditions are met.

The numeric effluent limitation, 0.95, incorporates a five percent margin of safety to ensure compliance with the water quality standards for temperature, maximum of 90 °F and maximum change of 5 °F, at the edge of the traditional 25% thermal mixing zone. TDP shall be calculated using the equations in the permit and can be exceeded under the thermal variance. The facility will demonstrate compliance with the alternative numeric effluent limit on a daily basis.

The equations were slightly different than implemented in the last permit. The Kelinfelder §316(a) thermal variance permit modification request dated August 9, 2019, was determined to be included at the time of renewal. These updated values reflect the equation output updates for the model.

See additional information regarding reporting in the permit for outfall #001. Hourly measurements will be averaged and daily maximums and variance timing will be determined on an hourly basis.

This differs from the previous permit's interpretation of daily value, where the discussion in 40 CFR 122.2 indicates: "Daily discharge means the "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day." But, Missouri water quality standards for temperature indicate an onus of "shall not cause or contribute", and, in deriving criteria per 10 CSR 20-7.031(5)(S)5, the onus is "not to be exceeded", therefore an hourly determination of compliance is preferred.

OTHER:

Whole Effluent Toxicity (WET) Test

A WET test is a quantifiable method to determine conclusively if discharges from the facility cause toxicity to aquatic life by itself, in combination with, or through synergistic responses, when mixed with receiving stream water. Under the federal Clean Water Act (CWA) §101(a)(3), requiring WET testing is reasonably appropriate for site-specific Missouri State Operating Permits for discharges to waters of the state issued under the National Pollutant Discharge Elimination System (NPDES) to quantify toxicity. WET testing is also required by 40 CFR 122.44(d)(1). WET testing ensures the provisions in 10 CSR 20-6 and Missouri's Water Quality Standards in 10 CSR 20-7 are being met. Under 10 CSR 20-6.010(8)(A)4, the Department may require other terms and conditions it deems necessary to ensure compliance with the CWA and related regulations of the Missouri Clean Water Commission. Missouri Clean Water Law (MCWL) RSMo §644.051.3. requires the Department to set permit conditions complying with the MCWL and CWA. RSMo §644.051.4 specifically references toxicity as an item the Department must consider in permits (along with water quality-based effluent limits); and §644.051.5. is the basic authority to require testing conditions. WET tests are required by all facilities meeting the following criteria:

- ✓ Facility is a designated a Major
- ✓ The previous permit required chronic WET testing; however, the facility is required to test only when adding biocides. The application of biocides is an acute event therefore an acute test is warranted.
- ✓ Outfall #001 is not required to conduct regularly scheduled Whole Effluent Toxicity (WET) Testing. However, in the event the permittee determines they must use a molluscicide or other toxic pollutant(s) to remove organisms from intake structures, WET testing shall be conducted once per year as described in the terms and conditions for WET testing contained in Special Condition #1, of this operating permit.
- ✓ The same mixing considerations and limits are applied as derived from outfall #02B; these limits are protective and based on the receiving stream flow.
- ✓ Effluent limitations were deemed necessary because the facility has control of how molluscicides are used and discharged in the facility.

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OUTFALL #02A – DOMESTIC WASTEWATER

EFFLUENT LIMITATIONS TABLE:

PARAMETERS	UNIT	DAILY MAX	MONTHLY AVG.	PREVIOUS PERMIT LIMITS	MINIMUM SAMPLING FREQUENCY	REPORTING FREQUENCY	SAMPLE TYPE
PHYSICAL							
FLOW	MGD	*	*	SAME	ONCE/QUARTER	QUARTERLY	24 HR. TOT
CONVENTIONAL							
BOD_5	mg/L	45	30	SAME	ONCE/QUARTER	QUARTERLY	GRAB
E. COLI	#/100 mL	1030	206	SAME	ONCE/QUARTER	QUARTERLY	GRAB
pH †	SU	6.0 TO 9.0	6.0 TO 9.0	SAME	ONCE/QUARTER	QUARTERLY	GRAB
TOTAL SUSPENDED SOLIDS (TSS)	mg/L	45	30	SAME	ONCE/QUARTER	QUARTERLY	GRAB

* monitoring and reporting requirement only
‡ *E. coli*: final limitations and monitoring requirements are applicable only during the recreational season from April 1 through October 31. The Monthly Average Limit for *E. coli* is expressed as a geometric mean.
† report the minimum and maximum pH values; pH is not to be averaged

DERIVATION AND DISCUSSION OF LIMITS:

PHYSICAL:

Flow
In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to ensure compliance with permitted effluent limitations. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the Department, which may require the submittal of an operating permit modification. The facility will report the total flow in millions of gallons per day (MGD), quarterly monitoring continued from previous permit.

CONVENTIONAL:

Biochemical Oxygen Demand - 5 Day (BOD_5)
45 mg/L daily maximum, 30 mg/L monthly average; technology based limitation per 10 CSR 20-7.015(2), continued from previous permit.

Escherichia coli (E. coli)
WBC-B streams receive daily maximum limit of 1030 colony forming units per 100 mL [10 CSR 20-7.015(9)(B)1.E.] and a monthly geometric mean limit of 206 bacteria per 100 mL [10 CSR 20-7.031 Table A1] during the recreational season from April 1 through October 31 only [10 CSR 20-7.031(5)(C)], to protect Whole Body Contact (B) [10 CSR 20-7.031(C)2.A.(II)] designated use of the receiving stream.

An effluent limit for both daily maximum and monthly geometric mean is required by 40 CFR 122.45(d). The geometric mean is calculated by multiplying all of the data points and then taking the nth root of this product, where n = # of samples collected. For example: Five *E. coli* samples were collected with results of 1, 4, 5, 6, and 10 (#/100 mL). Geometric mean = 5th root of (1)(4)(5)(6)(10) = 5th root of 1,200 = 4.1 #/100 mL.

Design flow of the treatment plant is less than 100,000 gallons per day, thus the monitoring frequency is equal to the other parameters of once per quarter. Ameren installed ultraviolet disinfection to meet an SOC for *E. Coli* effluent limits in the previous permit; the UV system came online in second quarter 2017; at that time the facility notified the Department the *E. coli* limits could be met, the SOC was terminated, and final effluent limitations became effective immediately.

Oil & Grease
Monitoring and limits removed; see Part III ANTIBACKSLIDING.

pH
6.0 to 9.0 SU. Technology based limits [10 CSR 20-7.015(2)] are applicable to this outfall. The permit writer has determined there is no reasonable potential to affect water quality therefore technology limitations for wastewater are applied. pH is a fundamental water quality indicator. Additionally, metals leachability and ammonia availability in wastewater is dependent on pH.

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Total Suspended Solids (TSS)
45 mg/L daily maximum, 30 mg/L monthly average; technology based limitation per 10 CSR 20-7.015(2), continued from previous permit.

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OUTFALL #02B – LOW VOLUME WASTE TREATMENT SYSTEM (LVW)

EFFLUENT LIMITATIONS TABLE:

PARAMETERS	UNIT	DAILY MAX	MONTHLY AVG.	PREVIOUS PERMIT LIMITS	MINIMUM SAMPLING FREQUENCY	REPORTING FREQUENCY	SAMPLE TYPE
PHYSICAL							
FLOW	MGD	*	*	SAME	ONCE/WEEK	MONTHLY	24 HR. TOT
CONVENTIONAL							
COD	mg/L	*	*	SAME	ONCE/QUARTER	QUARTERLY	GRAB
OIL & GREASE	mg/L	15	10	NEW	ONCE/MONTH	MONTHLY	GRAB
pH †	SU	6.0 TO 9.0	6.0 to 9.0	SAME	ONCE/WEEK	MONTHLY	GRAB
TSS – GROSS	mg/L	*	*	SAME	ONCE/WEEK	MONTHLY	GRAB
TSS - NET	mg/L	100	30	SAME	ONCE/WEEK	MONTHLY	GRAB
METALS							
BORON, TR	µg/L	*	*	SAME	ONCE/QUARTER	QUARTERLY	GRAB
NUTRIENTS							
AMMONIA AS N	mg/L	*	*	NEW	ONCE/MONTH	MONTHLY	GRAB
KJELDAHL NITROGEN, TOTAL	mg/L	*	*	NEW	ONCE/MONTH	MONTHLY	GRAB
NITRATE PLUS NITRITE AS N	mg/L	*	*	NEW	ONCE/MONTH	MONTHLY	GRAB
PHOSPHORUS, TOTAL (TP)	mg/L	*	*	QUARTERLY	ONCE/MONTH	MONTHLY	GRAB
OTHER							
CHLORIDE	mg/L	*	*	SAME	ONCE/QUARTER	QUARTERLY	GRAB
SULFATE	mg/L	*	*	SAME	ONCE/QUARTER	QUARTERLY	GRAB
CHLORIDE PLUS SULFATE	mg/L	*	*	SAME	ONCE/QUARTER	QUARTERLY	GRAB
WET TEST - ACUTE	TUa	3.3	-	* TUc	ONCE/YEAR	ANNUALLY	GRAB

PERMITTED FEATURE #010 –INTAKE TABLE:

PARAMETERS	UNIT	DAILY MAX	MONTHLY AVG.	PREVIOUS PERMIT LIMITS	MINIMUM SAMPLING FREQUENCY	REPORTING FREQUENCY	SAMPLE TYPE
CONVENTIONAL							
TOTAL SUSPENDED SOLIDS (TSS)	mg/L	*	*	SAME	WEEKLY	MONTHLY	GRAB

* monitoring and reporting requirement only
† report the minimum and maximum pH values; pH is not to be averaged
new parameter not established in previous state operating permit
interim parameter requirements prior to end of SOC
final parameter requirements at end of SOC
TR total recoverable

DERIVATION AND DISCUSSION OF LIMITS:

Requirements below are based on former outfall #002 data, this outfall's data, and previous sampling conditions because outfall #002 is no longer represented in this permit.

PHYSICAL:

Flow

In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to ensure compliance with permitted effluent limitations. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the Department, which may require the submittal of an operating permit modification. The facility will report the total flow in millions of gallons per day (MGD), weekly monitoring continued from previous permit.

CONVENTIONAL:

Chemical Oxygen Demand (COD)

Previous permit required monitoring at outfall #002. Data reported were from 4 to 32 mg/L. COD is a valuable indicator parameter. COD monitoring allows the permittee to identify increases materials or chemicals in the wastewater, which may indicate a need for maintenance or improvement of BMPs. Quarterly monitoring continued from previous permit.

Oil & Grease
15 mg/L daily maximum; 10 mg/L monthly average. Oil and grease is considered a conventional pollutant. Oil and grease is a comprehensive test which measures for gasoline, diesel, crude oil, creosote, kerosene, heating oils, heavy fuel oils, lubricating oils, waxes, and some asphalt and pitch. The test can also detect some volatile organics such as benzene, toluene, ethylbenzene, or xylene, but these constituents are often lost during testing due to their boiling points. The facility reported from non-detect to 15 mg/L. The permit writer completed an RPD on this parameter and found RP due to values reported on DMRs by the facility to the Department. Limits are retained to comply with antibacksliding regulations and RP determination. Additionally, 40 CFR 423 indicates oil and grease is a categorical standard which must be met; categorical limits are 20 mg/L daily maximum, 15 mg/L monthly average; WQS are more stringent than the TBEL therefore WQS will be used. Oils and greases of different densities will possibly form sheen or unsightly bottom deposits at levels which vary from 10 mg/L. To protect the general criteria, it is the responsibility of the permittee to visually observe the discharge and receiving waters for sheen or bottom deposits. Weekly monitoring at outfall #02B and monthly monitoring at outfall #002 was established in the previous permit. Given the waste type as low volume wastewater sources not typically having oil and grease, and generally non-detections of this parameter, monthly monitoring is retained. The facility is continued to be prohibited for releasing wastewater which has sheen in violation of the general water quality criteria per 10 CSR 20-7.031(4) and all discharges should be observed for such sheens.
AQL Chronic: 10 mg/L per 10 CSR 20-7.031 Table A1
Set chronic standard equal to chronic WLA per TSD §5.4.2 (EPA/505/2-90-001); multiply by 1.5 to obtain acute limit.
10 mg/L * 1.5 = 15 mg/L

pH
6.0 to 9.0 SU. Technology based limits [10 CSR 20-7.015(9)(I)1. and 40 CFR 423.15(b)(1)] are applicable to this outfall. The permit writer has determined there is no reasonable potential to affect water quality therefore technology limitations for wastewater are applied. pH is a fundamental water quality indicator. Additionally, metals leachability and ammonia availability in wastewater is dependent on pH.

Total Suspended Solids (TSS)
Net limits 100 mg/L daily maximum and 30 mg/L monthly average per 40 CFR 423.15(b)(3) NSPS. Net limits allowed per 40 CFR 122.45(g). There are no water quality standards established for this parameter in 10 CSR 20-7.031. However, general criteria established at 10 CSR 20-7.015(4)(C) states discharges must not cause unsightly turbidity. This discharge enters the Missouri River, a river known for natural turbidity. Past influent data show TSS ranging from 28 to 1760 mg/L, average 551 mg/L. Given the influent data, the effluent limitations established in the previous permit (and continued in this permit) are protective of the quality of water in the Missouri River; WQ based limits would be less stringent therefore are not implemented. The facility will continue to report the stream TSS by measuring the intake water at permitted feature #010. The facility will report the gross TSS discharges from outfall #02B. Net limits will be calculated using the below equations:

Flow ratio is determined as: flow in cfs of (#02B cfs – #02A cfs) / #02B cfs = X
Raw net TSS is "#010 TSS" – "#02B TSS" = Y.
Net TSS is X * Y

METALS:
Effluent limitations for total recoverable metals were developed using methods and procedures outlined in the *Technical Support Document For Water Quality-based Toxic Controls* (EPA/505/2-90-001) and *The Metals Translator: Guidance For Calculating a Total Recoverable Permit Limit From a Dissolved Criterion* (EPA 823-B-96-007). "Aquatic Life Protection" in 10 CSR 20-7.031 Tables A1 and A2, as well as general criteria protections in 10 CSR 20-7.031(4) apply to this discharge. The hardness value used for hardness-dependent metals calculations was based on the intake's 50th percentile, also known as the median per 10 CSR 20-7.015(1)(CC), and is reported in the calculations below. Per a memorandum dated August 6, 2019, the Director has determined permit writers should use the median of the Level III Ecoregion to calculate permit limits, or site specific data if applicable. Additional use criterion (HHP, DWS, GRW, IRR, or LWW) may also be used, as applicable, to determine the most protective effluent limit for the receiving waterbody's class and uses. The 50th percentile of the intake is: 221.6 mg/L hardness, however, no metals in this outfall require hardness calculations.

Boron, Total Recoverable
Monitoring only, continued from the previous permit. The facility reported between 280 and 1499 µg/L for this parameter; this parameter does not have RP for WQS for IRR; see fact sheet Part III, REASONABLE POTENTIAL. Boron is a known pollutant of concern for ash wastes. While the ash ponds are capped, the facility continues to discharge low volume wastewater which includes ash quench water. This waste source must, with each permit renewal, be reviewed for compliance with any site specific

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TBELs for baseline x10 pollutants. Because of the variable nature of this pollutant, long term averages are appropriate to use for determining if it is a pollutant of concern. A singular data point is less valid statistically than many data points.

NUTRIENTS:

Ammonia, Total as Nitrogen
Nitrogen is expected to be present in this outfall's discharge based on sampling submitted for renewal purposes, therefore monthly monitoring is required per 10 CSR 20-7.015(9)(D)8.B.

Kjeldahl Nitrogen, Total (TKN)
Nitrogen is expected to be present in this outfall's discharge based on sampling submitted for renewal purposes, therefore monthly monitoring is required per 10 CSR 20-7.015(9)(D)8.B.

Nitrate plus Nitrite
Nitrogen is expected to be present in this outfall's discharge based on sampling submitted for renewal purposes, therefore monthly monitoring is required per 10 CSR 20-7.015(9)(D)8.B.

Phosphorus, Total P (TP)
Phosphorus is expected to be present in this outfall's discharge based on sampling submitted for renewal purposes, therefore monthly monitoring is required per 10 CSR 20-7.015(9)(D)8.B.

OTHER:

Chloride
Monitoring only, continued from the previous permit. Monitoring throughout the last permit term showed data from 11.1 to 32.7 mg/L. Monitoring is continued to calculate the chloride plus sulfate parameter below. There are water quality standards for chloride alone, however this parameter does not have reasonable potential.

Sulfate
Monitoring only, continued from the previous permit. Sulfate is a known pollutant of concern in coal ash wastewater. Monitoring is continued to calculate chloride plus sulfate below. Data range from 113 to 362.4 mg/L; water quality standards for drinking water exist; however, there is no reasonable potential because this parameter also receives mixing.

Chloride Plus Sulfate
Monitoring only, continued from the previous permit. Previous permit required sampling and reporting chloride, sulfate, and chloride plus sulfate without limitations. A review of the data did not find reasonable potential for this parameter to cause or contribute to instream toxicity. However, sulfate is a known pollutant of concern for coal ash residuals. Monitoring is required to be continued to determine effectiveness of low volume waste treatment system.

Whole Effluent Toxicity (WET) Test
A WET test is a quantifiable method to determine conclusively if discharges from the facility cause toxicity to aquatic life by itself, in combination with, or through synergistic responses, when mixed with receiving stream water. Under the federal Clean Water Act (CWA) §101(a)(3), requiring WET testing is reasonably appropriate for site-specific Missouri State Operating Permits for discharges to waters of the state issued under the National Pollutant Discharge Elimination System (NPDES) to quantify toxicity. WET testing is also required by 40 CFR 122.44(d)(1). WET testing ensures the provisions in 10 CSR 20-6 and Missouri's Water Quality Standards in 10 CSR 20-7 are being met. Under 10 CSR 20-6.010(8)(A)4, the Department may require other terms and conditions it deems necessary to ensure compliance with the CWA and related regulations of the Missouri Clean Water Commission. Missouri Clean Water Law (MCWL) RSMo §644.051.3. requires the Department to set permit conditions complying with the MCWL and CWA. RSMo §644.051.4 specifically references toxicity as an item the Department must consider in permits (along with water quality-based effluent limits); and §644.051.5. is the basic authority to require testing conditions. WET tests are required by all facilities meeting the following criteria:

- ✓ Facility is a designated a Major
- ✓ Other: outfall will continued to be assessed for toxicity; although none has been demonstrated in the past, effluent limitations are
- ✓ Annual testing is the minimum testing frequency; monitoring requirements promulgated in 40 CFR 122.44(i)(2) state "requirements to report monitoring results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge, but in no case less than once per year."

WET, Acute
3.3 TUa daily maximum. Effluent limitations for this parameter are required to conform to antibacksliding regulations and to assure non-toxic effluent.

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WQS: no toxics in toxic amounts [10 CSR 20-7.031(4)(J)2.B.] = 0.3 TUa
Acute AQL: 0.3 TUa
The AEC is (8.20031158 CFSdf / (8690 CFSzid +8.20031158 CFSdf)) = 9.1%
Acute WLA: Ce = ((8.20031158 cfsDF + 82.0031158 cfsZID) * 0.3 – (82.003 cfsZID * 0 background)) / 8.20031158 cfsDF = 3.3
LTAa: WLAa * LTAa multiplier = 3.3 * 0.321 = 1.06 [CV: 0.6, 99th %ile]
Daily Maximum: MDL = LTA * MDL multiplier = 1.06 * 3.114 = 3.3 TUa [CV: 0.6, 99th %ile]

For classified permanent streams the allowable effluent concentration (AEC)% is determined to be 9.09%. 10 CSR 20-7.015((9)(L)4.A. states the dilution series must be proportional. Each dilution was determined by multiplying or dividing 2 from the AEC and then each consecutive value. The dilution series is rounded to: 2.25%, 4.5%, 9%, 18%, and 36%.

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PERMITTED FEATURE #02C – WEST DETENTION BASIN NO-DISCHARGE WASTEWATER STRUCTURE

EFFLUENT LIMITATIONS TABLE:

PARAMETERS	UNIT	DAILY MINIMUM	MONTHLY AVERAGE MAX	PREVIOUS PERMIT LIMITS	MINIMUM SAMPLING FREQUENCY	MINIMUM REPORTING FREQUENCY	SAMPLE TYPE
PHYSICAL							
FREEBOARD	FEET	2.0		NEW	ONCE MONTH	MONTHLY	MEASUREMENT

DERIVATION AND DISCUSSION OF LIMITS:
Under normal operations the wastewater receives treatment in the low volume waste basin and is discharges through outfall #02B.

PHYSICAL:

Freeboard
Monthly monitoring of the freeboard in the basin is required to ensure proper operational controls. This permitted feature was listed as no-discharge from this outfall. As such, an antidegradation review was not conducted and discharge authorization has not been granted. To ensure the basin remains no-discharge, comply with all BMPs listed, monitor freeboard/liquid levels, and report highest reading monthly. Permits only authorize discharges after the permittee has documented compliance with state and federal Clean Water laws and regulations, including antidegradation and construction requirements. Freeboard is the distance between the top of the liquid level and the bottom of the discharge pipe or canal. Freeboard should be measured to the nearest inch.

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STORMWATER OUTFALLS:

EFFLUENT LIMITATIONS TABLE:

PARAMETERS	UNIT	DAILY MAXIMUM LIMIT	BENCH-MARK	PREVIOUS PERMIT LIMITS	MINIMUM SAMPLING FREQUENCY	REPORTING FREQUENCY	SAMPLE TYPE
PHYSICAL							
FLOW	MGD	*	-	SAME	⁂	⁂	24 HR. ESTIMATE
CONVENTIONAL							
COD	mg/L	**	90	SAME	⁂	⁂	GRAB
OIL & GREASE	mg/L	**	10	SAME	⁂	⁂	GRAB
pH †	SU	**	6.5 to 9.0	SAME	⁂	⁂	GRAB
TSS	mg/L	**	100	NEW	⁂	⁂	GRAB

* monitoring and reporting requirement only
** monitoring with associated benchmark
† report the minimum and maximum pH values; pH is not to be averaged
new parameter not established in previous state operating permit
⁂ Sampling and reporting frequency based on BMPs installed and area's potential for contaminated discharge to a receiving stream. Areas with grass or vegetation received less frequent monitoring requirements. Regardless of sampling regime, the facility must continue to observe the areas for contaminant discharge or BMP status.

DERIVATION AND DISCUSSION OF LIMITS:

PHYSICAL:

Flow
In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to ensure compliance with permitted effluent limitations. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the Department, which may require the submittal of an operating permit modification. The facility will report the total flow in millions of gallons per day (MGD), quarterly monitoring continued from previous permit.

CONVENTIONAL:

Chemical Oxygen Demand (COD)
Monitoring with 90 mg/L daily maximum benchmark included using the permit writer's best professional judgment; continued from previous permit. There is no numeric water quality standard for COD; however, increased oxygen demand may impact instream water quality. COD is also a valuable indicator parameter. COD monitoring allows the permittee to identify increases in COD may indicate materials/chemicals coming into contact with stormwater causing an increase in oxygen demand. Increases in COD may indicate a need for maintenance or improvement of BMPs. The benchmark value falls within the range of values implemented in other permits having similar industrial activities and is achievable through proper BMP controls. The facility reported from 1 to 9500 mg/L for this parameter; 14 values were above 90 mg/L, most values were below the 90 mg/L established, and 90 mg/L is retained.

Oil & Grease
Monitoring with a daily maximum benchmark of 10 mg/L, continued from previous permit as a known possible pollutant of concern in stormwater at power plants. Oil and grease is considered a conventional pollutant. Oil and grease is a comprehensive test which measures for gasoline, diesel, crude oil, creosote, kerosene, heating oils, heavy fuel oils, lubricating oils, waxes, and some asphalt and pitch. The test can also detect some volatile organics such as benzene, toluene, ethylbenzene, or xylene, but these constituents are often lost during testing due to their boiling points. It is recommended to perform separate testing for these constituents if they are a known pollutant of concern at the site, i.e. aquatic life toxicity or human health is a concern. Results do not allow for separation of specific pollutants within the test, they are reported, totaled, as "oil and grease". Per 10 CSR 20-7.031 Table A1: *Criteria for Designated Uses*; 10 mg/L is the standard for protection of aquatic life. This standard will also be used to protect the general criteria found at 10 CSR 20-7.031(4). Ten mg/L is the level at which sheen is expected to form on receiving waters. Oils and greases of different densities will possibly form sheen or unsightly bottom deposits at levels which vary from 10 mg/L. To protect the general criteria, it is the responsibility of the permittee to visually observe the discharge and receiving waters for sheen or bottom deposits. The benchmark is achievable through proper operational and maintenance of BMPs and falls within the range of values implemented in other permits having similar industrial activities.

pH

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A benchmark of 6.5 to 9.0 SU continued from the previous permit. pH is a fundamental water quality indicator. Drastic changes in pH could indicate non-stormwater discharges are being discharged through stormwater outfalls or BMP failure.

Total Suspended Solids (TSS)

Monitoring with a daily maximum benchmark of 100 mg/L is implemented in place of settleable solids; see ANTIBACKSLIDING section in Part III of the fact sheet. There is no numeric water quality standard for TSS; however, sediment discharges can negatively impact aquatic life habitat. TSS is also a valuable indicator parameter. TSS monitoring allows the permittee to identify increases in TSS indicating uncontrolled materials leaving the site. Increased suspended solids in runoff can lead to decreased available oxygen for aquatic life and an increase of surface water temperatures in a receiving stream. Suspended solids can also be carriers of toxins, which can adsorb to the suspended particles; therefore, total suspended solids are a valuable indicator parameter for other pollution. The benchmark is achievable through proper operational and maintenance of BMPs and falls within the range of values implemented in other permits having similar industrial activities. In the application for renewal, the facility reported from 2 to 61 mg/L for TSS at the stormwater outfalls.

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PART V. ADMINISTRATIVE REQUIREMENTS

On the basis of preliminary staff review and the application of applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the operating permit. The proposed determinations are tentative pending public comment.

PERMIT SYNCHRONIZATION:
The Department of Natural Resources is currently undergoing a synchronization process for operating permits. Permits are normally issued on a five-year term, but to achieve synchronization many permits will need to be issued for less than the full five years allowed by regulation. The intent is all permits within a watershed will move through the Watershed Based Management (WBM) cycle together will all expire in the same fiscal year. [HYPERLINK "http://dnr.mo.gov/env/wpp/cpp/docs/watershed-based-management.pdf"]. This will allow further streamlining by placing multiple permits within a smaller geographic area on public notice simultaneously, thereby reducing repeated administrative efforts. This will also allow the Department to explore a watershed based permitting effort at some point in the future. Renewal applications must continue to be submitted within 180 days of expiration, however, in instances where effluent data from the previous renewal is less than two years old, such data may be re-submitted to meet the requirements of the renewal application. If the permit provides a schedule of compliance for meeting new water quality based effluent limits beyond the expiration date of the permit, the time remaining in the schedule of compliance will be allotted in the renewed permit.

- ✓ This permit will expire in 5 years; application requirements necessitate a full 5 years for gathering all information required to be submitted 180 days prior to permit expiration.

PUBLIC NOTICE:
The Department shall give public notice a draft permit has been prepared and its issuance is pending. [HYPERLINK "http://dnr.mo.gov/env/wpp/permits/pn/index.html"]. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest in or with water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and permittee must be notified of the denial in writing.

The Department must issue public notice of a pending operating permit or of a new or reissued statewide general permit. The public comment period is the length of time not less than 30 days following the date of the public notice which interested persons may submit written comments about the proposed permit.

For persons wanting to submit comments regarding this proposed operating permit, then please refer to the Public Notice page located at the front of this draft operating permit. The Public Notice page gives direction on how and where to submit appropriate comments.

- ✓ The Public Notice period for this operating permit is tentatively scheduled to begin in April 2021.

DATE OF FACT SHEET: SEPTEMBER 29, 2020
COMPLETED BY:
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