MUNICIPAL FACILITY FACT SHEET

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT TO DISCHARGE TREATED WASTEWATER
TO WATERS OF THE UNITED STATES

Permit No.: MS0053503 Last Updated: March 18, 2025

1. Summary of Permit Changes

A. Due to reasonable potential found, monthly average and daily maximum total recoverable zinc limits have been added.

B. Decrease in static monthly average and daily maximum copper limits due to change in reported hardness and decrease in total suspended solids in effluent.

C. Instream (downstream and upstream) monitoring requirements have been added for total nitrogen and total phosphorus. This was done to provide additional site-specific data.

D. Changed the time for instream sampling from 6 p.m. – 6 a.m. to 6 a.m. – 12 p.m.

E. Implementation of the optimization strategies identified in the 2014 Energy Conservation Study have been added. Data gathered through various trials of identified optimization techniques will be used in conjunction with gathered site-specific instream data to build a more representative dynamic WASP model to determine the impact of the discharger on the downstream waterbodies. Interim reporting is being required both at 24 and 36 months from the effective date of the permit. Conclusions of implementation of optimization recommendations are required within 48 months of the effective date of the permit and a final report is due by the time of permit renewal.

2. Facility Information

A. Name and Address of Permittee: Mississippi Band of Choctaw Indians
Post Office Box 6366
Choctaw, Mississippi 39350

B. Facility Address: Pearl River Wastewater Treatment Facility
168 James Billie Road
Philadelphia, Mississippi 39350

C. Type of Facility: Municipal Wastewater Treatment Plant
Publicly-Owned Treatment Works (POTW)
Standard Industrial Classification Code: 4952

D.

E. Location and Description of the discharge (as reported by applicant):

Outfall	Latitude	Longitude	Receiving Waterbody	Watershed
001	32°47'20.21" N	89°11'51.19" W	Wolf Creek to Kentawka Canal to Pearl River	Upper Pearl Basin HUC 03180001

F. Permitted Capacity: 1.5 MGD

G. Description of Wastewater Treatment Facility:

Outfall	Operation Description	Treatment Description
001	Sanitary Wastewater	Treatment consists of physical treatment with influent screening, followed by biological treatment with aeration and clarification. Sludge is to pass through an aerobic digester and a belt press before disposal. Before discharge, the effluent undergoes UV disinfection and passes through a post-treatment aeration chamber. Facility anticipates undergoing upgrades and repairs during this permit cycle. The upgrades and repairs are not anticipated to include a change in the treatment process. Population served is approximately 17,750.

H. Type of Wastewater Discharge:

☐ Process Wastewater ☐ Stormwater
☒ Domestic Wastewater ☐ Combined (describe)
☐ Other (describe)

I. Characterization of Effluent

Outfall No. 001 (Summary of DMR data from reports 7/1/2019-8/31/2023; See Appendix 2)

Effluent Characteristic	Minimum Reported Value	Average of Reported Monthly Average Values	Maximum Reported Value
Flow (MGD)	---	0.75	1.17
Carbonaceous Biochemical Oxygen Demand, 5-day ($CBOD_5$), mg/l (lbs/day)	---	2.00 (14.87)	15.80 (119.50)
$CBOD_5$ Percent Removal, %	82.5%	95.5%	---
Total Suspended Solids (TSS), mg/l (lbs/day)	---	4.69 (29.78)	41 (290)
TSS Percent Removal, %	71.0%	93.8%	---
E.coli, #/100ml	---	158.78	2420
pH	5.70	---	8.50

Total Ammonia as Nitrogen, mg/l (lbs/day)	---	0.37 (2.60)	10.8 (79.10)
Dissolved Oxygen (DO), mg/l	6.30	7.77	---
Total Nitrogen as Nitrogen, mg/l	---	4.49	11.5
Total Phosphorous as Phosphorous, mg/l	---	0.85	2.41
Total Recoverable Copper, µg/l	---	8.99	23.9
Total Hardness, mg/l of $CaCO_3$	44.8	60.16	97.00

3. Water Quality Standards & Receiving Waterbody Information

A. Receiving Waterbody Classification and Information – The Mississippi Band of Choctaw Indians (MBCI) has not promulgated their own Water Quality Standards, therefore there are no Water Quality Standards applicable to the Tribal waters at this time. The State/Tribal Boundary is located downstream of the outfall within Wolf Creek prior to its confluence with Kentawka Canal. Kentawka Canal and Pearl River cross over the State/Tribal Boundary multiple times before finally ending up in the State of Mississippi. The EPA used Mississippi Water Quality Standards (11 Miss. Admin. Code Pt 6 Ch. 2, Rule 2.4) to determine reasonable potential at the State/Tribal Boundary and for state waters. Wolf Creek, Kentawka Canal, and Pearl River have a designated use of Fish and Wildlife in the State of Mississippi. This permit is protective of designated uses of downstream state waters in the State of Mississippi.

B. Specific Water Quality Criteria for Classified Water Usage

The following are the most protective of criteria within the following applicable use classifications: Mississippi Fish and Wildlife use:

i. pH: The normal pH of the waters shall be 6.0 to 9.0. The discharge of waters or wastewaters shall not cause the pH to vary more than 1.0 unit within this range, nor be less than 6.0, nor be greater than 9.0.

ii. Water Temperature: The maximum water temperature increase above natural temperatures shall not exceed 5 °F (2.8 °C) in streams, lakes, and reservoirs nor shall the maximum water temperature exceed 90 °F (32.2 °C)

iii. Specific Conductance: There shall be no substances added to increase the conductivity above 1000 microhms/cm for freshwater streams.

iv. Dissolved Solids: There shall be no substances added to the waters to cause the dissolved solids to exceed 750 mg/l as a monthly average value, nor exceed 1500 mg/l at any time for freshwater streams.

v. Ammonia (toxicity): Ammonia toxicity shall be evaluated according to the EPA guidelines published in *1999 Update of Ambient Water Quality Criteria for Ammonia;* the EPA document number EPA-822-R-99-014 or *Ambient Water Quality Criteria for Ammonia (Saltwater) – 1989*; the EPA document number 440/5-88-004, and any subsequent amendments and additions.

vi. Dissolved Oxygen: Dissolved oxygen concentrations shall be maintained at a daily average of no less than 5.0 mg/l with an instantaneous minimum of not less than 4.0 mg/l.

vii. Bacteria: Culturable escherichia coli shall not exceed a geometric mean of 126 per 100 mL over a 30-day period, nor shall the samples examined during a 30-day period exceed 410 per 100 mL more than 10% of the time.

viii. Nutrients: Waters shall be free from materials attributable to municipal, industrial, agricultural, or other dischargers producing color, odor, taste, total suspended or dissolved solids, sediment, turbidity, or other conditions, in such degree as to create a nuisance, render the waters injurious to public health, recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated uses.

ix. Toxicants

a. Narrative:

1. Municipal wastes, industrial wastes, or other wastes shall receive effective treatment or control in accordance with Section 301, 306, and 307 of the Federal Clean Water Act. A degree of treatment greater than defined in these sections may be required when necessary to protect legitimate water uses.

2. Aquatic Life Criteria: The concentration of toxic substances in State waters shall not result in chronic or acute toxicity or impairment of the uses of aquatic life. Toxicity concentrations in State waters in excess of these values shown in Table 2 will be assessed to determine chronic or acute toxicity, and/or the impairment of the uses of aquatic life. Chronic and/or acute toxicity will be determined in accordance with the *Water Quality Standards Handbook: Second Edition* (EPA-823-B-94-005a, August 1994) and *Technical Support Document for Water Quality-Based Toxics Control* (EPA-505/2-90-001, March 1991). Regardless of the results of chronic or acute toxicity bioassay surveys, the concentrations of toxic substances shall not exceed the chronic or acute values, except as provided for in Rules 2.2.F.5(a) and 2.2.F.5(b) for establishing alternative criteria. *Part 6: Chapter 2: Mississippi Commission on Environmental Quality Regulations for Water Quality Criteria for Intrastate, Interstate, And Coastal Waters: Table 2 (February 25, 2016).*

3. Human Health Criteria: The concentration of toxic substances shall not exceed the level necessary to protect human health through exposure routes of fish (and shellfish) tissue consumption, water consumption, or other routes identified as appropriate for the water body.

b. Numerics: Numeric criteria for all waters are established herein for certain toxic pollutants for which the EPA has published national criteria for the protection of aquatic life and human health pursuant to Section 304(a) of the Federal Clean Water Act in addition to chlorine and ammonia. The pollutants are listed in Table 2 and are expressed as the dissolved phase of the parameter. *Part 6: Chapter 2: Mississippi Commission on*

Environmental Quality Regulations for Water Quality Criteria For Intrastate, Interstate, And Coastal Waters: Table 2 (February 25, 2016).

x. "Free-Froms"

a. Waters shall be free from substances attributable to municipal, industrial, agricultural, or other discharges that will settle to form putrescent or otherwise objectionable sludge deposits.

b. Waters shall be free from floating debris, oil, scum, and other floating materials attributable to municipal, industrial, agricultural, or other discharges in amounts sufficient to be unsightly or deleterious.

c. Waters shall be free from materials attributable to municipal, industrial, agricultural, or other discharges producing color, odor, taste, total suspended or dissolved solids, sediment, turbidity, or other conditions in such degree as to create a nuisance, render the waters injurious to public health, recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated use. Except as prohibited in Rule 2.1.H. above, the turbidity outside the limits of a 750- foot mixing zone shall not exceed the background turbidity at the time of discharge by more than 50 Nephelometric Turbidity Units (NTU). Exemptions to the turbidity standard may be granted under the following circumstances:

(1) in cases of emergency to protect the public health and welfare
(2) for environmental restoration projects which will result in reasonable and temporary deviations and which have been reviewed and approved by the Mississippi Department of Environmental Quality (MDEQ).

d. Waters shall be free from substances attributable to municipal, industrial, agricultural, or other discharges in concentrations or combinations that are toxic or harmful to humans, animals, or aquatic life.

C. Critical Flows – Due to limited flow gage data in the receiving waterbody, conservative assumptions were made regarding critical flows as follows:

Wolf Creek: 7Q10 = 0 cfs

D. 303(d) Status – Wolf Creek, Kentawka Canal, and the receiving segment of the Pearl River have not been assessed for water quality by the MBCI, nor are they listed as impaired on the State of Mississippi 2024 303(d) List.

E. Total Maximum Daily Loads – TMDLs exist in the Pearl River for mercury, nutrients, sediment, DDT, and toxaphene, but none list Pearl River WWTF as a point source. Pearl River WWTF effluent is not an expected source of DDT, toxaphene, or mercury, nor is it expected to cause or contribute to a sediment impairment. MDEQ approved the *TMDL for Total Nitrogen and Total Phosphorus for the Pearl River* in 2009. Discharges from Tribal lands, including from the Pearl River WWTF, were not included in the TMDL as a source of total nitrogen or total phosphorus. This permit includes total nitrogen and total phosphorous monitoring requirements.

4. Effluent Limits and Permit Conditions

A. Proposed Effluent Limitations

PARAMETERS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	Daily Min	Monthly Avg	Weekly Avg	Daily Max	Sampling Location	Measurement Frequency	Sample Type
Flow, MGD	---	Report	Report	---	Effluent	Continuous	Recorder
Dissolved Oxygen (DO), mg/l	6.0	---	---	---	Effluent	1/Week	Grab
Carbonaceous Biochemical Oxygen Demand 5-Day ($CBOD_5$), mg/l (lbs/day)	--- ---	Report 10.0 (34.2)	--- 15.0 (51.3)	--- ---	Influent Effluent	1/Week	24-hour Composite 24-hour Composite
Carbonaceous Biochemical Oxygen Demand 5-Day ($CBOD_5$) Percent Removal, %	85%[a]				Influent/Effluent	1/Month	Calculated
Total Suspended Solids (TSS), mg/l (lbs/day)	--- ---	Report 30.0 (375)	--- 45.0 (563)	--- ---	Influent Effluent	1/Week	24-hour Composite 24-Hour Composite
Total Suspended Solids (TSS) Percent Removal, %	85%[a]				Influent/Effluent	1/Month	Calculated
Total Ammonia as Nitrogen, mg/l (lbs/day)	---	2.0 (25.0)	3.0 (37.5)	---	Effluent	1/Week	24-hour Composite
pH, standard units (SU)	6.5	---	---	9.0	Effluent	1/Week	Grab
E. coli, #/100 ml		126[b]	---	410	Effluent	1/Week	Grab
Total Recoverable Copper, µg/l	---	14.81	---	21.26	Effluent	1/Month	Grab
Total Recoverable Zinc, mg/l	---	0.225	---	0.227	Effluent	1/Month	Grab
Total Hardness as $CaCO_3$, mg/l	Report	Report	---	---	Effluent	1/Month See I.A.8 in Permit	Grab

PARAMETERS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	Daily Min	Monthly Avg	Weekly Avg	Daily Max	Sampling Location	Measurement Frequency	Sample Type
Total Nitrogen (TN) as Nitrogen, mg/l	---	Report	Report	---	Effluent	Quarterly	Grab
Total Phosphorus, (TP) as Phosphorous, mg/l	---	Report	Report	---	Effluent	Quarterly	Grab
Chronic Whole Effluent Toxicity, IC_{25}	See I.A.7				Effluent	See Part IV in Permit	
In-stream monitoring	---	---	---	---	Upstream/ downstream	See I.A.9 and I.A.10 in Permit	Grab

[a] Each month, the average of the monthly average effluent $CBOD_5$ and TSS concentrations shall not exceed 15% of the average of their respective influent concentration values (85% removal). The percent removal shall be reported on the Discharge Monitoring Report (DMR) form (EPA No. 3320-1).

[b] The geometric mean of the e. coli values collected during any monthly period shall not exceed 126 colonies per 100 ml of effluent sample and shall be reported as the monthly average value on the DMR Form.

B. Reasonable Potential Analysis (RPA)

Title 40 of the Federal Code of Regulations, 40 CFR 122.44(d) requires NPDES permit issuing authorities to develop procedures for determining whether a discharge causes, has the reasonable potential to cause, or contributes to an instream excursion above a narrative or numeric criterion. If such reasonable potential is determined to exist, the NPDES permit must contain pollutant effluent limits and/or effluent limits for whole effluent toxicity. The EPA's reasonable potential analysis is based on guidelines provided in "U.S. EPA NPDES Permit Writer's Manual (2010)" and its references. Reasonable potential analysis was performed using data reported on Part D of Application Form 2A and facility DMR data from July 31, 2019 thru December 31, 2023. All Part D pollutants were found to be below detection except for copper and zinc. The results of the reasonable potential analysis indicated the need for copper and zinc limits in the permit resulting in monthly average and daily maximum limits being included in the permit. Additional information on the process and results of the reasonable potential analysis can be found in Appendix 3.

C. Total Nitrogen and Total Phosphorus

To protect and maintain waters of the State, consideration must be given to control nutrients reaching Mississippi's waterways. Excessive nutrient concentrations in a river can produce an overabundance of algae that create eutrophic conditions. There are no numeric water quality criteria for Total Phosphorus (TP) and Total Nitrogen (TN) in MS and the MBCI

has not promulgated their own water quality standards. Therefore, EPA interpreted MDEQ's narrative nutrient criteria that is applicable to all waterbodies to assess for reasonable potential for TN and TP.

Interpretation of MDEQ Narrative Nutrient Criteria

Where a State or Tribe has not established a numeric water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion, the permitting authority must establish effluent limits using one or more of the options provided in 40 CFR 122.44(d)(1)(vi).

EPA has interpreted the State of Mississippi's narrative criterion, which states that "waters shall be free from materials attributable to municipal, industrial, agricultural, or other discharges in concentrations or combinations that are toxic or harmful to humans, animals, or aquatic life." (11 Miss. Admin. Code Pt 6 Ch. 2, Rule 2.2(A)(4))

To interpret Mississippi's narrative nutrient criteria, EPA compared approved ecoregion TN and TP concentrations with target values used in the EPA approved Pearl River TMDL.

Various Reference Nutrient Concentrations for Rivers and Streams				
Parameter	**EPA Ecoregion IX Subecoregion 65**	**EPA Ecoregion IX**	**State of Florida Panhandle (West)**	**Pearl River TMDL targets for Ecoregion 65**
Total Nitrogen (mg/L)	0.395 – 0.618	0.69	0.67	0.7
Total Phosphorus (mg/L)	0.0225	36.56 (ug/L)	0.06	0.1

Due to the proximity of the discharge to the Pearl River, it was determined that use of the target values identified by MDEQ within the TMDL would be an appropriate interpretation for the narrative nutrient criteria applicable at the Tribal boundary.

Reasonable Potential and status of receiving water body

EPA used reported quarterly effluent data at harmonic mean flows to assess reasonable potential for the likelihood of the discharger to cause or contribute to an exceedance of water quality standards. Limited receiving water body (RWB) data available requires EPA to make conservative assumptions that may not be representative of the current conditions in

the receiving water body (RWB). Therefore, EPA is requiring the permittee to work through various options provided in an 'Energy Conservation Study' performed on this facility in 2014. It is believed through optimization techniques provided in the study in conjunction with additional site-specific data, EPA will be able to determine if reasonable potential (RP) exists to exceed water quality standards. Instream data collected throughout the next permit cycle will be included as inputs for the dynamic WASP model and aid in a more demonstrative RPA. If it is determined during the next permit cycle that there is RP to cause or contribute to an exceedance of water quality standards, the instream data and WASP model outputs will be used to develop appropriate effluent limits.

Additional Instream Monitoring

Wolf Creek and Kentawka Canal are currently not assessed, however the downstream waterbody falls under the Pearl River TMDL which includes Waste Load Allocations (WLA) for TN and TP. This TMDL only covers major dischargers that directly discharge into the Pearl River; therefore, this facility is not included in the TMDL.

To understand if this facility is potentially contributing to the downstream impairment, the facility will be required to add TP and TN to their current instream monitoring parameters. The instream monitoring data will allow EPA to better assess the impact of the facility on Wolf Creek, Kentawka Canal and Pearl River. This data will be used to develop models and run a more comprehensive RP analysis to determine if NPDES permit effluent limits for TN and TP are needed in the future.

Energy Conservation Study

In 2014 an Energy Conservation Study for the MBCI Pearl River Wastewater Treatment Plant was conducted by Dr. Larry Moore in conjunction with EPA Region 4. The study analyzed the mechanics and capacity of the treatment process at the facility. The study looked at operating conditions at the time and raw wastewater data to determine what typical effluent produced by the facility would consist of. Analysis of the treatment system at normal operation and typical influent characteristics led to various plant optimization scenarios that would lead to nitrification/denitrification. The final report of the study outlines the benefits of cycling the aerators on and off at various intervals to allow the oxidation ditches to become anoxic. It is expected that this could provide a significant reduction in nitrogen loading for this WWTP.

D. Whole Effluent Toxicity (WET)

The chronic WET test measures the effect of wastewater on an indicator organism's growth, reproduction and survival. The two species of indicator organisms designated in this permit are *Ceriodaphnia dubia* and *Pimephales promelas*. The effects of an effluent in chronic toxicity tests are estimated based on the statistical calculation of the effluent concentration which causes a 25% reduction in growth or reproduction of test organisms. This inhibition concentration, denoted as IC_{25}, is then compared to the instream waste concentration (IWC), which is the proportion of

effluent in the receiving water, to determine if toxicity has occurred at a level of concern. If the IC_{25} is lower than the IWC, the effluent has the potential to inhibit aquatic organisms in the receiving water. WET testing also requires a measure of test sensitivity known as Percent Minimum Significant Difference (PMSD). See the table below from Section 10.2.8.3 of Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, 4th Edition, EPA 821-R-02-013, 2002 for PMSD variability criteria.

TABLE 6. VARIABILITY CRITERIA (UPPER AND LOWER PMSD BOUNDS) FOR SUBLETHAL HYPOTHESIS TESTING ENDPOINTS SUBMITTED UNDER NPDES PERMITS.[1]

Test Method	Endpoint	Lower PMSD Bound	Upper PMSD Bound
Method 1000.0, Fathead Minnow Larval Survival and Growth Test	growth	12	30
Method 1002.0, *Ceriodaphnia dubia* Survival and Reproduction Test	reproduction	13	47
Method 1003.0, *Selenastrum capricornutum* Growth Test	growth	9.1	29

[1] Lower and upper PMSD bounds were determined from the 10th and 90th percentile, respectively, of PMSD data from EPA's WET Interlaboratory Variability Study (USEPA, 2001a; USEPA, 2001b).

The permittee submitted the results of four individual multi-species annual chronic WET tests with the permit renewal application. The June 2022 initial test was invalid because test acceptability criteria was unmet, and a follow-up test was performed in August 2022 which resulted in a pass for both species. The routine test taken in June 2023 was invalid due to a reduction in survival and growth of *Pimephales promelas* (Fathead minnow) at the 75% concentration. All other concentrations resulted in no significant decrease. A follow up test of the flathead minnow passed and revealed no toxicity.

Due to the facility's classification as a major NPDES discharger, and because of the facility's reasonable potential to cause or contribute to a violation of the State of Mississippi's copper water quality criteria downstream, this facility has reasonable potential to create a condition of toxicity. Therefore, a chronic WET limit has been deemed necessary. A chronic WET limit where an inhibition concentration (IC_{25}) of less than 100% will constitute a violation has been included in the permit, along with a requirement for annual testing for two species, *Ceriodaphnia dubia* and *Pimephales promelas*. These requirements are as stringent as the requirements in the previous permit and are protective of the State of Mississippi's water quality standards downstream of the outfall.

E. Basis for Conventional Pollutants Limits

Pollutant of Concern	**Basis**
pH	Effluent pH limits in the permit include a daily minimum of 6.5 S.U. and a daily maximum of 9.0 S.U. These limits are unchanged from the previous permit. They are more stringent than the minimum level of effluent quality requirements of 40 CFR § 133.102 for discharges of wastewater from POTWs and are protective of the State of Mississippi downstream water quality standards for pH.

5-Day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	Effluent $CBOD_5$ limits in the permit include a monthly average concentration of 10.0 mg/l and a weekly average concentration of 15.0 mg/l. Effluent $CBOD_5$ loading limits of 34.2 lbs/day monthly average and 51.3 lbs/day weekly average are also included in this permit. These limits are unchanged from the previous permit and are protective of the State of Mississippi downstream water quality standard for dissolved oxygen based on WASP model results (See Appendix 1). These limits are more stringent than minimum level of effluent quality requirements of 40 CFR § 133.102 for discharges of wastewater from POTWs. An 85% removal limitation for $CBOD_5$ has been added to the permit based on minimum level of effluent quality requirements of 40 CFR § 133.102 for discharges of wastewater from POTWs. An influent $CBOD_5$ monitoring requirement has also been added to the permit.
Total Suspended Solids (TSS)	The effluent limitations for TSS are based on minimum level of effluent quality requirements of 40 CFR § 133.102 for discharges of wastewater from POTWs. The permit includes monthly average limits of 30 mg/l and 375 lbs/day and weekly average limits of 45 mg/l and 563 lbs/day, as well as an 85% removal limitation and influent monitoring. All TSS limits and monitoring requirements are unchanged from the previous permit.
E. coli	The limits include a monthly geometric mean of 126 #/100 mL and a daily maximum of 410 #/100 mL. These limits remain unchanged from the previous permit and are consistent with Mississippi's Water Quality Standards.

F. Basis for Nonconventional Pollutants Limits

Pollutant of Concern	**Basis**
Ammonia	The permit includes monthly average ammonia limits of 2.0 mg/l and 25.0 lbs/day and weekly average ammonia limits of 3.0 mg/l and 37.5 lbs/day. These limits are unchanged from the previous permit and are protective of the State of Mississippi downstream water quality standard for dissolved oxygen based on WASP model results (See Appendix 1). MDEQ currently interprets their ammonia toxicity water quality standard for freshwater to be the EPA 1999 Update of Ambient Water Quality Criteria for Ammonia. The DO-based ammonia limits included in this permit are more stringent than the calculated toxicity-based ammonia limits and are therefore protective of the MDEQ toxicity-based ammonia water quality standard (EPA 1999 Update of Ambient Water Quality Criteria for Ammonia). See Appendix 4 for the ammonia toxicity analysis.
Dissolved Oxygen (DO)	The permit includes a daily minimum dissolved oxygen limit of 6.0 mg/l. This limit is unchanged from the previous permit and is protective of the State of Mississippi downstream water quality standard for dissolved oxygen based on WASP model results (See Appendix 1).
Total Nitrogen	Required monitoring for Total Nitrogen (NO_2 + NO_3-N + TKN) is being continued in this permit so that sufficient information will be available from this point source should it be necessary at some later time to impose limits on this discharge.
Total Phosphorus	Required monitoring for Total Phosphorus is being continued in this permit so that sufficient information will be available from this point source should it be necessary at some later time to impose limits on this discharge.
Total Hardness as $CaCO_3$	Monthly monitoring for total hardness is required in conjunction with monitoring for total recoverable copper. Effluent hardness data will be used to characterize the effluent and develop copper and zinc limits.
Chronic Whole Effluent Toxicity, IC_{25}	A chronic WET limit of $IC_{25} \geq 100\%$ has been included in the permit with a requirement for annual testing for two species, *Ceriodaphnia dubia* and *Pimephales promelas*. These requirements are as stringent as the requirements in the previous permit. For more information on the basis of this limit, see paragraph 4.C. above.

G. Basis for Toxic Pollutants Limits

Pollutant of Concern	**Basis**
Copper, Total Recoverable	The reasonable potential (RP) analysis (Appendix 3) for toxics identified total recoverable Copper as a pollutant that could potentially cause or contribute to a violation of the State of Mississippi's downstream Copper water quality criteria. The toxicities of some metals, such as Copper, vary with the hardness of the water. Therefore, the water quality criteria for these metals also vary with hardness. EPA uses the hardness of the receiving water when mixed with the effluent to determine the water quality criteria for such metals. Since toxicity decreases (and numeric water quality criteria increase) as hardness increases, EPA has used the average hardness measured from the outfall as the assumption for hardness. In the absence of site-specific translators, EPA used *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (EPA 823-B-96-007, June 1996). This guidance recommends the use of water quality criteria conversion factors as the default translators. Because site-specific translators were not available, EPA has used the State of Mississippi's downstream Copper water quality criteria in the reasonable potential and effluent limit calculations for this discharge. Static Copper limit calculations are based on long-term average hardness (60.16 mg/l) and long-term average TSS (4.78 mg/l), values that are calculated from effluent data from the facility. To be conservatively protective of water quality, no dilution allowance was provided to the facility. The calculated Copper limits included in this permit are 14.81 µg/l monthly average and 21.26 µg/l daily maximum. For more information on the calculations, see Appendix 5.
Zinc, Total Recoverable	The reasonable potential (RP) analysis (Appendix 3) for toxics identified Zinc as a pollutant that could potentially cause or contribute to a violation of the State of Mississippi's downstream zinc water quality criteria. The toxicities of some metals, such as Zinc, vary with the hardness of the water. Therefore, the water quality criteria for these metals also vary with hardness. EPA uses the hardness of the receiving water when mixed with the effluent to determine the water quality criteria for such metals. Since toxicity decreases (and numeric water quality criteria increase) as hardness increases, EPA has used the average hardness measured from the outfall as the assumption for hardness. In the absence of site-specific translators, EPA used *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (EPA 823-B-96-007, June 1996). This guidance recommends the use of water quality criteria conversion factors as the default translators. Because site-specific translators were not available, EPA has used the State of Mississippi's downstream Zinc water quality criteria in the reasonable potential and effluent limit calculations for this discharge. Static Zinc limit calculations are based on long-term average hardness (60.16 mg/l) and long-term average TSS (4.78 mg/l), values that are calculated from effluent data from the facility. To be conservatively protective of water quality, no dilution allowance was provided to the facility. The calculated Zinc limits included in this permit are 0.225 mg/l monthly average and 0.227 mg/l daily maximum. For more information on the calculations, see Appendix 5.

H. Basis for Instream Monitoring Requirements

Instream monitoring requirements for dissolved oxygen, pH, temperature and conductivity

upstream and downstream of the discharge have been continued in this permit to analyze the impact of the discharge on the receiving waterbody and ensure compliance with the State of Mississippi's dissolved oxygen water quality standard in Mississippi state waters downstream of the outfall. See Appendix 2 for reported instream data from the previous permit cycle.

I. Calculations for Water Quality-Based Effluent Limits (WQBELs)

i. Instream Waste Concentration (IWC)

$$IWC\ (\%) = \frac{\text{Design Flow (gpd)}}{\text{Design Flow (gpd)+7Q10(gpd)}}\ x\ 100\%$$

$$IWC\ (\%) = \frac{1{,}500{,}000\ \text{gpd}}{1{,}500{,}000\ \text{gpd} + 0\ \text{gpd}}\ x\ 100\%$$

$IWC\ (\%) = 100\%$ in Wolf Creek

ii. Weekly Average Limits for $CBOD_5$, TSS, and DO-based NH_3-N

Weekly average limits were developed using the following equation:

Weekly average limit = Monthly average limit x 1.5

iii. Loading Limits for TSS and DO-based NH_3-N

Loading limits were developed using the following equation:

Loading limit (lbs/day) = Concentration limit (mg/l) x Design flow (MGD) x 8.34

J. Applicable Technology-Based Effluent Limits (TBELs)

Technology-based effluent limitations aim to prevent pollution by requiring a minimum level of effluent quality that is attainable using demonstrated technologies for reducing discharges of pollutants or pollution into the waters of the United States.

i. Secondary Treatment Standards

Parameter	**Secondary Treatment Standard**
BOD_5 ($CBOD_5$)	30 mg/l (25 mg/l) Monthly Average 45 mg/l (37.5 mg/l) Weekly Average
TSS	30 mg/l Monthly Average 45 mg/l Weekly Average

Removal	85% BOD_5 (or $CBOD_5$) and TSS
pH	Maintained within the limits of 6.0-9.0 standard units

K. Comparison & Summary of Water Quality-Based vs. Technology-Based Effluent Limits

For each parameter, applicable technology-based limits (TBELs) were compared to the applicable water-quality based limits (WQBELs), and the most stringent limits were selected for the permit. The selected limits, which are indicated by bold text, were compared to the limits in the current permit, and all are at least as stringent as the current permit limits.

Parameter	**Current Permit Limits**				**Proposed Permit Limits**							
					WQBELs				**TBELs**			
	Daily Min	Monthly Avg	Weekly Avg	Daily Max	Daily Min	Monthly Avg	Weekly Avg	Daily Max	Daily Min	Monthly Avg	Weekly Avg	Daily Max
Flow, MGD	---	Report	Report	---	---	**Report**	**Report**	---	---	---	---	---
Dissolved Oxygen, mg/l	6.0	---			**6.0**	---			---			
$CBOD_5$, mg/l (lb/d)	---	10.0 (34.2)	15.0 (51.3)	---	---	**10.0 (34.2)**	**15.0 (51.3)**	---	---	25	37.5	---
$CBOD_5$ % Removal	---				---				**---**	**85%**	---	---
TSS, mg/l (lb/d)	---	30.0 (375)	45.0 (563)	---	---				**---**	**30.0 (375)**	**45.0 (563)**	**---**
TSS % Removal	85%				---				**85%**			
Total Ammonia as Nitrogen, mg/l (lb/d)	---	2.0 (25.0)	3.0 (37.5)	---	---	**2.0 (25.0)**	**3.0 (37.5)**	---	---			
pH, S.U.	6.5	---		9.0	**6.5**	---		**9.0**	6.0	---		9.0
E. coli, #/100 ml	---	---	---	---	**---**	**126**	**---**	**410**	---			
Total Recoverable Copper, µg/l	---	18.76	---	27.19	---	**14.81**	---	**21.26**	---			
Total Recoverable, Zinc, mg/l					---	**0.225**	---	**0.227**	---			
Total Hardness as $CaCO_3$, mg/l	---	---	---	Report	**Report**	**Report**	---	---	---			
TN, mg/l	---	---	---	Report	---	**Report**	**Report**	---	---			
TP, mg/l	---	---	---	Report	---	**Report**	**Report**	---	---			
Chronic WET	IC_{25} > 100%				**IC_{25} > 100%**				---			
Instream Monitoring	Upstream/Downstream DO, pH, temperature, conductivity				**Upstream/Downstream DO, pH, temperature, conductivity, TP and TN**				---			

5. 401 Certification

The Clean Water Act (CWA) § 401 statute and regulations stipulate that no federal permit or license can be issued that may result in a discharge to waters of the United States unless the state or authorized Tribe certifies that the discharge is consistent with water quality standards and other water quality goals or waives its certification authority. The EPA Regional offices are the certifying authority on behalf of Tribes without CWA § 401 program authority.

The CWA § 401 regulations direct certifying authorities to conclude that the permitted activity will be consistent with effluent limitations for conventional and non-conventional pollutants, water quality standards, new source performance standards, and toxic pollutant limitations, and any other appropriate state and/or Tribal requirements. A second component of the scope of the CWA § 401 review is determining whether an activity requiring certification in one state or Tribe (i.e., in the location where the discharge originates) may potentially impact the water quality of a neighboring state or Tribe. In those instances, the EPA is directed to notify the state or Tribe whose water quality may be affected, and neighboring state or Tribe may object to permit issuance. On March 12*th*, 2025, the Mississippi Department of Environmental Quality determined that there was no reason for objection or concerns that the project, when operated and maintained as required, would affect water quality within the jurisdiction of the State of Mississippi.

The MBCI has not promulgated water quality standards, and discharges from the Pearl River WWTF will occur just upstream of the Mississippi state boundary. The subject permit was developed to be consistent with the State of Mississippi's Water Quality Standards (11 Miss. Admin. Code Pt 6 Ch. 2, Rule 2.4 4). It is protective of designated uses of state waters and with the other applicable provisions of the CWA (i.e., §§ 301, 302, 303, 306, and 307).

6. Services Consultation

In accordance with 40 CFR § 122.49(c) the EPA is required to ensure, in consultation with the U.S. Fish and Wildlife Service (Service), that "any action authorized by the EPA is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat". In a letter dated September 27, 2024, the Service concurred with the EPA determination that the proposed project "May affect, but [is] not likely to adversely affect" federally listed species or critical habitat.

7. National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA), and implementing regulations 36 CFR Part 800 require the EPA, before issuing a license (permit), to identify the area of potential effect of a permitted discharge and, if historic or cultural resources within that area would be adversely affected by the discharge, to adopt measures when feasible to mitigate potential adverse effects of the licensed activity and properties listed or eligible for listing in the National Register of Historic Places. The MBCI is responsible for administering the NHPA within Tribal boundaries. In a letter dated August 13, 2024, EPA sent out a determination letter to the tribe that the permit issuance will have no effect to historic or cultural properties. EPA received no comments from the tribe.

8. Public Participation

The public notice for this draft permit was published in the Clarion-Ledger with the permit documents available on the EPA Region 4 website from November 6th, 2024 to December 6th,2024. No comments were received.

Appendix 1

Model Selection:

EPA's Advanced Eutro WASP Model (version 8.41) was parameterized to evaluate fate and transport of oxygen demanding substances from the discharger into downstream receiving waters.

Key Model Assumptions:
The one-dimensional longitudinally segmented model was run in a steady-state mode with the following assumptions:

- Primary drivers for dissolved oxygen concentration in the receiving stream are reaeration, CBOD and NBOD demand, Sediment Oxygen Demand (SOD) demand, and Boundary conditions.
- Receiving stream Wolf Creek flow boundary at critical 7Q10 drought flow (0.00-MGD)
- Simulated effluent for a range of flow scenarios including at:
    - capped flow 0.41-MGD (0.0180-cms),
    - average flow 0.8-MGD (0.0351-cms),
    - full design flow 1.5-MGD (0.0657-cms), and
    - the estimated growing season (May-Sept) average flows (Wolf Creek = 3.9-MGD (0.17-cms), Kentawka Canal = 78-MGD (3.4-cms), Pearl River = 320-MGD (14.0-cms))
- Simulation tests included monthly and weekly effluent limits for
    - CBOD (30-mg/L & 50-mg/L CBOD-ultimate assuming a typical CBOD5/CBOD-ultimate ratio for activated sludge of 0.31 and CBOD5 of 10-mg/L & 15-mg/L, respectively) and
    - NH3 (2.0-mg/L & 3.0-mg/L, respectively).
- Assumed Wolf Creek boundary conditions: NH3 as 2-mg/L, DO as 6-mg/L, CBOD-ultimate as 30-mg/L, NO2NO3 as 1-mg/L.
- Assumed receiving waters boundary conditions: NH3 as 0.1-mg/L, DO as 5-mg/L, CBOD-ultimate as 6-mg/L, NO2NO3 as 1-mg/L.
- Assumed constant receiving stream background water temperature of 25-deg C, a typical growing season average for this location.
- The DO discharge was set at the minimum limit of 6.0-mg/L.
- BOD decay rate set to 0.1/day and corrected for temperature. Rate is consistent with typical secondary treated effluent.
- Nitrification rate set to 0.1/day and corrected for temperature. Rate is consistent with typical secondary treated effluent.
- SOD assumptions: Wolf Creek as 1.0-g/m2-day, Kentawka Canal as 1.5-g/m2-day, Pearl River as 2.0-g/m2-day.
- Reaeration rate based on Covar equation for open channel streams

Model segmentation was developed using the USGS NHDPlus dataset. Modeling files are available upon request.

Appendix 2 – Summary of DMR Data

Effluent Flow

Monitoring Period End Date	Monthly Avg, MGD	Weekly Avg, MGD
07/31/2019	0.92	0.98
08/31/2019	0.87	0.89
09/30/2019	0.82	0.85
10/31/2019	0.90	1.15
11/30/2019	0.74	0.85
12/31/2019	0.73	0.80
01/31/2020	0.83	1.03
02/29/2020	0.89	1.22
03/31/2020	0.76	1.00
04/30/2020	0.57	0.74
05/31/2020	0.45	0.46
06/30/2020	0.50	0.54
07/31/2020	0.69	0.84
08/31/2020	0.63	0.72
09/30/2020	0.67	0.81
10/31/2020	0.62	0.75
11/30/2020	0.61	0.76
12/31/2020	0.63	0.92
01/31/2021	0.85	0.93
02/28/2021	0.68	0.81
03/31/2021	0.71	0.93
04/30/2021	0.68	0.76
05/31/2021	0.75	0.83
06/30/2021	0.75	0.89
07/31/2021	1.17	1.46
08/31/2021	0.72	0.75
09/30/2021	0.77	1.04
10/31/2021	0.67	0.71
11/30/2021	0.60	0.63
12/31/2021	0.55	0.68
01/31/2022	0.71	0.74
02/28/2022	0.73	0.88
03/31/2022	0.80	0.94
04/30/2022	0.87	1.02
05/31/2022	0.82	0.92
06/30/2022	0.90	1.72
07/31/2022	1.09	1.29
08/31/2022	1.14	1.29
09/30/2022	0.87	0.91
10/31/2022	0.99	1.11
11/30/2022	1.09	0.98
12/31/2022	0.84	1.72
01/31/2023	0.95	0.89
02/28/2023	0.10	1.07
03/31/2023	0.08	0.11
04/30/2023	0.86	0.09
05/31/2023	0.71	0.94
06/30/2023	0.80	0.76
07/31/2023	0.91	1.05
08/31/2023	0.79	1.14
09/30/2023	0.65	0.92
12/31/2022	0.84	0.68
01/31/2023	0.95	1.72
02/28/2023	0.10	0.89
03/31/2023	0.08	1.07
04/30/2023	0.86	0.11
05/31/2023	0.71	0.09
06/30/2023	0.80	0.94
07/31/2023	0.91	0.76
08/31/2023	0.79	1.05

Data Points, n	51	51
Average	0.75	0.90
Maximum	1.17	1.72

$CBOD_5$

Monitoring Period End Date	Influent Monthly Avg, mg/L	Effluent Monthly Avg, mg/L	Effluent Monthly Avg, lb/d	Effluent Weekly Avg, mg/L	Effluent Weekly Avg, lb/d	Monthly Avg, % removal
07/31/2019		1.60	10.80	3.00	20.10	
08/31/2019	42.75	1.30	9.00	1.70	11.50	96.51
09/30/2019	44.95	1.90	12.30	2.00	12.30	95.66
10/31/2019	77.60	2.40	21.10	4.00	31.50	95.76
11/30/2019	80.65	2.80	16.50	3.10	20.00	96.40
12/31/2019	70.50	2.00	12.20	2.00	17.70	97.03
01/31/2020	64.00	2.00	12.80	2.00	14.70	96.82
02/29/2020	77.00	1.80	13.60	2.00	14.00	97.75
03/31/2020	57.50	2.00	11.30	2.00	18.60	96.35
04/30/2020	55.63	2.00	8.00	2.00	9.70	96.29
05/31/2020	42.00	2.00	7.70	2.00	7.70	95.00
06/30/2020	33.00	2.00	8.10	2.00	8.80	93.90
07/31/2020	32.40	2.00	11.50	2.00	13.30	92.00
08/31/2020	68.50	2.00	12.80	2.00	19.10	96.40
09/30/2020	118.75	2.00	10.70	2.00	10.80	97.50
10/31/2020	62.25	2.00	10.80	2.00	11.40	96.50
11/30/2020	127.75	1.80	8.00	2.00	15.80	98.30
12/31/2020	98.60	1.80	9.50	2.00	17.60	97.60
01/31/2021	134.00	2.00	15.60	2.00	15.60	98.30
02/28/2021	125.00	2.00	9.60	2.00	9.60	98.40
03/31/2021	142.20	2.00	9.80	2.00	10.50	98.60
04/30/2021	107.50	2.00	10.40	2.00	11.30	98.10
05/31/2021	139.50	2.10	11.00	2.20	11.10	98.30
06/30/2021	125.60	2.00	11.50	2.00	13.60	98.10
07/31/2021	166.75	2.00	31.70	2.00	31.70	98.60
08/31/2021	78.50	1.50	9.10	2.00	11.80	98.00
09/30/2021	127.40	2.00	14.20	2.00	18.80	97.90
10/31/2021	225.50	2.10	11.60	2.30	12.80	99.00
11/30/2021	162.00	1.50	8.00	2.00	11.80	98.80
12/31/2021	154.00	2.40	6.60	5.00	25.00	97.90
01/31/2022	190.00	2.00	9.20	2.00	10.80	98.80
02/28/2022	94.75	2.00	11.90	2.00	13.00	97.60
03/31/2022	86.00	2.00	14.20	2.00	20.30	97.00
04/30/2022	86.25	2.00	13.20	2.00	14.70	96.90
05/31/2022	65.25	1.80	13.60	2.00	18.40	97.20
06/30/2022	47.40	1.80	13.20	2.00	13.40	95.00
07/31/2022	114.75	2.20	18.20	2.90	18.80	96.90
08/31/2022	40.75	2.00	17.90	2.00	17.90	94.50
09/30/2022	37.00	2.00	14.10	2.00	14.40	94.50
10/31/2022	75.00	2.00	18.50	2.00	22.50	96.00
11/30/2022	69.25	1.80	10.50	2.00	12.80	96.60
12/31/2022	51.85	2.00	14.70	2.00	16.10	94.30
01/31/2023	51.00	2.70	21.30	4.60	35.10	94.40
02/28/2023	50.25	2.20	2.30	2.70	4.30	95.60
03/31/2023	47.20	2.00	1.50	2.00	1.70	94.60
04/30/2023	47.00	2.00	13.30	2.00	14.80	95.50
05/31/2023	58.20	2.40	14.60	4.20	26.00	94.80
06/30/2023	41.08	2.90	18.60	4.60	29.80	82.70
07/31/2023	88.00	15.80	119.50	39.00	304.10	82.50
08/31/2023	60.80	3.60	26.60	6.40	51.10	94.10
09/30/2023	42.00	3.00	15.60	6.00	33.60	89.60
Data Points, n	46	47	47	47	47	46
Minimum	-	-	-	-	-	82.5
Average	85.71	2.00	14.87	3.21	22.58	95.5
Maximum	225.5	15.80	119.50	39.00	304.10	-

TSS

Monitoring Period End Date	Influent Monthly Avg, mg/l	Effluent Monthly Avg, mg/l	Effluent Monthly Avg, lb/d	Effluent Weekly Avg, mg/l	Effluent Weekly Avg, lb/d	Monthly Avg Min, % removal
07/31/2019	43.00	5.00	34.30	6.00	37.70	71.00
08/31/2019	46.00	1.00	7.60	2.00	14.20	97.40
09/30/2019	86.00	2.00	12.30	2.00	12.30	97.30
10/31/2019	460.00	6.00	51.20	16.00	150.10	88.80
11/30/2019	74.00	2.00	10.50	2.00	12.90	97.00
12/31/2019	95.00	2.00	12.50	5.00	44.40	97.20
01/31/2020	55.00	2.00	10.10	4.00	22.40	96.70
02/29/2020	90.00	2.00	6.60	5.00	13.20	96.80
03/31/2020	95.00	3.00	11.70	4.00	18.60	94.00
04/30/2020	98.00	8.00	33.90	15.00	73.10	85.70
05/31/2020	63.00	9.00	7.70	27.00	7.70	78.60
06/30/2020	28.00	10.00	47.70	25.00	96.50	67.40
07/31/2020	47.00	6.00	39.50	8.00	39.80	86.70
08/31/2020	94.00	8.00	65.10	14.00	133.60	91.30
09/30/2020	194.00	2.00	15.90	4.00	21.10	98.50
10/31/2020	111.00	6.00	40.10	7.00	46.20	94.40
11/30/2020	124.00	2.00	17.70	6.00	47.40	97.70
12/31/2020	204.00	3.00	18.10	6.00	27.10	95.70
01/31/2021	403.00	3.00	39.00	5.00	39.00	98.20
02/28/2021	153.00	2.00	9.60	4.00	9.60	98.50
03/31/2021	222.00	2.00	8.10	3.00	14.70	99.30
04/30/2021	215.00	3.00	7.60	6.00	9.60	98.10
05/31/2021	254.00	5.00	31.30	11.00	55.30	97.90
06/30/2021	333.00	3.00	24.60	7.00	34.00	98.60
07/31/2021	294.00	1.00	31.70	2.00	31.70	98.90
08/31/2021	115.00	3.00	27.40	5.00	32.60	94.40
09/30/2021	298.00	7.00	35.20	16.00	71.10	97.30
10/31/2021	778.00	2.00	10.50	4.00	19.90	99.70
11/30/2021	310.00	3.00	15.40	5.00	23.40	98.60
12/31/2021	399.00	4.00	9.90	5.00	25.00	96.50
01/31/2022	534.00	3.00	7.60	5.00	10.80	99.30
02/28/2022	60.00	1.00	6.00	1.00	6.50	98.00
03/31/2022	124.00	3.00	24.40	8.00	44.60	96.50
04/30/2022	311.00	1.00	5.90	3.00	16.70	97.80
05/31/2022	55.00	2.00	17.20	3.00	27.70	95.30
06/30/2022	47.00	2.00	17.80	3.00	18.20	93.20
07/31/2022	115.00	2.00	31.40	5.00	44.00	98.10
08/31/2022	39.00	6.00	17.90	17.00	17.90	79.30
09/30/2022	95.00	3.00	21.30	5.00	36.10	93.80
10/31/2022	117.00	8.00	73.60	17.00	122.80	90.60
11/30/2022	725.00	3.00	19.00	5.00	26.80	98.40
12/31/2022	213.00	3.00	16.70	5.00	35.10	98.10
01/31/2023	146.00	8.00	65.20	18.00	156.70	93.80
02/28/2023	376.00	3.00	2.10	6.00	4.10	99.40
03/31/2023	179.00	2.00	1.50	5.00	4.10	97.90
04/30/2023	202.00	2.00	11.90	4.00	27.80	99.00
05/31/2023	177.00	4.00	24.20	10.00	62.00	97.30
06/30/2023	127.00	10.00	75.20	30.00	229.90	85.50
07/31/2023	568.00	41.00	290.00	83.00	564.40	76.50
08/31/2023	166.00	9.00	67.30	19.00	148.60	95.10
09/30/2023	121.00	6.00	34.30	6.00	37.70	92.30

Data Points, n	51	51	51	51	51	51
Minimum	28.00	-	-	-	-	71.00
Average	201.53	4.69	29.78	9.66	55.78	93.79
Maximum	-	41.0	290.00	83.00	564.40	-

Effluent Total Ammonia as N

Monitoring Period End Date	Monthly Avg, mg/l	Monthly Avg, lb/d	Weekly Avg, mg/l	Weekly Avg, lb/d
07/31/2019	1.30	9.10	2.80	20.90
08/31/2019	0.50	3.70	0.80	5.40
09/30/2019	0.60	2.70	1.00	2.70
10/31/2019	0.70	5.10	3.00	16.80
11/30/2019	0.10	0.40	0.20	0.90
12/31/2019	0.10	0.70	0.20	2.00
01/31/2020	0.20	0.30	1.00	0.40
02/29/2020	0.20	0.40	0.40	0.40
03/31/2020	0.40	2.30	0.60	3.90
04/30/2020	0.10	0.30	0.30	0.40
05/31/2020	0.10	0.30	0.10	0.30
06/30/2020	0.10	0.50	0.20	0.80
07/31/2020	0.10	0.30	0.10	0.40
08/31/2020	0.00	0.30	0.00	0.50
09/30/2020	0.00	0.10	0.00	0.20
10/31/2020	0.00	0.10	0.00	0.10
11/30/2020	0.10	0.50	0.50	1.20
12/31/2020	0.00	0.20	0.00	0.40
01/31/2021	0.00	0.20	0.00	0.20
02/28/2021	0.00	0.00	0.00	0.00
03/31/2021	0.00	0.10	0.00	0.20
04/30/2021	0.00	0.30	0.10	0.50
05/31/2021	0.00	0.10	0.00	0.20
06/30/2021	0.10	0.40	0.20	1.00
07/31/2021	0.10	0.80	0.10	0.80
08/31/2021	0.00	0.10	0.10	0.30
09/30/2021	0.00	0.10	0.00	0.20
10/31/2021	0.10	0.20	0.10	0.40
11/30/2021	0.00	0.10	0.00	0.10
12/31/2021	0.00	0.10	0.00	0.10
01/31/2022	0.00	0.10	0.10	0.20
02/28/2022	0.00	0.00	0.00	0.10
03/31/2022	0.00	0.30	0.00	0.40
04/30/2022	0.10	0.80	0.30	2.10
05/31/2022	0.00	0.30	0.10	0.90
06/30/2022	0.10	0.70	0.10	0.70
07/31/2022	0.10	0.60	0.10	0.80
08/31/2022	0.20	3.80	0.80	6.80
09/30/2022	0.30	2.50	0.60	4.00
10/31/2022	0.00	0.30	0.00	0.40
11/30/2022	0.00	0.10	0.00	0.20
12/31/2022	0.00	0.10	0.00	0.20
01/31/2023	0.60	5.10	1.60	12.00
02/28/2023	0.30	0.20	1.10	0.80
03/31/2023	0.00	0.00	0.00	0.00
04/30/2023	0.00	0.10	0.00	0.20
05/31/2023	0.00	0.30	0.10	0.40
06/30/2023	0.50	3.70	1.00	8.00
07/31/2023	10.80	79.10	13.80	102.40
08/31/2023	0.20	1.00	0.90	4.30
09/30/2023	0.90	3.50	3.30	12.30

Data Points, n	51	51	51	51
Average	0.37	2.60	0.70	4.29
Maximum	10.80	79.10	13.80	102.40

Effluent pH

Monitoring Period End Date	Daily Min, S.U.	Daily Max, S.U.
07/31/2019	7.40	7.70
08/31/2019	7.50	7.70
09/30/2019	6.50	7.70
10/31/2019	7.20	7.70
11/30/2019	7.20	7.40
12/31/2019	7.30	7.40
01/31/2020	6.90	7.50
02/29/2020	6.80	7.40
03/31/2020	7.20	7.50
04/30/2020	7.20	7.60
05/31/2020	7.30	7.50
06/30/2020	7.40	7.50
07/31/2020	7.20	7.80
08/31/2020	7.30	8.20
09/30/2020	7.30	7.50
10/31/2020	7.10	7.30
11/30/2020	6.70	7.50
12/31/2020	6.90	7.20
01/31/2021	7.00	7.60
02/28/2021	7.00	7.70
03/31/2021	7.00	7.70
04/30/2021	7.10	7.10
05/31/2021	7.10	7.10
06/30/2021	7.10	7.50
07/31/2021	7.20	7.80
08/31/2021	7.40	8.00
09/30/2021	7.40	7.80
10/31/2021	7.40	7.90
11/30/2021	6.20	8.60
12/31/2021	7.40	8.00
01/31/2022	7.00	7.70
02/28/2022	6.80	7.70
03/31/2022	6.50	7.40
04/30/2022	7.40	7.60
05/31/2022	7.00	7.80
06/30/2022	6.30	7.00
07/31/2022	6.50	8.00
08/31/2022	7.50	7.90
09/30/2022	7.10	7.70
10/31/2022	5.80	8.50
11/30/2022	7.30	8.30
12/31/2022	5.70	7.80
01/31/2023	7.00	7.70
02/28/2023	7.40	7.70
03/31/2023	7.30	7.60
04/30/2023	7.30	7.50
05/31/2023	7.30	7.70
06/30/2023	7.30	7.80
07/31/2023	7.10	7.50
08/31/2023	7.40	7.90
09/30/2023	6.80	7.70

Data Points, n	51	51
Minimum	5.70	
Maximum		8.50

Effluent Dissolved Oxygen (DO)

Monitoring Period End Date	Minimum, mg/l
07/31/2019	6.30
08/31/2019	6.30
09/30/2019	6.70
10/31/2019	6.50
11/30/2019	7.30
12/31/2019	7.30
01/31/2020	7.90
02/29/2020	7.80
03/31/2020	8.20
04/30/2020	8.70
05/31/2020	8.50
06/30/2020	7.40
07/31/2020	7.30
08/31/2020	7.50
09/30/2020	7.70
10/31/2020	7.80
11/30/2020	7.80
12/31/2020	8.90
01/31/2021	8.90
02/28/2021	8.70
03/31/2021	8.30
04/30/2021	8.40
05/31/2021	8.10
06/30/2021	7.80
07/31/2021	7.70
08/31/2021	7.50
09/30/2021	7.60
10/31/2021	7.80
11/30/2021	7.40
12/31/2021	8.10
01/31/2022	8.90
02/28/2022	8.10
03/31/2022	8.20
04/30/2022	8.70
05/31/2022	7.70
06/30/2022	7.60
07/31/2022	7.60
08/31/2022	7.60
09/30/2022	7.30
10/31/2022	7.50
11/30/2022	8.00
12/31/2022	8.20
01/31/2023	8.50
02/28/2023	8.40
03/31/2023	8.10
04/30/2023	8.30
05/31/2023	7.40
06/30/2023	7.40
07/31/2023	6.10
08/31/2023	7.60
09/30/2023	7.00

Data Points, n	51
Minimum	6.30
Average	7.77

E.coli

Monitoring Period End Date	Monthly Average, #/100 mL	Daily Max, #/100 mL
07/31/2019	1,876.00	8,000.00
08/31/2019	25.00	44.00
09/30/2019	25.00	54.00
10/31/2019	50.00	205.00
11/30/2019	8.00	11.00
12/31/2019	8.00	17.00
01/31/2020	38.00	148.00
02/29/2020	4.00	9.00
03/31/2020	4.00	6.00
04/30/2020	5.00	12.00
05/31/2020	9.00	21.00
06/30/2020	26.00	59.00
07/31/2020	31.00	47.00
08/31/2020	19.00	31.00
09/30/2020	25.00	33.00
10/31/2020	209.00	727.00
11/30/2020	60.00	117.00
12/31/2020	587.00	2,419.00
01/31/2021	14.00	43.00
02/28/2021	29.00	64.00
03/31/2021	13.00	33.00
04/30/2021	27.00	57.00
05/31/2021	25.00	32.00
06/30/2021	22.00	59.00
07/31/2021	20.00	47.00
08/31/2021	163.00	2,419.00
09/30/2021	10.00	30.00
10/31/2021	96.00	172.00
11/30/2021	31.00	172.00
12/31/2021	17.00	50.00
01/31/2022	20.00	28.00
02/28/2022	12.00	25.00
03/31/2022	20.00	94.00
04/30/2022	17.00	18.00
05/31/2022	23.00	91.00
06/30/2022	40.00	142.00
07/31/2022	124.00	308.00
08/31/2022	620.00	2,420.00
09/30/2022	846.00	2,420.00
10/31/2022	20.00	59.00
11/30/2022	16.00	45.00
12/31/2022	49.00	461.00
01/31/2023	14.00	172.00
02/28/2023	6.00	49.00
03/31/2023	2.00	10.00
04/30/2023	3.00	6.00
05/31/2023	7.00	21.00
06/30/2023	218.00	2,420.00
07/31/2023	2,420.00	2,420.00
08/31/2023	124.00	2,420.00
09/30/2023	21.00	55.00

Data Points, n	51	51
Average	158.78	565.14
Maximum	1876.00	8000.00

Effluent Total Recoverable Copper

Monitoring Period End Date	Daily Max, ug/l	Monthly Avg, ug/l
07/31/2019	1.47	1.47
08/31/2019	1.09	1.09
09/30/2019	1.47	1.47
10/31/2019	2.76	2.76
11/30/2019	6.99	6.99
12/31/2019	3.56	3.56
01/31/2020	4.56	4.56
02/29/2020	3.63	3.63
03/31/2020	3.68	3.68
04/30/2020	1.00	1.00
05/31/2020	11.30	11.30
06/30/2020	19.00	19.00
07/31/2020	16.00	16.00
08/31/2020	16.10	16.10
09/30/2020	15.00	15.00
10/31/2020	7.67	7.67
11/30/2020	15.30	15.30
12/31/2020	5.66	5.66
01/31/2021	11.70	11.70
02/28/2021	13.30	13.30
03/31/2021	10.90	10.90
04/30/2021	8.73	8.73
05/31/2021	9.59	9.59
06/30/2021	6.63	6.63
07/31/2021	19.00	19.00
08/31/2021	4.73	4.73
09/30/2021	12.50	12.50
10/31/2021	12.20	12.20
11/30/2021	11.50	11.50
12/31/2021	10.90	10.90
01/31/2022	10.10	10.10
02/28/2022	10.80	10.80
03/31/2022	10.30	10.30
04/30/2022	8.65	8.65
05/31/2022	7.07	7.07
06/30/2022	2.60	2.60
07/31/2022	7.47	7.47
08/31/2022	8.72	8.72
09/30/2022	11.60	11.60
10/31/2022	6.18	6.18
11/30/2022	3.17	3.17
12/31/2022	8.06	8.06
01/31/2023	7.34	7.34
02/28/2023	12.80	12.80
03/31/2023	5.82	5.82
04/30/2023	8.00	8.00
05/31/2023	8.94	8.94
06/30/2023	4.22	4.22
07/31/2023	23.90	23.90
08/31/2023	12.60	12.60
09/30/2023	12.10	12.10

Data Points, n	51	51
Average	8.99	8.99
Maximum	23.90	23.90

Effluent Total Hardness as $CaCO_3$

Monitoring Period End Date	Monthly Avg, mg/l	Daily Min, mg/L
07/31/2019	64.40	64.40
08/31/2019	44.80	44.80
09/30/2019	52.40	52.40
10/31/2019	46.80	46.80
11/30/2019	55.20	55.20
12/31/2019	44.80	44.80
01/31/2020	58.00	58.00
02/29/2020	46.00	46.00
03/31/2020	49.00	49.00
04/30/2020	59.00	59.00
05/31/2020	58.00	58.00
06/30/2020	66.00	66.00
07/31/2020	65.00	65.00
08/31/2020	97.00	97.00
09/30/2020	75.00	75.00
10/31/2020	58.00	58.00
11/30/2020	60.00	60.00
12/31/2020	56.00	56.00
01/31/2021	59.00	59.00
02/28/2021	60.00	60.00
03/31/2021	61.00	61.00
04/30/2021	58.00	58.00
05/31/2021	60.00	60.00
06/30/2021	60.00	60.00
07/31/2021	67.00	67.00
08/31/2021	71.00	71.00
09/30/2021	53.00	53.00
10/31/2021	65.00	65.00
11/30/2021	58.00	58.00
12/31/2021	63.00	63.00
01/31/2022	53.00	53.00
02/28/2022	66.00	66.00
03/31/2022	62.00	62.00
04/30/2022	52.00	52.00
05/31/2022	58.00	58.00
06/30/2022	59.00	59.00
07/31/2022	62.00	62.00
08/31/2022	60.00	60.00
09/30/2022	63.00	63.00
10/31/2022	57.00	57.00
11/30/2022	57.00	57.00
12/31/2022	58.00	58.00
01/31/2023	57.00	57.00
02/28/2023	62.00	62.00
03/31/2023	60.00	60.00
04/30/2023	63.00	63.00
05/31/2023	61.00	61.00
06/30/2023	64.00	64.00
07/31/2023	68.00	68.00
08/31/2023	64.00	64.00
09/30/2023	72.00	72.00

Data Points, n	51	51
Average	60.16	60.16
Minimum	44.80	44.80
Maximum	97.00	

Effluent Total Nitrogen as N

Monitoring Period End Date	Weekly Avg, mg/l	Monthly Avg, mg/l
09/30/2019	2.46	**
12/31/2019	3.73	**
03/31/2020	0.80	**
06/30/2020	0.81	0.81
09/30/2020	8.37	8.37
12/31/2020	0.85	4.09
03/31/2021	6.43	6.43
06/30/2021	0.08	0.08
09/30/2021	7.07	7.07
12/31/2021	9.10	9.10
03/31/2022	8.48	8.48
06/30/2022	0.40	0.40
09/30/2022	6.77	6.77
12/31/2022	6.58	6.58
03/31/2023	1.77	1.77
06/30/2023	1.09	1.09
09/30/2023	11.50	11.50

Data Points, n	17	14
Average	4.49	5.18
Maximum	11.50	11.50

** Unknown data

Zinc, from application

Pollutant Scan	Reported value, mg/L
	0.0858
	0.0304
	0.0225

Data Points, n	3
Average	0.0462
Maximum	0.0858

Effluent Total Phosphorous as P

Monitoring Period End Date	Weekly Avg, mg/l	Monthly Avg, mg/l
09/30/2019	1.15	**
12/31/2019	0.48	**
03/31/2020	0.53	**
06/30/2020	0.58	0.58
09/30/2020	1.07	1.07
12/31/2020	0.85	4.09
03/31/2021	0.70	0.70
06/30/2021	0.67	0.67
09/30/2021	1.07	1.07
12/31/2021	0.60	0.60
03/31/2022	0.73	0.73
06/30/2022	0.22	0.22
09/30/2022	2.41	2.41
12/31/2022	0.75	0.75
03/31/2023	0.65	0.65
06/30/2023	0.93	0.93
09/30/2023	1.01	1.01

Data Points, n	17	14
Average	0.85	1.11
Maximum	2.41	4.09

** Unknown data

Instream Conductivity

Monitoring Period End Date	Downstream – Kentawka Canal			Downstream - Pearl River			Upstream – Wolf Creek		
	Daily Min, umho/cm	Daily Avg, umho/cm	Daily Max, umho/cm	Daily Min, umho/cm	Daily Avg, umho/cm	Daily Max, umho/cm	Daily Min, umho/cm	Daily Avg, umho/cm	Daily Max, umho/cm
07/31/2019	170.20	175.30	180.40	57.60	67.20	76.80	85.10	87.40	89.60
08/31/2019	142.00	163.00	184.00	39.00	39.00	39.00	60.00	64.00	68.00
09/30/2019	367.00	398.00	429.00	77.00	79.50	82.00	150.00	203.50	257.00
06/30/2020	12.00	33.00	54.00	41.00	41.50	42.00	54.00	62.00	70.00
07/31/2020	66.00	174.20	282.30	27.00	40.10	53.10	59.00	105.60	152.20
08/31/2020	218.00	250.20	282.30	53.10	57.40	61.70	115.90	134.10	152.20
09/30/2020	263.00	295.70	347.60	66.70	259.50	638.00	95.10	124.70	142.90
06/30/2021	122.30	138.50	154.70	25.00	29.50	34.00	46.60	65.10	83.50
07/31/2021	78.80	137.70	196.50	39.00	47.00	55.00	63.40	99.80	136.20
08/31/2021	205.70	241.00	276.30	53.00	57.50	62.00	122.00	136.60	151.20
09/30/2021	76.30	129.90	183.50	45.60	51.30	57.00	67.40	95.70	124.00
06/30/2022	207.80	283.50	359.20	76.00	90.00	104.00	118.80	157.30	195.90
07/31/2022	118.70	175.90	233.00	68.00	71.00	74.00	70.50	108.30	146.10
08/31/2022	133.30	219.60	305.80	38.00	59.50	81.00	77.30	135.60	193.90
09/30/2022	161.80	185.90	210.00	67.00	70.00	73.00	116.90	194.80	272.60
06/30/2023	168.90	177.90	186.90	39.50	55.40	71.20	90.40	124.50	158.50
07/31/2023	173.40	174.90	176.30	20.70	35.80	50.90	75.20	83.80	92.30
08/31/2023	136.90	293.50	424.80	58.60	72.80	91.10	147.00	231.00	303.00
09/30/2023	186.90	241.10	301.10	71.20	80.10	92.40	158.50	221.50	315.00

Data Points, n	19	19	19	19	19	19	19	19	19
Minimum	12.00			20.70			46.60		
Average		204.67			68.64			128.17	
Maximum			429.00			638.00			315.00

Instream Dissolved Oxygen

Monitoring Period End Date	Downstream – Kentawka Canal			Downstream - Pearl River			Upstream – Wolf Creek		
	Daily Min, mg/l	Daily Avg, mg/l	Daily Max, mg/l	Daily Min, mg/l	Daily Avg, mg/l	Daily Max, mg/l	Daily Min, mg/l	Daily Avg, mg/l	Daily Max, mg/l
07/31/2019	7.00	7.10	7.10	5.10	5.30	5.50	7.10	7.20	7.20
08/31/2019	6.60	6.80	7.00	6.10	6.10	6.20	7.20	7.40	7.60
09/30/2019	6.20	6.40	6.50	5.50	5.70	5.80	4.90	5.00	5.20
06/30/2020	7.10	7.30	7.50	5.20	6.10	7.10	7.90	7.90	7.90
07/31/2020	7.00	7.10	7.10	5.10	5.80	6.50	6.80	7.40	8.00
08/31/2020	7.10	7.30	7.40	6.50	6.60	6.60	6.80	6.90	7.00
09/30/2020	6.50	7.30	8.20	6.60	7.10	7.80	5.40	6.60	7.50
06/30/2021	4.60	6.00	7.30	5.70	7.10	8.50	7.80	7.90	7.90
07/31/2021	6.60	6.70	6.70	6.30	6.40	6.60	7.20	7.20	7.20
08/31/2021	5.60	5.80	5.90	5.90	6.10	6.40	3.80	5.40	6.90
09/30/2021	7.00	7.20	7.50	6.20	7.20	8.20	7.60	7.70	7.80
06/30/2022	6.80	6.86	6.92	6.42	6.58	6.74	5.62	6.21	6.81
07/31/2022	6.20	6.30	6.40	6.20	6.20	6.20	5.70	6.30	6.90
08/31/2022	7.10	7.10	7.20	4.50	5.60	6.70	4.80	6.20	7.60
09/30/2022	6.70	7.00	7.30	5.30	5.70	6.20	6.90	7.00	7.00
06/30/2023	6.60	6.90	7.20	5.10	5.70	6.30	5.00	6.00	7.10
07/31/2023	4.20	5.70	7.10	4.80	5.70	6.70	7.20	7.30	7.40
08/31/2023	3.70	5.10	6.10	5.70	6.40	7.20	2.90	5.50	7.20
09/30/2023	4.80	6.00	7.20	6.30	6.60	7.10	2.00	3.00	5.00

Data Points, n	19	19	19	19	19	19	19	19	19
Minimum	3.70			4.80			2.00		
Average		6.63			6.21			6.53	
Maximum			8.20			8.50			8.00

Instream pH

Monitoring Period End Date	Downstream – Kentawka Canal		Downstream - Pearl River		Upstream – Wolf Creek	
	Daily Min, S.U.	Daily Max, S.U.	Daily Min, S.U.	Daily Max, S.U.	Daily Min, S.U.	Daily Max, S.U.
07/31/2019	6.90	7.00	6.70	6.90	7.10	7.20
08/31/2019	5.90	7.30	5.40	5.50	5.80	6.70
09/30/2019	7.10	7.40	6.60	6.60	6.90	6.90
06/30/2020	6.10	6.70	5.20	5.70	6.00	6.50
07/31/2020	6.00	7.70	4.80	6.80	5.90	7.40
08/31/2020	7.60	7.70	6.80	6.80	7.20	7.40
09/30/2020	7.50	7.60	6.90	7.10	6.90	7.30
06/30/2021	6.90	7.30	5.10	6.30	6.70	7.20
07/31/2021	6.80	7.50	6.50	6.70	6.80	7.40
08/31/2021	7.40	7.50	6.60	6.70	7.10	7.20
09/30/2021	6.90	7.50	6.10	6.80	6.90	7.40
06/30/2022	7.45	7.66	6.92	6.96	7.17	7.35
07/31/2022	7.10	7.50	6.80	6.80	6.80	7.30
08/31/2022	7.20	7.70	5.50	6.70	7.10	7.40
09/30/2022	7.30	7.50	6.30	6.60	7.30	7.60
06/30/2023	7.30	7.40	6.30	6.80	7.20	7.40
07/31/2023	7.00	7.10	5.60	6.50	7.10	7.20
08/31/2023	7.30	7.60	6.50	7.10	7.30	7.70
09/30/2023	7.30	7.50	6.80	7.00	6.70	7.40

Data Points, n	19	19	19	19	19	19
Minimum	5.90		4.80		5.80	
Maximum		7.70		7.10		7.70

Instream Temperature

Monitoring Period End Date	Upstream - Wolf Creek			Downstream - Kentawka Canal			Downstream - Pearl River		
	Daily Min, Deg F	Daily Avg, Deg F	Daily Max, Deg F	Daily Min, Deg F	Daily Avg, Deg F	Daily Max, Deg F	Daily Min, Deg F	Daily Avg, Deg F	Daily Max, Deg F
07/31/2019	74.10	73.10	75.00	78.10	78.30	78.40	72.90	73.10	73.40
08/31/2019	79.20	80.60	81.80	78.30	79.90	81.50	78.90	80.60	82.20
09/30/2019	81.40	78.60	82.50	79.70	81.50	83.30	78.00	78.60	79.20
06/30/2020	75.00	75.80	76.20	75.30	75.60	75.90	75.60	75.80	76.00
07/31/2020	77.20	79.60	79.50	75.80	78.60	81.30	76.90	79.60	82.20
08/31/2020	77.20	82.00	79.50	80.20	80.80	81.30	81.90	82.00	82.20
09/30/2020	69.10	76.20	81.10	68.20	75.70	82.90	70.50	76.20	84.40
06/30/2021	74.70	73.90	78.40	72.00	73.20	74.50	73.60	73.90	74.30
07/31/2021	75.70	75.40	79.70	75.60	77.00	78.40	75.20	75.40	75.60
08/31/2021	78.10	77.40	80.10	79.90	80.40	81.00	76.50	77.40	78.30
09/30/2021	72.50	73.60	77.50	70.30	72.90	75.40	72.00	73.60	75.20
06/30/2022	26.20	26.50	26.80	27.20	28.50	29.80	25.10	26.50	28.00
07/31/2022	79.30	79.10	81.10	80.60	81.40	82.20	77.90	79.10	80.20
08/31/2022	77.70	79.60	80.80	77.00	81.10	85.30	78.10	79.60	81.10
09/30/2022	78.10	77.30	78.60	78.60	78.60	78.60	76.50	77.30	78.10
06/30/2023	75.70	77.30	80.20	77.70	78.40	79.20	76.50	77.30	78.10
07/31/2023	79.30	78.60	81.90	77.70	78.40	78.30	78.40	78.60	78.80
08/31/2023	79.90	79.30	81.70	82.60	83.10	8.50	77.70	79.30	80.40
09/30/2023	75.70	76.80	77.40	77.20	78.20	78.20	76.50	76.80	77.20

Data Points, n	19	19	19	19	19	19	19	19	19
Minimum	26.20			27.20			25.10		
Average		75.47			75.87			74.77	
Maximum			82.50			85.30			84.40

Appendix 3 – Reasonable Potential Analysis

Method

The MBCI has not promulgated water quality standards for metals and organics for tribal waters. The receiving waterbody crosses the State/Tribal boundary shortly downstream of the outfall, and the State of Mississippi has promulgated metals and organics water quality standards. Therefore, the reasonable potential analysis was designed to assess if there is reasonable potential for the Pearl River WWTF's effluent to cause or contribute to the exceedance of the State of Mississippi's water quality standards at the State/Tribal boundary.

EPA's *Technical Support Document for Water Quality-Based Toxics Control* (1991 EPA/505/2-90-001) (TSD) provides guidance for assessing potential toxicity for metals and man-made organic toxicant pollutants. The following from the TSD Chapter 3 page 53 illustrates the methodology employed for this permit reissuance. The method references a Table 3-1 or 3-2 in the TSD for selection of reasonable potential multiplying factors. For this analysis, the EPA used the 95%ile (Table 3-2).

Box 3-2. Determining "Reasonable Potential" for Excursions Above Ambient Criteria Using Effluent Data Only

EPA recommends finding that a permittee has "reasonable potential" to exceed a receiving water quality standard if it cannot be demonstrated with a high confidence level that the upper bound of the lognormal distribution of effluent concentrations is below the receiving water criteria at specified low-flow conditions.

Step 1 Determine the number of total observations ("*n*") for a particular set of effluent data (concentrations or toxic units [TUs]), and determine the highest value from that data set.

Step 2 Determine the coefficient of variation for the data set. For a data set where $n<10$, the coefficient of variation (CV) is estimated to equal 0.6, or the CV is calculated from data obtained from a discharger. For a data set where $n>10$, the CV is calculated as standard deviation/mean (see Figure 3-1). For less than 10 items of data, the uncertainty in the CV is too large to calculate a standard deviation or mean with sufficient confidence.

Step 3 Determine the appropriate ratio from Table 3-1 or 3-2.

Step 4 Multiply the highest value from a data set by the value from Table 3-1 or 3-2. Use this value with the appropriate dilution to project a maximum receiving water concentration (RWC).

Step 5 Compare the projected maximum RWC to the applicable standard (criteria maximum concentration, criteria continuous concentration [CCC], or reference ambient concentration). EPA recommends that permitting authorities find reasonable potential when the projected RWC is greater than an ambient criterion.

Example

Consider the following results of toxicity measurements of an effluent that is being characterized: 5 TU_c, 2 TU_c, 9 TU_c, and 6 TU_c. Assume that the effluent is diluted to 2 percent at the edge of the mixing zone. Further assume that the CV is 0.6, the upper bound of the effluent distribution is the 99th percentile, and the confidence level is 99 percent.

Step 1 There are four samples, and the maximum value of the sample results is 9 TU_c.

Step 2 The value of the CV is 0.6.

Step 3 The value of the ratio for four pieces of data and a CV of 0.6 is 4.7.

Step 4 The value that exceeds the 99th percentile of the distribution (ratio times x_{max}) after dilution is calculated as:

$$[9\ TU_c \times 4.7 \times 0.02] = 0.85\ TU_c.$$

Step 5 0.85 TU_c is less than the ambient criteria concentration of 1.0 TU_c. There is no reasonable potential for this effluent to cause an excursion above the CCC.

Due to the low drought flow in the stream, the conservative assumption was made to not provide the facility a dilution allowance so that the State of Mississippi's water quality standards were applied at end-of-pipe.

Average effluent hardness and TSS values were calculated from DMR data and data from Application Form 2A Part D (see Appendix 2), and flows and calculated combined hardness and TSS are shown in Table 1 below. Table 2 includes the calculations and results of the reasonable potential analysis, as well as the calculated water quality-based effluent limits (WQBELs) for the pollutants of concern (shown in the second to last column from the right). The results showed reasonable potential for the facility to cause or contribute to a violation of the State of Mississippi's copper and zinc water quality criteria downstream. Therefore, copper effluent limits of 14.81 µg/l monthly average and 21.26 µg/l daily maximum and zinc effluent limits of 0.225 mg/L monthly average and 0.227 mg/L daily maximum have been included in the permit. More details on the limit calculations for copper can be found in Appendix 5.

Table 1. Facility and Receiving Water Characteristics

Stream Flow 7Q10, cfs	0
Effluent Flow, cfs	2.23
Combined Flow, cfs	2.23
Instream Waste Concentration	100%
Background Instream Hardness, mg/L CaCO3	0
Effluent Hardness, mg/L CaCO3	60
Combined Instream Hardness, mg/L CaCO3	60
Background Instream TSS, mg/L	0
Effluent TSS, mg/L	4.78
Combined Instream TSS	4.78

Table 2. Reasonable Potential Analysis and WQBEL Calculation

Parameter		Background (ug/L)	Max Effluent Concentration (mg/L)	Average effluent concentration (mg/L)	n	CV MF	WQC (mg/L)	Receiving Water Conc. (mg/L)	RP?
Zinc	Acute	0	0.0858	0.0462	3	5.6	0.0760	0.06092	YES
	Chronic	0	0.0858	0.0462	3	5.6	0.0752	0.3280	YES
Copper	Acute	0	0.0239	0.00899	51	1.7	0.00867	0.0406	YES
	Chronic	0	0.0239	0.00899	51	1.7	0.00604	0.0153	YES

Appendix 4 – Ammonia Toxicity Analysis

The MBCI has not promulgated WQS. The State of Mississippi has adopted the *1999 Update of Ambient Water Quality Criteria for Ammonia; EPA document number EPA-822-R-99-014* for ammonia toxicity. Toxicity-based ammonia limits have been developed for this permit so that these criteria will be met at the State/Tribal boundary and in state waters.

Criterion Maximum Concentration (CMC) - Salmonid Fish Present

$$CMC = \frac{0.0577}{1 + 10^{(7.204 - pH)}} + \frac{39.0}{1 + 10^{(pH - 7.204)}}$$

CMC = Instream criterion maximum concentration for total ammonia

pH = 7 SU

Instream CMC = 24.10 mg/l

$$C_E = \frac{[CMC \times (Design\ Flow + 7Q10)] - (7Q10 \times C_B)}{Design\ Flow}$$

Where:

C_B = Upstream ammonia concentration = 0 mg/l

C_E = Allowable ammonia effluent concentration, mg/l

C_E = 24.10 mg/l

Criterion Continuous Concentration (CCC) – Early Life Stages Present

$$CCC = \left(\frac{0.0577}{1+10^{(7.688 - \mathrm{pH})}} + \frac{2.487}{1+10^{(\mathrm{pH} - 7.688)}}\right) \times MIN(2.85, 1.45 \times 10^{[0.028 \times (25 - T)]})$$

CCC = Instream criterion continuous concentration for total ammonia

$$C_E = \frac{[CCC \times (Design\ Flow + 7Q10)] - (7Q10 \times C_B)}{Design\ Flow}$$

Where:

C_B = Upstream ammonia concentration = 0 mg/l

C_E = Allowable ammonia effluent concentration, mg/l

Summer (May 1st – Oct 31st)

pH = 7 SU, T = 30 °C

CCC (Summer) = 2.18 mg/l

C_E (Summer) = 2.18 mg/l

Winter (Nov 1st – Apr 30th)

pH = 7 SU, T = 20 °C

CCC (Winter) = 4.15 mg/l

C_E (Winter) = 4.15 mg/l

The seasonal limits based on the Instream CCC criteria are more stringent than the limit based on the Instream CMC criteria. Therefore, the limits of 2.18 mg/l (Summer) and 4.15 mg/l (Winter) will be used to compare against the DO-based ammonia WQBELs developed in the QUAL-2E model.

Appendix 5 – Calculation of Copper Limits

The calculation of total recoverable copper limits for this facility relied on Mississippi's adopted hardness-based copper water quality criteria and the TSS-based metals translator as outlined in EPA's 1996 Metals Translator Guidance. Average values of effluent hardness and TSS were calculated based on reported effluent data in DMRs and Application Form 2A Part D (see Appendix 2). The equations used were as follows:

Acute Copper Criteria

$$CMC_{total\ dissolved}, \frac{\mu g}{l} = e^{0.9422 \times \ln(Total\ Hardness, mg/l) - 1.7} \times 0.96$$

An average effluent hardness value of 60.16 mg/l was used to calculate a $CMC_{total\ dissolved}$ value of 8.67 µg/l

Chronic Copper Criteria

$$CCC_{total\ dissolved}, \frac{\mu g}{l} = e^{0.8545 \times \ln(Total\ Hardness, mg/l) - 1.702} \times 0.96$$

An average effluent hardness value of 60.16 mg/l was used to calculate a $CCC_{total\ dissolved}$ value of 6.04 µg/l

TSS-based Metals Translator for Copper

$$K_p = = 1.04 \times 10\text{^}6 \times TSS\text{^}(-0.7436)$$

$$f_D = 1/(1 + TSS \times K_p \times 10\text{^} - 6)$$

$$C_{total\ recoverable}, \frac{\mu g}{l} = C_{total\ dissolved}, ug/l/\ f_D$$

An average effluent TSS value of 4.78 mg/l was used to calculate a K_p value of 325155 and an f_D value of 0.39. The total recoverable CMC and CCC values were then calculated to be 8.67 µg/l and 6.04 µg/l, respectively. Because no dilution allowance was granted to this facility, the daily maximum and monthly average copper limits were calculated to be 21.26 µg/l and 14.81 µg/l, respectively.

Appendix 6 – Calculation of Zinc Limits

The calculation of total recoverable zinc limits for this facility relied on Mississippi's adopted hardness-based zinc water quality criteria and the TSS-based metals translator as outlined in EPA's 1996 Metals Translator Guidance. Average values of effluent hardness and TSS were calculated based on reported effluent data in DMRs and Application Form 2A Part D (see Appendix 2). The equations used were as follows:

Acute Zinc Criteria

$$CMC_{total\ dissolved}, \frac{\mu g}{l} = e^{(\ln((Total\ Hardness, mg\ /l)\text{x } 0.8473)+0.884)}$$

An average effluent hardness value of 60.16 mg/l was used to calculate a $CMC_{total\ dissolved}$ value of 77.72 µg/l

Chronic Copper Criteria

$$CCC_{total\ dissolved}, \frac{\mu g}{l} = e^{(\ln((Total\ Hardness, mg/l)\text{x } 0.8473)+0.884)}$$

An average effluent hardness value of 60.16 mg/l was used to calculate a $CCC_{total\ dissolved}$ value of 77.72 µg/l

TSS-based Metals Translator for Copper

$$K_p = = 1.25 \times 10\text{^}6 \times TSS\text{^}(-0.7038)$$

$$f_D = 1/(1 + TSS \times K_p \times 10\text{^} - 6)$$

$$C_{total\ recoverable}, \frac{\mu g}{l} = C_{total\ dissolved}, ug/l/\ f_D$$

An average effluent TSS value of 4.78 mg/l was used to calculate a K_p value of 415904.26 and an f_D value of 0.33. The total recoverable CMC and CCC values were then calculated to be 77.722 µg/l and 77.722 µg/l, respectively. Because no dilution allowance was granted to this facility, the daily maximum and monthly average zinc limits were calculated to be 227 µg/l (0.227 mg/L) and 224.7 µg/l (0.225 mg/L), respectively.