FACT SHEET
AND
PERMIT RATIONALE

Westinghouse Electric Company LLC
Columbia Fuel Fabrication Facility
NPDES Permit No. SC0001848

Permitting Engineer: Byron M Amick

January 23, 2020
Revised: 09/13/2023

Facility Rating: ☒ Major ☐ Minor

☐ Issuance (New) ☒ Reissuance ☐ Modification ☐ Minor Modification

If any part of this application is for a new facility or expansion of an existing facility or increase in permitted limits, an antidegradation review may be required per the requirements of R.61-68.D. If required, the antidegradation review will be included as part of the permit application.

Site Address: 5801 Bluff Road, Hopkins, SC 29061
County: Richland
Watershed: Basin 02 (Saluda-Edisto River Basin)

Facility Description (include SIC/NAICS codes): This facility fabricates nuclear fuel assemblies. The plant also produces control rods and mechanical components. SIC Code is 2819; Industrial Inorganic Chemicals, not elsewhere classified. NAICS Code is 325180; Other Basic Inorganic Chemical Manufacturing.

Receiving Waters and Classification by outfall: 001-Congaree River-Freshwater (FW)

Is any discharge to Impaired Waters? Yes (see State 303(d) list for impaired waters)
If Yes, list the monitoring station number(s) and parameter(s) causing impairment: The entire Congaree River from Columbia to the Santee River is listed as impaired for mercury in the 2018 South Carolina Fish Consumption Advisories, which includes monitoring stations C-007, C-007A and C-007F. Monitoring stations S-995, S-996 and S-997 were removed from the list of impaired stations in 2012 due to the fecal coliform standard being attained.

Is any discharge to a waterbody or for a parameter listed in an approved TMDL? No
If Yes, list the parameter(s) for which the TMDL is written and the waterbody segments impacted: N/A

Does any discharge have the potential to affect a threatened or endangered species? Yes
If Yes, list the species and the waterbody in which the species resides: Shortnose Sturgeon - Congaree/Santee Rivers

Outfalls are discussed in Section I of this rationale with a general description of the discharge, treatment system, stream flows and other pertinent information about each outfall.

EPA review of the draft permit is required if any box below is checked (Mark all that apply)

☐ Permits with discharges which may affect the waters of another State (Coordination with the other State is also required)

List State and name of waterbody(ies) that reach affected state: None

☒ Major permits

☒ Permits with any discharge subject to any of the primary industrial categories (see R.61-9.122, Appendix A)

☒ Permits with any discharge of process wastewater with an average flow exceeding 0.5 MGD

☐ Permits which incorporate pollutant trading

☐ Priority permits

☐ Modification(s) to any permit listed above or a mod that changes a permit to put it into one of the above categories (where it previously was not)

List of Attachments to this Rationale:

Attachment 1	Permit Application
Attachment 2	Water Quality Spreadsheets
Attachment 3	Wasteload Allocation
Attachment 4	Treatment Description Table
Attachment 5	Maps
Attachment 6	PQL List
Attachment 7	Anti-degradation Analysis
Attachment 8	DMR Data

I. PERMIT LIMITATIONS AND MONITORING REQUIREMENTS

Facility Description

The Westinghouse Columbia Fuel Site is a nuclear fuel production facility, which began production in 1969. The facility fabricates nuclear fuel assemblies containing low enriched (<5% U-235) uranium oxide fuel for use in commercial nuclear-powered reactors. The plant also produces control rods and mechanical components. The fabrication process involves the chemical conversion of uranium hexafluoride to uranium oxide using the ammonium diuranate process or other alternate processes. The uranium dioxide is formed into ceramic fuel pellets, which are used in the nuclear fuel assembly. Some pellets contain nuclear absorbers (e.g., boron). The pellets are loaded into metal fuel rods and the rods are assembled into bundles. Various ancillary operations are carried out in support of the conversion and fabrication process including: oxidation, dissolution, chemical precipitation, scrap recovery, cylinder cleaning, washing, incineration, solvent extraction, and waste treatment. Other support operations are conducted in the mechanical fabrication area including: welding, metal fabrication, metal plating, and quality control testing.

Outfall 001

Description of outfall, receiving water and wastewater treatment system: This outfall is comprised of treated process wastewater (including utility waters), other treated contaminated wastewater and treated sanitary wastewater (**internal Outfall 01A**). The long-term average flow from these sources is expected to be approximately 0.1 MGD. The effluent is pumped approximately 4 miles from the facility for discharge through a diffuser to the Congaree River. (Outfall 001 Location: See Attachment 5.) The diffuser is approximately fifteen feet below the river surface. Diffuser details are provided in the Whole Effluent Toxicity section of this rationale. This discharge is also regulated by the Nuclear Regulatory Commission (NRC) and is monitored per their specifications and the results are reported to the NRC.

There are three distinct wastewater streams at the Columbia Fuel Fabrication Facility (CFFF). The three streams (process, sanitary, and contaminated) are managed separately in preliminary stages of treatment to provide the best, specific treatment before being combined into a single outfall that is monitored before being discharged to the Congaree River. At least once per week, environmental samples are collected from the site's composite sampler and sent to either the on-site Chem Lab or an off-site laboratory to evaluate the discharge against permitted values set by DHEC.

Influents to the Process Sump are supplied from locations that have not been in direct contact with uranium, such as the tank farm (bulk chemical storage) containment pad, mechanical ultrasonic testing "UT" cleaner and furnaces, and DI water regeneration. The Sanitary Sump is also supplied from locations that do not contain uranium such as facility toilets, wastewater from cafeteria operations, and nonhazardous UCON wastewater. The Contaminated Sump is supplied from locations where low levels of uranium could be present such as shower areas and sinks for chemical area workers and laboratory sinks. As a precaution, investigation derived waste (IDW) from groundwater well sampling is also added to the contaminated sump. Details of treatment for each of the contributing wastewater streams are describe as follows:

Contaminated Wastewater Stream

The contaminated sump is pumped and batched into a 30,000-gallon holding tank. The tank is continuously recirculated. Once full, the tank is sampled for F (mg/l), NH3 (mg/l), pH, and activity. A self-imposed process limit of 3.0 E-06 uCi/ml for activity is established at this point in the treatment system to ensure adequate uranium removal. If the activity criterion of 3.0 E-06 uCi/ml is exceeded, the contents are recirculated though 1 micron filter canisters to remove particulate Uranium. If after recirculation, the activity criterion of 3.0 E-06 uCi/ml is still exceeded, sodium hydroxide is added to the tank to facilitate uranium precipitation followed by additional filtration. When the tank contents meet the discharge criterion for activity, it is pumped to the Sanitary Sump System to be further processed with the plant sanitary wastewater.

Process Wastewater Stream

Effluent from Conversion, commonly called "aqueous waste" at CFFF, is processed through the Waterglass Liquid Waste Effluent Treatment Facility, "Waterglass". The Waterglass process is used to recover residual uranium from process wastewater streams that service the chemical area of the plant where unencapsulated uranium is used to manufacture nuclear fuel. UF6 or uranyl nitrate are converted into UO2 powder in a process called "Conversion". The powder is pressed into pellets for use in nuclear fuel assemblies. The primary contributor to the Waterglass process is the wastewater from the Conversion Process. Other contributors to the Waterglass process include chemical area liquid scrubber effluents, precipitates from the Scrap Recycling Area including ammonia, ammonium fluoride, and ammonium nitrate. Another separate feed into Waterglass is the effluent from the cylinder re-certification process, which contains trace amounts of uranium from hydrostatic testing of cleaned UF6 cylinders. Waterglass process streams account for approximately 15,000 gpd.

In the Waterglass treatment process, the aqueous waste stream is contacted with sodium silicate solution. Sodium silicate entraps (flocculates) insoluble uranium and precipitates soluble uranium out of the liquid ammonia wastewater. The precipitated uranium is processed through a filter plate system and dewatered before being returned to the conversion process. The liquid ammonia wastewater is then purified though one of two on-site distillation columns. The still "bottoms", which have limited ammonia content and are comprised predominantly of water and calcium fluoride are sent to the West II lagoon for settling and then to the West I lagoon for further settling. From the West lagoons, process wastewater is pumped to either the North or South Lagoon. The North and South Lagoons serve the same purpose and are used alternately to further aerate and settle process wastewater. Over time solids accumulate in the process lagoons and dredging is necessary.

Process wastewater also enters T-1140 (Above ground storage tank that replaced the former East Lagoon) and from there the effluent flows to either the North or South Lagoon, depending on which lagoon is filling and which is discharging at the time. Alternately, T-1140 can be discharged directly to the lift station. Prior to discharge, a four-corner sample is collected and tested for F (mg/l), NH_3 (mg/l), TSS (mg/l), pH, and activity. Discharged process water mixes with sanitary wastewater in an underground pipe following disinfection. The combined process and sanitary effluent feed the Lift Station. From the lift station, effluent flows to the final aerator where the water is adjusted for pH and dechlorinated with sulfur dioxide. The final vessel in the treatment system is the "Round tank". Treated wastewater from the Round Tank is routed to sample valves in the “EPA Building” where both grab and composite sampling will occur. The EPA Building is a temperature-controlled building in the wastewater treatment area, which also houses process instrumentation and refrigerated composite sampling equipment. In-line sample analyzers divert flow back to the lift station for any parameters outside the acceptable range for pH and total chlorine.

Sanitary Wastewater Stream

The sanitary wastewater flow is directed though the sanitary sump to a biologically engineered single sludge treatment (BESST) activated sludge package plant. The package plant contains anoxic and aerobic digestion chambers for reducing Biochemical Oxygen Demand (BOD) in the wastewater. Raw sewage enters through a bar screen and mixes with activated sludge from the bottom of the clarifier where nitrates are converted to nitrogen gas by biological denitrification. In the next step of treatment, wastewater under-flows into the far end of the aeration chamber. The aeration portion of the package plant provides oxygen and mixing through fine bubble diffusers. Nitrogen in the form of ammonia is oxidized to nitrate (nitrification). Aerated mixed liquor flows into the bottom of the clarifier. The V-notched up-flow clarifier in the unit forms a sludge layer on the bottom that acts as a filter to collect the floc on the bottom while also allowing the clear effluent to discharge from the plant into the back corner of the Sanitary Lagoon. Sludge containing solids that cannot be broken down are pumped to settling tanks and then filtered in the dewatering building. Solids are drummed and shipped off site for burial at a low-level radioactive landfill.

The Sanitary Lagoon is a facultative pond with surface aeration and an anaerobic bottom. The discharge of the sanitary lagoon flows to the chlorination chamber where it is disinfected with gaseous chlorine. The outfall after the chlorination chamber combines with the North and South Lagoon discharge in an underground pipe that flows to the lift station. The lift station pumps the wastewater to the final aerator and round tank for final treatment and analysis prior to discharge through the outfall line to the Congaree River.

Calcium Fluoride Lagoon Dredging and Stormwater Runoff

A contracted company works on-site at CFFF to remove and dewater the settled calcium fluoride material from the lagoons. The dewatered material is moved to a concrete storage pad. The pad is sloped with trenches and a drain system so that Stormwater runoff is collected and routed to a gravity drain system that is piped directly to the West II Lagoon. Calcium Fluoride material is sampled and staged on the pad while waiting on results. If the material meets the free-release criteria specified in the NRC license, it is released for recycling in the cement industry. Material that does not meet the free-release criteria must be disposed of as low-level radioactive waste.

Operator requirements: Based on the treatment system described above and the Pollution Control Act (PCA), the treatment system is classified as Group III-Biological. The Environmental Certification Board Rules require that a Grade B-Biological operator be assigned to operate this facility. Inspections of the facility will be required daily per Regulation 61-9.122.41(e). In accordance with Regulation 61-9.122.41(e)(3)(ii)(B), the permittee has submitted a staffing plan justifying a lower grade operator for limited time periods (i.e., sick leave, vacation, weekends, holidays).

Information for this outfall is based on NPDES Permit Application: 2C dated 09/29/2017.

Data from Discharge Monitoring Reports (DMRs) and NPDES permit application (including all subsequent data presented) from 08/01/2019 - 09/30/2022 has been used to evaluate permit limitations.

This outfall is outside a state-approved source water protection area (SWPA) for a surface water drinking water intake and has the potential to affect the intake. The affected intake (Intake #S*38102*) is owned by Lake Marion Regional Water Authority. The 7Q10 and AAF to be used for permitting MCL and water/organism criteria are given on the spreadsheet. Additional information on source water protection is provided in sections III.B and G of this rationale.

Previous permit limits are based on the permit effective date of April 1, 2013.

All waterbody data is provided on the attached Water Quality Spreadsheets. This data includes 7Q10, annual average flow, dilution factors, hardness, TSS and other information as explained in this rationale. Additional information as necessary to explain the values used will be provided below.

A. Flow

1. Previous permit limits:
   Monthly Average: MR, MGD
   Daily Maximum: MR, MGD
   Sampling Frequency: daily
   Sample Type: continuous
2. NPDES Application
   a. 2C dated 09/29/2017 (No. of analyses: 179):
      Maximum Daily Value: 0.218 MGD
      Maximum 30-Day Value: 0.562 MGD
      Long Term Average Value: 0.097 MGD
3. DMR Data: The highest flow was reported in 08/2021 as 0.201 MGD
   Actual long term average flow (from DMR: 08/2019 to 09/2022): 0.1041 MGD
4. Conclusion: Effluent flow monitoring will continue as previously permitted.
   Monthly Average: MR, MGD
   Daily Maximum: MR, MGD
   Sampling Frequency: daily
   Sample Type: continuous

B. Ultimate Oxygen Demand (UOD)

1. Previous permit limits: No monitoring required
2. NPDES Application: not a 2C parameter
3. DMR Data: Reporting not required
4. Water Quality Modeling Recommendation: "Due to reduced stream flow and reduced assimilative capacity in the Congaree River, the Central Midlands COG agreed to a 35% critical UOD reduction for Westinghouse and other facilities."
   Equivalent UOD: critical: 265.5 lbs/day; seasonal: ---
   Calculated as
   UOD = [BOD_5 * (f-ratio)} + (NH3-N * 4.57)] * Flow * 8.34

where: UOD = Ultimate Oxygen Demand (lbs/d)
BOD_5 = Biological Oxygen Demand - five-day (mg/l)
f-ratio = based on type of discharge; for this permit 3.0 will be used
NH_3-N = Ammonia as nitrogen (mg/l)
Flow = effluent flow (MGD)
8.34 = units conversion factor

5. Conclusion: The UOD limits will be established for the critical summer months of March thru October as follows based on the dissolved oxygen model. UOD during the winter months will not be limited, but a requirement to monitor and report results will be included. Monitoring frequency for UOD will be consistent with the frequency required in the previous permit for each parameter used to calculate the UOD. Using the UOD Calculation of:

UOD (lbs/day) = [(BOD_5 (mg/l) x 3.0) + (NH3-N (mg/l) x 4.57)] x Flow (MGD) x 8.34

Final Limits Summer (Mar-Oct):
Monthly Average: 265.5 lbs/day
Daily Maximum: 531.0 lbs/day
Sampling Frequency: 1/week
Sample Type: calculation

Final Limits Winter (Nov-Feb):
Monthly Average: MR, lbs/day
Daily Maximum: MR, lbs/day
Sampling Frequency: 1/week
Sample Type: calculation

C. Dissolved Oxygen (DO)

1. Previous permit limits:
   Minimum: 1.0 mg/l (at all times)
   Sampling Frequency: 1/week
   Sample Type: grab
2. NPDES Application: (reporting not required)
3. DMR Data: The lowest value was reported in 10/20 as 5.8 mg/l
4. Water Quality Modeling Recommendation (Wasteload Allocation): 5.0 mg/l
5. *S.C. Water Classifications and Standards (S.C. Reg. 61-68)*: This discharge is to the Congaree River, which is a listed Class **Freshwaters (FW)** stream. Therefore, the instream standard for DO for this stream is "daily average not less than 5.0 mg/l with a low of 4.0 mg/l".
6. Conclusion: The Wasteload Allocation has determined that a minimum DO of 5.0 mg/l in the discharge from this facility is necessary to ensure that the instream standard is maintained. Therefore, the final limit will be:
   Daily Minimum: 5.0 mg/l
   Sampling Frequency: 1/week
   Sample Type: grab

D. Biochemical Oxygen Demand (BOD_5)

1. Previous permit limits:
   Monthly Average: 30 lbs/day; MR, mg/l
   Daily Maximum: 60 lbs/day; MR, mg/l
   Sampling Frequency: 1/week
   Sample Type: 24-hr composite
2. NPDES Application
   a. 2C dated 09/29/2017 (No. of analyses: 155):
      Maximum Daily Value: 98.3 lbs/day; 83.6 mg/l
      Maximum 30-Day Value: 27.6 lbs/day; 35.0 mg/l
      Long Term Average Value: 14.8 lbs/day; 18.0 mg/l
3. DMR Data: The highest value was reported in 08/2015 as 98.3 lbs/day and 83.6 mg/l
4. Water Quality Modeling (Wasteload Allocation): The critical (summer) BOD can be monitor and report, because the UOD limitation will regulate BOD in the discharge. The seasonal (winter) BOD will be limited to 64.8 mg/l, which is equivalent to the current permit limit of 30 lbs/day based on the effluent flow used in the model.
5. PQL: 2.0 mg/l (Method SM5210B)
6. Conclusion: Based on the Wasteload Allocation, BOD during the summer months will be monitored and results reported in order to collect data for use in the UOD calculation. During the winter months the mass limit will remain as previously permitted with a monitor and report results for the concentration values.

   Final Limits Summer (Mar-Oct):
   Monthly Average: MR, lbs/day; MR, mg/l
   Daily Maximum: MR, lbs/day; MR, mg/l
   Sampling Frequency: 1/week
   Sample Type: 24-hr composite

   Final Limits Winter (Nov-Feb):
   Monthly Average: 30 lbs/day; MR, mg/l
   Daily Maximum: 60 lbs/day; MR, mg/l
   Sampling Frequency: 1/week
   Sample Type: 24-hr composite

E. pH

1. Previous permit limits: between 6.0 and 9.0 standard units.
   Sampling Frequency: daily
   Sample Type: continuous
2. NPDES Application
   a. 2C dated 09/29/2017 (No. of analyses: cont.):
      minimum: 6.05 standard units
      maximum: 8.53 standard units
3. DMR Data: The lowest and highest values were reported as 4.49 and 9.14, both in 01/2014.
   Length of longest pH excursion: 50 minutes
   Percent of time exceeding pH limit: 0.49 %
4. *S.C. Water Classifications and Standards (S.C. Reg. 61-68)*: Section G.10.f. states that the Class **FW** standards for pH shall be "between 6.0 and 8.5".

5. Conclusion: Variations of pH in the discharge outside of the instream water quality standard can only be considered if there is sufficient critical flow in the receiving stream to maintain the water quality standard. The critical flow is identified as 1247.8 cfs or 805 MGD, the ratio of the receiving stream flow to the discharge is 7,824:1. As a result of this large dilution ratio (greater than 10), the stream's ambient pH is not expected to be altered by a 0.5 su change in the pH limitation. The pH limits shall remain between 6.0 and 9.0 standard units.
   Sampling Frequency: daily
   Sample Type: continuous

F. <u>Total Suspended Solids (TSS)</u>

1. Previous permit limits:
   Monthly Average: 32 lbs/day; MR, mg/l
   Daily Maximum: 64 lbs/day; MR, mg/l
   Sampling Frequency: 1/week
   Sample Type: 24-hr composite
2. NPDES Application
   a. 2C dated 09/29/2017 (No. of analyses: 155):
      Maximum Daily Value: 25.4 lbs/day; 26 mg/l
      Maximum 30-Day Value: 16 lbs/day; 18 mg/l
      Long Term Average Value: 9.0 lbs/day; 10.7 mg/l
3. DMR Data: The highest value was reported in 05/2018 as 32 lbs/day and 49 mg/l
4. Contributing loadings by operation (see outfall 001 description in Part I of the rationale).
   a. Wastewater Flow = 55,000 gpd; assumed average TSS of 40 mg/l
      Monthly Average: 40 mg/l x 8.34 x 0.055 MGD = 18.35 lbs/day
      Daily Maximum: 2(40 mg/l x 8.34 x 0.055 MGD) = 36.70 lbs/day
   b. Wastewater Flow = 19,000 gpd; assumed average TSS of 20 mg/l
      Monthly Average: 20 mg/l x 8.34 x 0.019 MGD = 3.17 lbs/day
      Daily Maximum: 2(20 mg/l x 8.34 x 0.019 MGD) = 6.34 lbs/day
   c. Wastewater Flow = 7,000 gpd; assumed average TSS of 20 mg/l
      Monthly Average: 20 mg/l x 8.34 x 0.007 MGD = 1.17 lbs/day
      Daily Maximum: 2(20 mg/l x 8.34 x 0.007 MGD) = 2.34 lbs/day
   d. Wastewater Flow = 60,000 gpd; assumed average TSS of 30 mg/l
      Monthly Average: 30 mg/l x 8.34 x 0.060 MGD = 15.01 lbs/day
      Daily Maximum: 2(30 mg/l x 8.34 x 0.060 MGD) = 30.02 lbs/day
   Total loading:
      Monthly Average: (18.35 + 3.17 + 1.17 + 15.01) lbs/day = 37.70 lbs/day
      Daily Maximum: (36.70 + 6.34 + 2.34 + 30.02) lbs/day = 75.40 lbs/day
5. PQL: 1.0 mg/l (Method SM2540D)
6. Conclusion: This facility has demonstrated via the DMR submittals that it has a history of compliance with the existing TSS limitation. Therefore, using the anti-backsliding regulation, the TSS limit will remain as previously permitted.
   Monthly Average: 32 lbs/day; MR, mg/l
   Daily Maximum: 64 lbs/day; MR, mg/l
   Sampling Frequency: 1/week
   Sample Type: 24-hr composite

G. Oil and Grease

1. Previous permit limits: not limited
2. NPDES Application
   a. 2C dated 09/29/2017 (No. of analyses: 1):
      Maximum Daily Value: <1.49 lbs/day; <1.17 mg/l
      Maximum 30-Day Value: -- lbs/day; -- mg/l
      Long Term Average Value: -- lbs/day; -- mg/l
3. DMR Data: Reporting not required
4. Regulation 61-68: Water Classifications and Standards
   Section E.5. - All ground waters and surface waters of the State shall at all times, regardless of flow, be free from:
   (b) Floating debris, oil, grease, scum, and other floating material attributable to sewage, industrial waste, or other waste in amounts sufficient to be unsightly to such a degree as to create a nuisance or interfere with classified water uses or existing water uses;
5. PQL: 5 mg/l
6. Conclusion: In the existing permit there is a prohibition against the effluent causing a visible sheen on the receiving water. With the introduction of the UCON wastewater, which contains lubricant, a direct measure of oil and grease in the effluent would be required. The UCON lubricant has been described as "food grade". To determine if the UCON lubricant has the reasonable potential to cause or contribute to a violation of the standard, two methods of monitoring will be required, the Hexane Extractable method and the Freon Extr-Grav method. This monitoring requirement will only become active once the UCON wastewater stream has been added to the wastewater treatment system with final discharge through the outfall. The Department may revisit the need to monitor oil and grease in the discharge based on sufficient results collected after the UCON wastewater stream has been added to the wastewater treatment system.
   Monthly Average: MR, mg/l
   Daily Maximum: MR, mg/l
   Sampling Frequency: 1/month
   Sample Type: grab

H. Total Nitrogen (as N)

1. Previous permit limits: No monitoring required
2. NPDES Application: not a 2C parameter
3. DMR Data: Reporting not required
4. Water Quality Modeling Recommendation: Monitor and Report Results.
5 See the Part III.G.1.c.ii of this rationale for guidelines for the discharge of nutrients.
6. Conclusion: Based on the Water Quality Modeling recommendation for the protection of downstream lakes, a requirement to monitor and report data will be established.
   Monthly Average: MR, mg/l
   Daily Maximum: MR, mg/l
   Sampling Frequency: 1/month
   Sample Type: 24-hr composite

I. Ammonia-Nitrogen, Total as N

1. Previous permit limits:
   Monthly Average: 50 lbs/day; MR, mg/l
   Daily Maximum: 100 lbs/day; MR, mg/l
   Sampling Frequency: 1/week
   Sample Type: 24-hr composite
2. NPDES Application
   a. 2C dated 09/29/2017 (No. of analyses: 155):
      Maximum Daily Value: 30.6 lbs/day; 32.7 mg/l
      Maximum 30-Day Value: 24.4 lbs/day; 27.1 mg/l
      Long Term Average Value: 7.9 lbs/day; 9.4 mg/l
3. DMR Data: The highest mass value was reported in 02/2014 as 34.48 lbs/day and the highest concentration value was reported in 04/2018 as 58.3 mg/l
4. Water Quality Modeling (Wasteload Allocation): The critical (summer) Ammonia can be monitor and report, because the UOD limitation will regulate Ammonia in the discharge. The seasonal (winter) Ammonia will be limited to 54.01 mg/l, which is equivalent to the current permit limit of 50 lbs/day based on the effluent flow used in the model.
5. Water Quality Criteria for Protection of Aquatic Life from Reg. 61-68, Appendix, Attachment 3: Freshwater:

   In situations where salmonids are absent, the CMC may be calculated as:

   $$\text{CMC} = \left\{ \frac{0.411}{1+10^{7.204-pH}} + \frac{58.4}{1+10^{pH-7.204}} \right\}$$

   Establish the CCC when fish early life stages (ELS) are present:

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

   Note: The Department always considers fish early life stages to be present unless data is presented which demonstrates their absence.

   Where:
   pH = 7.5
   Stream temp (critical) = 27.42°C
   Stream temp (seasonal) = 16.06°C
   Headwater concentration = 1.34 mg/l (critical) and 2.45 mg/l (seasonal)
   Critical months are March – October and November - February is seasonal.

   CCC (critical) = 1.90 mg/l CCC (seasonal) = 3.951 mg/l
   CMC (critical) = 19.89 mg/l CMC (seasonal) = 19.89 mg/l

   With dilution:
   Monthly average (critical): 4,104.22 mg/l Monthly average (seasonal): 11,010.15 mg/l
   Daily maximum (critical): 136,024.78 mg/l Daily maximum (seasonal): 127,886.58 mg/l
6. PQL: 0.1 mg/l

7. Conclusion: Based on the Wasteload Allocation, Ammonia during the summer months will be monitored and results reported in order to collect data for use in the UOD calculation. During the winter months the mass limit will remain as previously permitted with a monitor and report results for the concentration values.

    Final Limits Summer (Mar-Oct):
    Monthly Average: MR, lbs/day; MR, mg/l
    Daily Maximum: MR, lbs/day; MR, mg/l
    Sampling Frequency: 1/week
    Sample Type: 24-hr composite

    Final Limits Winter (Nov-Feb):
    Monthly Average: 50 lbs/day; MR, mg/l
    Daily Maximum: 100 lbs/day; MR, mg/l
    Sampling Frequency: 1/week
    Sample Type: 24-hr composite

J. Nitrate Nitrogen

1. Previous permit limits: No monitoring required
2. NPDES Application
    a. 2C dated 09/29/2017 (No. of analyses: 1, Nitrate-Nitrite):
        Maximum Daily Value: 1505 lbs/day; 1180 mg/l
        Maximum 30-Day Value: -- lbs/day; -- mg/l
        Long Term Average Value: -- lbs/day; -- mg/l
3. DMR Data: Reporting not required
4. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: No
5. PQL: 20 µg/l
6. Conclusion: There is no reasonable potential based on statistical analysis, however due to the nature of the discharge, this parameter will be added to the permit as an indicator parameter. This will be consistent with the other nitrogen/nutrient components potentially in the discharge.
    Monthly Average: MR mg/l
    Daily Maximum: MR mg/l
    Sampling Frequency: 1/month
    Sample Type: 24-hr composite

K. Phosphorus, Total (TP)

1. Previous permit limits:
    Monthly Average: MR, mg/l
    Daily Maximum: MR, mg/l
    Sampling Frequency: 1/month
    Sample Type: 24-hr composite
2. NPDES Application
    a. 2C dated 09/29/2017 (No. of analyses: 36):
        Maximum Daily Value: -- lbs/day; 4.6 mg/l
        Maximum 30-Day Value: -- lbs/day; -- mg/l
        Long Term Average Value: -- lbs/day; 1.6 mg/l
3. DMR Data: The highest value was reported in 06/2017 as 4.6 mg/l

4. Water Quality Modeling Recommendation: Continue to Monitor and Report Results.
5 See the Part III.G.1.c.ii of this rationale for guidelines for the discharge of nutrients.
6. Conclusion: Based on the Water Quality Modeling recommendation for the protection of downstream lakes, a requirement to monitor and report data will remain.
   Monthly Average: MR, mg/l
   Daily Maximum: MR, mg/l
   Sampling Frequency: 1/month
   Sample Type: 24-hr composite

L. <u>Fluoride, total</u>

1. Previous permit limits:
   Monthly Average: MR mg/l
   Daily Maximum: MR mg/l
   Sampling Frequency: 1/quarter
   Sample Type: 24-hr composite
2. NPDES Application:
   a. 2C dated 09/29/2017 (No. of analyses: 134):
      Maximum Daily Value: 6.24 lbs/day; 8.30 mg/l
      Maximum 30-day Value: 3.86 lbs/day; 4.46 mg/l
      Long Term Average Value: 2.93 lbs/day; 3.55 mg/l
3. DMR Data: The highest value was reported in the quarter ending 9/16 as 8.3 mg/l
4. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: No
5. PQL: 0.10 mg/l (Method 300.0, 300.1, or SM4500F C, D, E)
6. Conclusion: There is no reasonable potential based on statistical analysis, however due to the nature of the discharge, this parameter will remain as previously permitted.
   Monthly Average: MR mg/l
   Daily Maximum: MR mg/l
   Sampling Frequency: 1/quarter
   Sample Type: 24-hr composite

M. <u>Copper, total</u>

1. Previous permit limits: No monitoring required
2. NPDES Application
   a. 2C dated 09/29/2017 (No. of analyses: 3):
      Maximum Daily Value: <1.89 g; <5.00 µg/l
      Maximum 30-Day Value: -- mg; -- µg/l
      Long Term Average Value: 1.40 g; 3.35 µg/l
3. DMR Data: Reporting not required
4. Additional Laboratory Data:
   a. 06/28/2017: 2.50 µg/l
   b. 07/19/2017: 3.90J µg/l (J=value is estimated)
   c. 08/16/2017: 2.55 µg/l
5. Water Quality Criteria: See Spreadsheet in Appendix 2.
6. Other information: Monitoring station S-967 is listed in the Integrated Report for 2018 Section 303(d) List of Impaired Waters as impaired for copper. This impairment is described as “Congaree River at Devro-Teepak discharge outfall”.
7. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: No

8. PQL: 10.0 µg/l (Methods 200.7, 200.8, 200.9, SM3113B)
9. Conclusion: A Special Study conducted between September 2004 and February 2005 indicated a monitoring station that showed an impairment on the Congaree River (S-967) located approximately 4.5 miles downstream of the Westinghouse discharge point. After further research, the same special study had two other monitoring stations located at the Westinghouse discharge (S-965) and near the point where Sandy Run enters the Congaree River approximately 0.4 miles downstream of the Westinghouse discharge (S-971). Neither of the two stations between the Westinghouse discharge and the impaired station had copper present at levels that would indicate an instream impairment. The three industrial facilities that discharge to this stretch of the river all evaluated copper in the effluent using the rationale that the effluent may cause or contribute to the instream impairment. Westinghouse reported in the 2C application a positive concentration of copper in the effluent, but that result was not above the water quality criterion. Because the monitoring station at the Westinghouse discharge and the other monitoring stations downstream of the Westinghouse discharge but upstream of monitoring station S-967 do not show an impairment for copper, this discharge will not be considered a discharge to a copper impaired receiving stream. Based on this and the determination that there is no reasonable potential to cause or contribute to a violation of the instream violation criteria, no limiting or monitoring will be required for copper.

N. Uranium, total

1. Previous permit limits: No monitoring required
2. NPDES Application: not a 2C parameter
3. DMR Data: Reporting not required
4. Supplemental Data:

Date of Sampling	U-233 (ug/l)	U-234 (ug/l)	U-235 (ug/l)	U-236 (ug/l)	U-238 (ug/l)	Total U (ug/l)
2/28/2018	ND	ND	0.204	ND	5.100	5.304
3/7/2018	ND	ND	0.413	ND	10.500	10.913
3/14/2018	ND	ND	0.424	ND	10.500	10.924
3/21/2018	ND	ND	0.399	ND	10.400	10.799
3/29/2018	ND	ND	0.417	ND	10.400	10.817
4/4/2018	ND	ND	0.647	ND	16.600	17.247

5. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: No
6. Conclusion: There is no reasonable potential based on statistical analysis, however due to the nature of the discharge, this parameter will be added to the permit.
   Monthly Average: MR µg/l
   Daily Maximum: MR µg/l
   Sampling Frequency: 1/month
   Sample Type: 24-hr composite

O. Total Residual Chlorine (TRC)

1. Previous permit limits:
   Monthly Average: 0.5 mg/l
   Daily Maximum: 1.0 mg/l
   Sampling Frequency: 1/week
   Sample Type: grab
2. NPDES Application
   a. 2C dated 09/29/2017 (No. of analyses: 145):
      Maximum Daily Value: -- lbs/day; 0.79 mg/l

Maximum 30-Day Value: -- lbs/day; 0.41 mg/l
Long Term Average Value: -- lbs/day; 0.12 mg/l

3. DMR Data: The highest value was reported in 02/2014 as 1.32 mg/l
4. Water Quality Criteria from Reg. 61-68, Appendix:
   a. Aquatic Life (Freshwater):
      CCC (monthly average) = 11 µg/l
      monthly average: 11 µg/l x DF_1 (7824) = 86,064 µg/l or 86.064 mg/l
      CMC (daily maximum) = 19 µg/l
      daily maximum: 19 µg/l x DF_1 (7824) = 148,656 µg/l or 148.656 mg/l
   b. Human Health: none
5. Other information (Total Residual Chlorine Memo dated Oct. 30, 1986): TRC limits will be required for all NPDES permitted facilities which are utilizing chlorine for disinfection or other treatment. In all cases (Freshwater and Saltwater), the maximum allowable effluent limit for TRC shall not be greater than monthly average: 0.5 mg/l; daily maximum: 1.0 mg/l.
6. PQL: 0.05 mg/l
7. Conclusion: Because the facility uses chlorine treatment at the sanitary wastewater treatment process, TRC must remain on the permit. Due to the large dilution factor provided by the receiving stream the maximum allowable TRC limit will remain in the permit.
   Monthly Average: 0.5 mg/l
   Daily Maximum: 1.0 mg/l
   Sampling Frequency: 1/week
   Sample Type: grab

P. <u>E. Coli</u>

1. Previous permit limits: (modification effective date: May 1, 2017)
   Monthly Average: 126 MPN/100 ml
   Daily Maximum: 349 MPN/100 ml
   Sampling Frequency: 1/month
   Sample Type: grab
2. NPDES Application
   a. 2C dated 09/29/2017 (No. of analyses: 49): Fecal Coliform
      Maximum Daily Value: -- lbs/day; 2419.6 MPN/100 ml
      Maximum 30-Day Value: -- lbs/day; 322 MPN/100 ml
      Long Term Average Value: -- lbs/day; 10 MPN/100 ml
3. DMR Data: The highest value of E. Coli was reported in 08/2017 as 1 MPN/100 ml
4. Water Quality Data: E. coli standards in Regulation 61-68.E.14.c(8): In order to protect recreational uses in freshwaters (including FW, and all types of Trout Waters) of the State, NPDES permit effluent limitations shall be specified as a monthly average of 126 MPN/100ml and a daily maximum of 349 MPN/100 ml. Provisions for meeting alternate daily maximum bacteria limits shall be in accordance with R.61-68.E.14.c(12).
5. PQL: 1/100 ml
6. Conclusion: In order to guarantee that the facility's sanitary treatment system continues to operate effectively, and that the bacterial standards are met prior to final discharge, the limit will be:
   Monthly Average: 126 MPN/100 ml
   Daily Maximum: 349 MPN/100 ml
   Sampling Frequency: 1/month
   Sample Type: grab

Q. <u>Mercury, total</u>

1. Previous permit limits: No monitoring required
2. NPDES Application
   a. 2C dated 09/29/2017 (No. of analyses: 3):
      Maximum Daily Value: 1.73 mg; 4.14 ng/l
      Maximum 30-Day Value: -- mg; -- ng/l
      Long Term Average Value: <1.24 mg; <3.20 ng/l
3. DMR Data: Reporting not required
4. Water Quality Criteria: See Spreadsheet in Appendix 2.
5. Other information: The facility provided data from analysis using method 1631E. As noted on page one of this rationale the downstream monitoring stations C-007, C-007A and C-007F are listed in the Integrated Report for 2016 Section 303(d) List of Impaired Waters as impaired for mercury. Mercury is also listed as impaired waters due to the fish consumption advisory. Since the waterbody is impaired, the worst-case assumption that any addition to the water column levels may affect the methylmercury accumulation in fish, which may contribute to a water quality violation. As such, no credit for receiving stream dilution may be allowed (i.e., the 7Q10 and annual average flow at the discharge location will be set to zero for calculating limits).
6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: No (3 data points using method 1631E)
7. Regulation 61-68, Water Classifications & Standards (Effective June 27, 2014): Section E.18:
   For the protection of human health, methylmercury concentration in fish or shellfish shall not exceed 0.3 mg/kg in wet weight of edible tissue.
   a. NPDES permit implementation for methylmercury will require mercury monitoring, assessment and minimization for discharges that meet the following conditions;
      (1) The receiving stream is impaired for methylmercury in fish or shellfish tissue, and;
      (2) The discharge or proposed discharge has consistently quantifiable levels of mercury.
   b. The need for a total mercury effluent limit, for the protection of aquatic life and/or human health, pursuant to R.61-9.122.44(d), shall be based on a reasonable potential analysis of the discharge compared to the mercury standards for ambient waters.
8. PQL: 0.0005 µg/l (Method 1669(sampling)/1631E (analysis))
9. Conclusion: Two of the three samples reported, using the proper test method, show a quantifiable level of mercury. Because the receiving water body is listed on the 303(d) list as impaired for mercury, yet the reasonable potential analysis, without considering dilution, indicates no reasonable potential, there is no need for a total mercury effluent limit. However, according to R.61-68 Section E.18.a., mercury monitoring, assessment and minimization will be required. Therefore, the permittee will be required to perform minimization activities which will identify all potential sources and mechanisms for elimination or source reduction. This approach is consistent with R.61-9.122.44(d)(1)(vi) and 122.44(k)(4) since there is currently no way to translate the water column value to a fish tissue value for mercury.
   Monthly Average: MR, ng/l
   Daily Maximum: MR, ng/l
   Sampling Frequency: 1/year
   Sample Type: grab

Outfall 01A

Description of outfall, receiving water and wastewater treatment system: The facility's sanitary wastewater is segregated from the process wastewater for treatment by aeration and disinfection. The sewage treatment system is an extended aeration package treatment plant with a design capacity of 85,000 gallons per day. The package plant discharges to a 1.5 million gallon aerated sanitary lagoon with a retention time of approximately 11 days. The outlet of the sanitary lagoon enters a chlorine contact camber where gaseous chlorine is used for disinfection prior to the 001 wastewater lift station. The plant sanitary and process wastewaters merge prior to final treatment and discharge through outfall 001. Final treatment includes pH neutralization and de-chlorination. The Department will add this internal outfall as a check on the sanitary treatment system operation. The sanitary system is located adjacent to the process system so the same operator that inspects the process treatment system will inspect this system.

Operator requirements: Based on the treatment system described above and the Pollution Control Act (PCA), the treatment system is classified as Group III-Biological. The Environmental Certification Board Rules require that a Grade B-Biological operator be assigned to operate this facility. Inspections of the facility will be required on a daily basis per Regulation 61-9.122.41(e). In accordance with Regulation 61-9.122.41(e)(3)(ii)(B), the permittee has submitted a staffing plan justifying a lower grade operator for limited time periods (i.e., sick leave, vacation, weekends, holidays). This is the same operator requirement for the whole wastewater treatment described for Outfall 001.

A. Flow

1. Previous permit limits: No monitoring required
2. NPDES Application: 60,000 gallons
3. DMR Data: Reporting not required
4. Conclusion: The treated sanitary effluent mixes with the plant process wastewater and accounts for approximately half of the overall discharge.
   Monthly Average: MR, MGD
   Daily Maximum: MR, MGD
   Sampling Frequency: daily
   Sample Type: continuous

B. Biochemical Oxygen Demand (BOD_5)

1. Previous permit limits: No monitoring required
2. NPDES Application: no data provided
3. DMR Data: Reporting not required
4. Secondary Treatment: 30 mg/l monthly average; 45 mg/l weekly average
5. Conclusion: Because there is additional treatment, including a 30,000-gallon Aerator, BOD will be regulated at the final outfall. Therefore, no limit will be established at this location.

C. Total Suspended Solids (TSS)

1. Previous permit limits: No monitoring required
2. NPDES Application: no data provided
3. DMR Data: Reporting not required
4. Conclusion: There is no additional solids removal following the sanitary treatment system and prior to discharge. Therefore, in order to guarantee that the facility's sanitary treatment system continues to operate effectively, and that the effluent is treated to meet the standards prior to final discharge, the secondary treatment standard will be established.

Monthly Average: 30 mg/l
Daily Maximum: 60 mg/l
Sampling Frequency: 1/month
Sample Type: grab

D. E. Coli

1. Previous permit limits: No monitoring required
2. NPDES Application: no data provided
3. DMR Data: Reporting not required
4. Water Quality Data: E. coli standards in Regulation 61-68.E.14.c(8): In order to protect recreational uses in freshwaters (including FW, and all types of Trout Waters) of the State, NPDES permit effluent limitations shall be specified as a monthly average of 126 MPN/100ml and a daily maximum of 349 MPN/100 ml. Provisions for meeting alternate daily maximum bacteria limits shall be in accordance with R.61-68.E.14.c(12).
5. PQL: 1/100 ml
6. Conclusion: In order to guarantee that the facility's sanitary treatment system continues to operate effectively, and that the bacterial standards are met, the limit will be:
   Monthly Average: 126 MPN/100 ml
   Daily Maximum: 349 MPN/100 ml
   Sampling Frequency: 1/month
   Sample Type: grab

Whole Effluent Toxicity (WET) Requirements

1. Previous permit requirements:
   Chronic whole effluent toxicity testing shall be performed at a CTC =1.0% using a multi-concentration dilution series of: 0%, 0.25%, 0.5 %, 8.0%, and 25%
   Monthly Average: MR %
   Daily Maximum: MR %
   Sampling Frequency: annual
   Sample Type: grab
2. DMR Data:

DMR YEAR	Sample Date	Percent Effect
4/1/2013 - 3/31/2014	6/10/2013	14.9%
4/1/2014 - 3/31/2015	4/21/2014	10.5%
4/1/2015 - 3/31/2016	4/27/2015	57%
4/1/2016 - 3/31/2017	4/25/2016	3%
4/1/2017 - 3/31/2018	4/24/2017	3%
4/1/2018 - 3/31/2019	4/23/2018	7%

3. Mixing Zone and Zone of Initial Dilution (ZID) Information: This facility discharges to the Congaree River through a three-port submerged diffuser. The river is 128 meters wide, and the diffuser is 2 meters long positioned perpendicular to the river flow. The diffuser is not centered in the river, it is located about 6 meters from the bank with the first port 6.71 meters from the left bank and the last port 8.71 meters from the left bank. The diffuser was designed to operate with 3 ports with a discharge flow rate of 0.26 MGD.

The stream at the point of discharge is 128 m wide (w in the equation below). The mixing zone and ZID dimensions are determined as follows using stream width:

Chronic mixing zone
Width: ½ w = 64 m
Length: 2w = 256 m

Acute ZID
Width: 1/10 w = 12.8 m
Length: 1/3 w = 42.67 m

The following dilutions can be determined at the boundary conditions given above.

Chronic concentrations
Width: N/A (plume does not reach this boundary)
Length: 0.265%

Acute concentrations
Width: 0.176%
Length: 0.596%

4. Reasonable potential evaluation: Yes, (See Attachment 2 for a spreadsheet of data used.) The results reported on the DMR for the time period of 4/1/2015 - 3/31/2016 indicate a 57% effect.
5. Conclusion: Based on the DMR data, this discharge has the reasonable potential to cause or contribute to toxicity violations. A toxicity limitation must be re-established to address the issue of toxicity's reasonable potential. Also, the Mixing Zone demonstration provided is dated 1996. With the data provided, the Department used CORMIX v11 to model the effluent plume to obtain the concentrations in this evaluation. The facility will be required to submit a new mixing zone demonstration using the most recent CORMIX or other approved mixing zone model within six months of the effective date of the permit. The use of a Chronic Test Concentration (CTC) of 1.0% will continue with a limitation and an increased monitoring frequency. The following permit requirements are based on an evaluation of the treatment provided, the variability of pollutants in the discharge, the nature and characteristics of the discharge, and the available dilution in accordance with R.61-9.122.44(d)(1).

   Testing using multiple dilutions will be required. The dilution series is as follows (minimum of 5 dilutions and a control): 0% (control), 0.5%, 1.0% (CTC), 12.5%, 25% and 50%

   Monthly Average = 25%
   Daily Maximum = 40%
   Chronic whole effluent toxicity testing shall be performed using *Ceriodaphnia dubia* at a CTC = 1.0% using the dilution series 0%, 0.5%, 12.5%, 25%, 50%
   Sampling Frequency: 1/quarter
   Sample Type: 24-hr composite

Biological Monitoring Requirements

No biological monitoring has been recommended for the NPDES discharge.

Groundwater Monitoring Requirements

a. Groundwater Monitoring Wells

The Department's Groundwater Protection Section reviewed the permit renewal application and recommends that the facility monitor and report each of the forty (40) groundwater monitoring wells (W-3A, W-6, W-7A, W-10, W-11, W-13R, W-14, W-15, W-16, W-17, W-18R, W-19B, W-20, W-22, W-23R, W-24, W-25, W-26, W-27, W-28, W-29, W-30, W-32, W-33, W-35, W-36, W-37, W-38, W-39, W-40, W-41R, W-42, W-43, W-44, W-45, W-46, W-47, W-48, W-49, and WRW-2) semi-annually for the following parameters:

Top of Well Casing Elevation (within 0.01 feet)
Water Table Elevation (within 0.01 feet) (relative to mean sea level)
Depth to the Water Table (within 0.01 feet) (relative to land surface)
Well Depth (within 0.01 feet) - The well depth check will be conducted annually, simultaneously with the siltation evaluation
Field pH (standard units)
Field Specific Conductance (umhos/cm)
Field Turbidity (NTU)
Nitrate-Nitrogen (mg-N/l)
Fluoride, total (mg/l)
Uranium, total (µg/l)
Uranium, Isotopic speciation (µg/l)
Technetium-99 (Tc-99) (by liquid scintillation) (pCi/g)
Bis(2-ethylhexyl) phthalate (µg/l)
Naphthalene
Tributyl phosphate
Semi-Volatile Organic Compounds (SVOCs)* (EPA Methods 8270) (µg/l)
INCLUDE ONLY: BASE/NEUTRAL COMPOUNDS

The parameters that are byproducts of nuclear criticality, an activity that does not occur at this site, will be removed from the sampling requirements. Therefore, the sampling required in Part V.C.4. of the previous permit for all fission, activation products and tritium will not be renewed for this permit cycle.

b. Lagoon Liner Inspection

The Department will require Impoundment Integrity Inspections for facilities that have impoundments to hold or treat wastewater. The integrity inspection shall include a visual inspection of the liners, with a comprehensive inspection to occur during any sludge removal operations.

In Part II.E.3 of the permit the facility is required to develop and maintain a complete Operations and Maintenance (O&M) Manual for the waste treatment facilities. This O&M shall include liner maintenance, which identifies expected liner life and scheduled replacements.

Sludge Disposal

Sludge generated in the wastewater treatment systems are dewatered and sent to Energy Solutions located in Clive, Utah for final disposal.

Cooling Water Intake Structure Information and Requirements to satisfy CWA 316(b)

This facility uses cooling water that it obtains from the City of Columbia municipal water supply. There are no intake structures to withdraw raw water from surface waters, therefore the 316(b) requirements do not apply.

Storm Water Requirements

The site is subject to the NPDES General Permit for Storm Water Discharges Associated with Industrial Activity under coverage No. SCR003391 for the storm water only point source discharges at the site. Storm water discharges that are mixed with non-storm water are not eligible for coverage under the general permit (See section 1.1.4 of the general permit). All stormwater runoff from the site converges and discharges from a single outfall referred to as "C-valve." Neither Industrial Stormwater nor Construction (land disturbance) Stormwater runoff commingle with the wastestreams entering the wastewater treatment system. The only stormwater that enters the on-site treatment system is the rainwater that falls directly over the lagoons themselves.

Threatened and Endangered Species Information

The one species that lives in the Congaree River, which is listed by both the federal and state authorities as legally Endangered is the shortnose sturgeon. A review of the Heritage Trust database in 2023 has identified the shortnose sturgeon in the Congaree National Park and as potentially living in the entire stretch of the Congaree River.

Atlantic and shortnose sturgeon have conservation status rankings of G3 and S3 (NatureServe 2014), meaning that populations of both species are "vulnerable", both globally and in South Carolina. In general, populations of both species along the entire Atlantic Coast are reduced from historical levels for at least the past half-century (Atlantic States Marine Fisheries Commission (ASMFC) 1990; ASMFC 1998; National Marine Fisheries Service (NMFS) 1998). The Atlantic Sturgeon South Atlantic Distinct Population. Segment (DPS) was listed as endangered under the Endangered Species Act (ESA) in 2012, The shortnose sturgeon has been listed as "endangered" under the ESA since 1967 and the American Fisheries Society deemed it "threatened" in 1989.

In previous discussions with the South Carolina Department of Natural Resources (SC-DNR) concerning the shortnose sturgeon, it was noted that shortnose sturgeon, particularly juveniles, are sensitive to low dissolved oxygen levels. Aside from DO, there is no information showing that the shortnose sturgeon is more sensitive than the established criteria used to evaluate the permit limitations. Therefore, based on known information this permit is protective of the shortnose sturgeon.

Within a 5-mile radius of the site there are three plant species and three animal that are "of concern", the species, with their global and state rankings are as follows:

Species	Ranking	Species	Ranking
Carolina Bird-in-a-nest	G2G3, S3	Banded Killfish	G5, S1
Nestronia	G4, S3	Barn-Owl	G5, S4
Winter Grape-fern	G4?, S1	Swamp Rabbit	G5, S2?

There are also three other species listed within the 5-mile radius, which have both a global/state ranking and a legal status, either Federal or State. These species do not live in the receiving stream but may utilized the Congaree River as a food source. The species are:

Species	Ranking	Legal Status
Bald Eagle	G5, S2	ST - Threatened, State
Rafinesque's Big-Eared Bat	G3G4, S2	SE - Endangered, State
Wood Stork	G4, S1S2	LT - Threatened, Federal SE - Endangered, State

Global rankings:

Basic Ranks

GX - **Presumed Extinct** (species) - Not located despite intensive searches and virtually no likelihood of rediscovery.
Eliminated (ecological communities) - Eliminated throughout its range, with no restoration potential due to extinction of dominant or characteristic species.

GH - **Possibly Extinct** (species) - Missing; known from only historical occurrences but still some hope of rediscovery.
Presumed Eliminated - (Historic, ecological communities)-Presumed eliminated throughout its range, with no or virtually no likelihood that it will be rediscovered, but with the potential for restoration, for example, American Chestnut (Forest).

G1 - **Critically Imperiled** - At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

G2 - **Imperiled** - At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

G3 - **Vulnerable** - At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G4 - **Apparently Secure** - Uncommon but not rare; some cause for long-term concern due to declines or other factors.

G5 - **Secure** - Common; widespread and abundant.

G? - Status unknown

Variant Ranks

G#G# - **Range Rank** - A numeric range rank (e.g., G2G3) is used to indicate the range of uncertainty in the status of a species or community. Ranges cannot skip more than one rank (e.g., GU should be used rather than G1G4).

GU - **Unrankable** - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. Whenever possible, the most likely rank is assigned and the question mark qualifier is added (e.g., G2?) to express uncertainty, or a range rank (e.g., G2G3) is used to delineate the limits (range) of uncertainty.

GNR - **Unranked** - Global rank not yet assessed.

GNA - **Not Applicable** - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

Rank Qualiifiers

? - **Inexact Numeric Rank -** Denotes inexact numeric rank (e.g., G2?)

Q - **Questionable taxonomy that may reduce conservation priority -** Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon or type in another taxon or type, with the resulting taxon having a lower-priority (numerically higher) conservation status rank. The “Q” modifier is only used at a global level and not at a national or subnational level.

C - **Captive or Cultivated Only** - At present extant only in captivity or cultivation, or as a reintroduced population not yet established.

T#- **Infraspecific Taxon** (trinomial)—The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above for global conservation status ranks. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T-rank cannot imply the subspecies or variety is more abundant than the species as a whole-for example, a G1T2 cannot occur. A vertebrate animal population, such as those listed as distinct population segments under under the U.S. Endangered Species Act, may be considered an infraspecific taxon and assigned a T-rank; in such cases a Q is used after the T-rank to denote the taxon's informal taxonomic status.

State or Subnational rankings:

Basic Ranks

SX - **Presumed Extirpated**—Species or community is believed to be extirpated from the nation or state/province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

SH - **Possibly Extirpated** (Historical)—Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become NH or SH without such a 20-40 year delay if the only known occurrences in a nation or state/province were destroyed or if it had been extensively and unsuccessfully looked for. The NH or SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.

S1 - **Critically Imperiled** - Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2 - **Imperiled** - Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3 - **Vulnerable** - Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4 - **Apparently Secure** - Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5 - **Secure** - Common; widespread and abundant in the nation or state/province.
SNR - **Unranked** - Nation or state/province conservation status not yet assessed.
SU - **Unrankable** - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA - **Not Applicable** - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S# - **Range Rank** - A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU should be used rather than S1S4).
Not Provided - Species is known to occur in this nation or state/province. Contact the relevant natural heritage program for assigned conservation status.
Other Qualifiers
? - **Inexact Numeric Rank -** Denotes inexact or uncertain numeric rank. (The ? qualifies the character immediately preceding it in the S-rank.)

There does not appear to be any limitations that could be placed in this permit that would have an impact on any of the species listed above.

II. GENERAL INFORMATION

A. The effluent from this facility may be subject to the requirements of any of the following regulations: R.61-68, R.61-69, R.61-9.122, 124, 125, 129, 133, and 403; 40 CFR Part 136; Subchapter N (40 CFR Parts 400 through 402 and 404 through 471); and R.61-9.503, 504 and 505.

B. Authority: This permit is written in accordance with applicable laws and regulations including, but not limited to, Regulation 61-9, Regulation 61-68, Pollution Control Act and Clean Water Act.

C. Under R.61-9.124.8 (Fact Sheet), a fact sheet shall be prepared for every draft permit for a major NPDES facility or activity, for every Class I sludge management facility, for every NPDES draft permit that incorporates a variance or requires an explanation under section 124.56(b), and for every draft permit which the Department finds is the subject of wide-spread public interest or raises major issues.

D. The conclusions noted in the Rationale establish proposed effluent limitations and permit requirements addressed in R.61-9.122.43 (Establishing Permit Conditions), R.61-9.122.44 (Establishing Limitations, Standards and other permit conditions) and other appropriate sections of R.61-9.

III. BACKGROUND AND PROCEDURES FOR PERMIT LIMIT DEVELOPMENT

A. The receiving waterbody 7Q10, annual average flow or other critical flow condition at the discharge point, and 7Q10, annual average flow, or other critical flow condition for source water protection are determined by the SCDHEC's Wasteload Allocation Section. The 7Q10, Annual Average Flow or other critical flow conditions are based on information published or verified by the USGS, an estimate extrapolation from published or verified USGS data or from data provided by the permittee. These flows may be adjusted by the Wasteload Allocation Section to account for existing water withdrawals that impact the flow. The 7Q10 (or 30Q5 if provided by the applicant), annual average flow at the discharge point, or other critical flow condition or 7Q10 (or 30Q5 if provided by the applicant), annual average flow or other critical flow condition for source water protection for a proposed or existing surface water drinking water intake will be used to determine dilution factors, as appropriate, in accordance with R.61-68.C.4.a & 4.b for aquatic life, human health, and organoleptic effects respectively.

B. Water and organism consumption and drinking water MCL criteria will be evaluated for protection of human health when calculating dilution factors. "The Department may, after Notice of Intent included in a notice of a proposed NPDES permit in accordance with Regulation 61-9.124.10, determine that drinking water MCLs or W/O shall not apply to discharges to those waterbodies where there is: no potential to affect an existing or proposed drinking water source and no state-approved source water protection area." For permitting purposes, "a proposed drinking water source is one for which a complete permit application, including plans and specifications for the intake, is on file with the Department at the time of consideration of an NPDES permit application for a discharge that will affect or has the potential to affect the drinking water source" (R.61-68.E.14.c(5)).

   The Department will implement this protection in NPDES permits using the source water protection program already developed for the drinking water program. A source water protection program was developed originally in 1999 to define the source water protection areas for each drinking water intake. The program was designed to identify source water protection areas (SWPAs) to aid drinking water systems in identifying sources of potential contamination that could affect their intakes. In September 2009, this program was modified to redefine the SWPAs as smaller, more manageable areas. The revised document developed in September 2009 is entitled "South Carolina Drinking Water Source Assessment and Protection Program." For the purposes of NPDES permitting, the SWPA referred to in Regulation 61-68.E.14.c(5) is the Primary Protection Area defined in the revised assessment and protection document. More information regarding the use of these protection areas is provided later in this rationale with the discussion of the procedure for establishing permit limits in Section G.2.

C. Application of numeric criteria to protect human health: If separate numeric criteria are given for organism consumption, water and organism consumption (W/O), and drinking water Maximum Contaminant Levels (MCLs), they shall be applied as appropriate. The most stringent of the criteria shall be applied to protect the existing and classified uses of the waters of the State (R.61-68.E.14.b(1)).

D. Numeric criteria have been established in R.61-68 based on organoleptic data (prevention of undesirable taste and odor). For those substances which have aquatic life and/or human health numeric criteria and organoleptic numeric criteria, the most stringent of the three shall be used for derivation of permit effluent limitations. See R.61-68.E.13.

E. Sampling Frequency: Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. Monitoring results must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in the permit (R.61-9.122.41(j)(4)). Typically, 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 a year (R.61-9.122.44(i)(2)).

F. Compliance Schedules:

   1. A person issued an NPDES permit by the Department who is not in compliance with applicable effluent standards and limitations or other requirements contained therein at the time the permit is issued, shall be required to achieve compliance within a period of time as set forth by the Department, with effluent standards and limitations, with water quality standards, or with specific requirements or conditions set by the Department. The Department shall require compliance with terms and conditions of the permit in the shortest reasonable period of time as determined thereby or within a time schedule for compliance which shall be specified in the issued permit. (R.61-9.122.47(c)(1))

2. If a time schedule for compliance specified in an NPDES permit which is established by the Department, exceeds nine (9) months, the time schedule shall provide for interim dates of achievement for compliance with certain applicable terms and conditions of the permit. (R.61-9.122.47(c)(2))

G. Procedure for establishing effluent limitations:

1. Effluent limits (mass and concentration) for Five-day Biochemical Oxygen Demand (BOD_5), Ultimate Oxygen Demand (UOD), Dissolved Oxygen (DO), Total Ammonia Nitrogen (as N), and Nutrients (e.g., nitrogen and phosphorus) are established by the Wasteload Allocation (WLA) Section, with consideration given to technology-based limitations.

   a. Five-day Biochemical Oxygen Demand BOD_5, Ultimate Oxygen Demand (UOD), Dissolved Oxygen (DO):

      Effluent limits for conventional oxygen demanding constituents (BOD_5, UOD and DO) are established to protect in-stream water quality, while utilizing a portion of the assimilative capacity of the receiving water. The ability of a water body to assimilate oxygen-demanding substances is a function of its physical and chemical characteristics above and below the discharge point. Various mathematical techniques, called models, have been developed to estimate this capacity. The Department follows the procedures as outlined in the "State/EPA Region IV Agreement on the Development of Wasteload Allocations/Total Maximum Daily Loads and NPDES Permit Limitations" dated October 30, 1991 (as updated) for determining the assimilative capacity of a given water body. Mathematical models such as QUAL2E and QUAL2E-UNCAS are used in accordance with "Enhanced Stream Water Quality Models QUAL2E and QUAL2E-UNCAS: Documentation and Users Manual" (EPA/600/3-87/007; dated May 1987) as updated. BOD_5 and UOD values determined from modeling results will be used in permitting as monthly average derived limits (C_{wla}). Daily maximum derived limits will typically be determined by multiplying the monthly average value by two.

      For facilities subject to effluent guidelines limitations or other technology-based limitations, BOD_5 will also be evaluated in accordance with the applicable industrial categorical guidelines. These guidelines will be identified in Part I of this rationale when they are applicable to the permit.

   b. Total Ammonia Nitrogen (as N):

      Ammonia limitations based on oxygen demand will be determined from modeling information as described above. These values will be used as monthly average derived limits and a daily maximum will typically be determined by multiplying the monthly average derived limit by two. These values will be compared with the ammonia water quality criteria for protection of aquatic life from Regulation 61-68, Attachment 3 and any categorical limitations. The more stringent of the limitations will be imposed. Calculations for aquatic life criteria and other wasteload recommendations are shown in Part I of this rationale when ammonia is a pollutant of concern.

c. Discharges of Nutrients:

In order to protect and maintain lakes and other waters of the State, consideration is given to the control of nutrients reaching the waters of the State. Therefore, in accordance with regulation R.61-68.E.11**,** the Department controls the nutrients as prescribed below. Nutrient limitations will be determined from the best available information and/or modeling performed by the Wasteload Allocation Section to meet these water quality standards.

i. Discharges of nutrients from all sources, including point and nonpoint, to waters of the State shall be prohibited or limited if the discharge would result in or if the waters experience growths of microscopic or macroscopic vegetation such that the water quality standards would be violated or the existing or classified uses of the waters would be impaired. Loading of nutrients shall be addressed on an individual basis as necessary to ensure compliance with the narrative and numeric criteria.

ii. Numeric nutrient criteria for lakes are based on an ecoregional approach which takes into account the geographic location of the lakes within the State and are listed below. These numeric criteria are applicable to lakes of 40 acres or more. Lakes of less than 40 acres will continue to be protected by the narrative criteria.

1. For the Blue Ridge Mountains ecoregion of the State, total phosphorus shall not exceed 0.02 mg/l, chlorophyll *a* shall not exceed 10 ug/l, and total nitrogen shall not exceed 0.35 mg/l

2. For the Piedmont and Southeastern Plains ecoregions of the State, total phosphorus shall not exceed 0.06 mg/l, chlorophyll *a* shall not exceed 40 ug/l, and total nitrogen shall not exceed 1.50 mg/l

3. For the Middle Atlantic Coastal Plains ecoregion of the State, total phosphorus shall not exceed 0.09 mg/l, chlorophyll *a* shall not exceed 40 ug/l, and total nitrogen shall not exceed 1.50 mg/l.

iii. In evaluating the effects of nutrients upon the quality of lakes and other waters of the State, the Department may consider, but not be limited to, such factors as the hydrology and morphometry of the waterbody, the existing and projected trophic state, characteristics of the loadings, and other control mechanisms in order to protect the existing and classified uses of the waters.

iv. The Department shall take appropriate action, to include, but not limited to: establishing numeric effluent limitations in permits, establishing Total Maximum Daily Loads, establishing waste load allocations, and establishing load allocations for nutrients to ensure that the lakes attain and maintain the narrative and numeric criteria and other applicable water quality standards.

v. The criteria specific to lakes shall be applicable to all portions of the lake. For this purpose, the Department shall define the applicable area to be that area covered when measured at full pool elevation.

2. Effluent concentration limits (C_{efflim}) for parameters other than the parameters listed in G.1.a-c (except ammonia toxicity calculations) above are established using the following procedures:

Q_{7Q10}	7Q10 or other critical flow condition of the receiving water at the discharge point in mgd. (may require adjustment for withdrawals)
AAF_d	Average Annual Flow (AAF) or other critical flow condition of the receiving water at the discharge point in mgd. (may require adjustment for withdrawals)
Q_{7Q10i}	7Q10 or other critical flow condition of the receiving water at either the SWP Area 15-river mile boundary or at the intake, as appropriate, in mgd.
AAF_i	Average Annual Flow (AAF) of the receiving water at either the SWP Area 15-river mile boundary or at the intake, as appropriate, in mgd.
Q_d	Long term average discharge flow in mgd.

a. Determine dilution factors:

The following information is to be used (where applicable) for establishing effluent concentration limits:

DF_1: This dilution factor is based on 7Q10 or other critical flow condition of the receiving water at the discharge point (Q_{7Q10}). This dilution factor is used to determine the derived limits for protection of the following aquatic life and human health concerns for the reasons indicated:

i. Aquatic Life (see R.61-68.C.4.a(1)). Protection of aquatic life on a short-term basis is needed at the point where aquatic organisms become exposed to the discharge.

ii. Human Health – Organism Consumption for parameters identified as non-carcinogens per R.61-68.C.4.b(1). Protection for human health on a short-term basis for consumption of aquatic organisms is needed at the point the aquatic organisms become exposed to the discharge.

$$DF_1 = \left(\frac{Q_{7Q10} + Q_d}{Q_d} \right)$$

DF_2: This dilution factor is based on the Average Annual Flow or other critical flow of the receiving water at the discharge point (AAF_d). This dilution factor is used to determine the derived limits for protection of the following human health and organoleptic concerns for the reasons indicated:

i. Human Health – Organism Consumption for parameters identified as carcinogens per R.61-68.C.4.b(1). Protection for human health on a long-term basis to prevent cancer due to consumption of aquatic organisms is needed at the point the aquatic organisms become exposed to the discharge.

ii. Organoleptic effects per R.61-68.C.4.b(1). Protection for taste and odor issues related to the discharge is needed at the point where the discharge enters the receiving water.

$$DF_2 = \left(\frac{AAF_d + Q_d}{Q_d} \right)$$

DF$_3$: This dilution factor is based on the 7Q10 or other critical flow condition (Q_{7Q10i}) for protection of a proposed or existing surface water drinking water intake that the discharge has the potential to affect. This dilution factor is used to determine the derived limits for protection of the following human health concerns for the reasons indicated:

i. Human Health – Water and Organism (W/O) Consumption for parameters identified as non-carcinogens per R.61-68.C.4.b(1) and E.14.c(5) to protect for short-term health effects when the discharge has the potential to affect a surface water drinking water intake. Protection of human health relative to drinking the water from the waterbody and consuming aquatic organisms from the same waterbody is provided by this criterion, but drinking the water withdrawn from the waterbody may require a higher level of protection in terms of applicable dilution than consumption of organisms.

ii. Human Health - Drinking Water Maximum Contaminant Level (MCL) for parameters identified as non-carcinogens per R.61-68.C.4.b(1) and E.14.c(5) to protect for short-term health effects when the discharge has the potential to affect a surface water drinking water intake. Protection of human health relative to drinking the water from the waterbody after conventional treatment per R.61-68.G is provided by this criterion.

$$DF_3 = \left(\frac{Q_{7Q10i} + Q_d}{Q_d} \right)$$

DF$_4$: This dilution factor is based on the Average Annual Flow or other critical flow condition (AAF_i) for protection of a proposed or existing surface water drinking water intake that the discharge has the potential to affect. This dilution factor is used to determine the derived limits for protection of the following human health concerns for the reasons indicated:

i. Human Health–Water and Organism Consumption for parameters identified as carcinogens per R.61-68.C.4.b(1) and E.14.c(5) to protect for long-term health effects due to cancer when the discharge has the potential to affect a surface water drinking water intake. Protection of human health relative to drinking the water from the waterbody and consuming aquatic organisms from the same waterbody is provided by this criterion, but drinking the water withdrawn from the waterbody may require a higher level of protection in terms of applicable dilution than consumption of organisms.

ii. Human Health - Drinking Water Maximum Contaminant Level (MCL) for parameters identified as carcinogens per R.61-68.C.4.b(1) and E.14.c(5) to protect for long-term health effects due to cancer when the discharge has the potential to affect a surface water drinking water intake. Protection of human health relative to drinking the water from the waterbody after conventional treatment per R.61-68.G is provided by this criterion.

$$DF_4 = \left(\frac{AAF_i + Q_d}{Q_d} \right)$$

For both DF_3 and DF_4, to satisfy the mixing zone requirements of R.61-68.C.10(a) for both W/O and MCL criteria, the Department will use the following flows to determine dilution:

1. The following applies to discharges and intakes in flowing rivers:

   a. Where the discharge is within the SWPA (15 river miles) of the intake, the flow at the 15-river mile boundary of the tributary with the largest applicable critical flow will be used.

   b. Where the discharge is outside the SWPA (15 river miles) of the intake, the applicable critical flow at the intake will be used.

2. When the discharge is either in the tributary to a lake or in a lake and the intake is in the same lake that does not behave as a run-of- river impoundment*, the flow is determined using the sum of the applicable critical flows of all tributaries entering the lake.

3. The following applies when both the discharge and the intake are in a lake arm that behaves as a run-of-river impoundment*:

   a. Where the discharge is within the SWPA (15-mile buffer which may include both lake and river miles) of the intake, the flow at the 15-mile boundary of the tributary with the largest applicable critical flow will be used.

   b. Where the discharge is outside the SWPA (15-mile buffer which may include both lake and river miles) of the intake, the applicable critical flow at the intake will be used.

4. Where the discharge is in the arm of a lake and the intake is in the upper reach of another arm of the lake, no protection of W/O or MCL criteria is needed because the discharge does not have the potential to affect the intake,

5. If the discharge has the potential to affect multiple intakes, the SWPA of the intake closest to the discharge will be protected. However, the permittee may be required to provide notification to all potentially affected intakes.

* Run-of-river impoundment is defined as a lake or reservoir (or arm of a lake or reservoir) that is narrow and/or shallow offering little dilution or delay in contaminant flow toward an intake.

b. Determine derived limits using the following procedures:

WQS_{al} Freshwater Standard (based on an established criteria or other published data per R.61-68) for protection of Aquatic Life; may be a CCC or CMC as defined below

WQS_{org} Standard (based on an established criteria or other published data per R.61-68) for protection of Human Health – Organism Consumption

WQS_{wo} Standard (based on an established criteria or other published data per R.61-68) for protection of Human Health – Water & Organism Consumption.

WQS_{mcl} Standard (based on an established criteria or other published data per R.61-68) for Drinking Water MCL (Maximum Contaminant Level).

WQS_{ol}: Standard (based on an established criteria or other published data per R.61-68) based on Organoleptic Data.

C_{aqlife} Concentration limit derived from aquatic life data

C_{HH} Concentration limit derived from human health data as determined from organism (C_{org}), water/organism (C_{wo})and MCL (C_{mcl}) data

C_{ol} Concentration limit derived from organoleptic data

C_b The background concentration of the concerned parameter in mg/l is typically determined from ambient monitoring data or data provided by applicant. If the waterbody to which the discharge flows is not on the 303(d) list, the 90th percentile of ambient monitoring data for aquatic life protection for the parameters identified in the Appendix (Water Quality Numeric Criteria) to Regulation 61-68 from the last 3 years, or whatever is available if less than 3 years, will typically be used. If the waterbody to which the discharge flows is not on the 303(d) list, the median value of ambient monitoring data for human health protection for the parameters identified in the Appendix (Water Quality Numeric Criteria) to Regulation 61-68 from the last 3 years, or whatever is available if less than 3 years, will typically be used. The background concentration is assumed to be zero (0) in the absence of actual data based on Departmental guidance and EPA recommendation.

i. Determine the derived limits for protection of Aquatic Life (C_{aqlife})

1. The following guidelines apply to determining aquatic life limits using this basic equation:

$$C_{aqlife} = (DF_1 \times WQS_{al}) - \left\{ C_b \times \left(\frac{Q_{7Q10}}{Q_d} \right) \right\}$$

a. Typically, the Criterion Maximum Concentration (CMC) is applied as a daily maximum derived limit and the Criterion Continuous Concentration (CCC) is applied as a monthly average derived limit, after consideration of dilution and background concentrations. The CMC and CCC for specific metals will be adjusted using the procedures in 60 FR 22229, "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance-Revision of Metals Criteria," May 4, 1995 and the "Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria," Oct. 1, 1993 and applied as a daily maximum and monthly average, respectively, after consideration of dilution and background concentrations. For specific metals, this calculation is explained in detail later in this

rationale.

monthly average = C_{aqlife} using CCC as WQS_{al}
daily maximum = C_{aqlife} using CMC as WQS_{al}

b. If only a CMC exists for a particular parameter, the daily maximum derived permit limit will be set using that value, after consideration of dilution and background concentrations. If no other values (e.g., human health) exist for that parameter on which to base a monthly average limit and the discharge is continuous, the monthly average will be set equal to the daily maximum to satisfy Regulation 61-9.122.45(d). In no case shall the monthly average limit be set higher than the daily maximum limit. If only a CCC is given, it will be used as a monthly average derived limit and the daily maximum derived limit will be two (2) times the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the US EPA's "Technical Support Document for Water Quality-based Toxics Control", EPA/505/2-90-001, March 1991 (hereafter known as the TSD).

If a CCC exists and no CMC exists and no other acute or chronic data exists, the aquatic life limits are

monthly average = C_{aqlife} using CCC as WQS_{al}
daily maximum = 2 x C_{aqlife}

If a CMC and no CCC exists, and no other acute or chronic data exists, the aquatic life limits are

monthly average = C_{aqlife} using CMC as WQS_{al}
daily maximum = C_{aqlife} using CMC as WQS_{al}

c. If only an acute toxicity effect concentration for a number of species for a particular pollutant is given as a LC_{50}, the lowest concentration should be divided by an acute-to-chronic ratio (ACR) of 10 and a sensitivity factor of 3.3, for an acceptable instream concentration in order to protect against chronic toxicity effects (R.61-68.E.16.a(1)). Other acute toxicity data will be handled similarly. The value obtained from this calculation will be used as a monthly average derived limit after consideration of dilution and background concentrations. The daily maximum will be two (2) times the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the TSD.

monthly average = C_{aqlife} using other data as WQS_{al}
daily maximum = 2 x C_{aqlife}

d. If a chronic toxicity effect concentration for a number of species for a particular pollutant is given as a no observed effect concentration (NOEC), the lowest concentration should be divided by a sensitivity factor of 3.3 in order to protect against chronic toxicity to the most sensitive species (R.61-68.E.16.a(2)). Other chronic toxicity data will be handled similarly. The value obtained from this calculation will be used as a monthly average derived limit after consideration of dilution and background concentrations. The daily maximum will be two (2) times

the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the TSD.

monthly average = C_{aqlife} using other data as WQS_{al}
daily maximum = 2 x C_{aqlife}

e. If both acute and chronic data are available for a particular pollutant, monthly average derived limit will be calculated as in c and d above for each acute and chronic, respectively. The more stringent of the monthly average derived limits will be the monthly average derived limit used after consideration of dilution and background concentrations. The daily maximum will be two (2) times the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the TSD.

monthly average = C_{aqlife} using other data as WQS_{al}
daily maximum = 2 x C_{aqlife}

f. Consider the background concentration (C_b) of the parameter of concern. If the background concentration is equal to or greater than the applicable standard (*WQS,* as defined above) for the parameter of concern, then the derived concentration limit (C_{aqlife}) for that parameter is established equal to the standard (*WQS*) so that no additional amount of that pollutant is added to the waterbody. An exception exists where the naturally occurring instream concentration for a substance is higher than the derived permit effluent limitation. In those situations, the Department may establish permit effluent limitations (C_{efflim}) at a level higher than the derived limit, but no higher than the natural background concentration (i.e. a "rise above background" limit). In such cases, the Department may require biological instream monitoring and/or whole effluent toxicity (WET) testing (R.61-68.E.14.c(2)).

If C_b is not based on naturally occurring concentrations and

$$C_b \geq WQS$$

Then, generally,

$$C_{\text{aqlife}} = WQS .$$

If C_b is based on naturally occurring concentrations and

$$C_b \geq WQS$$

Then, generally,

$$C_{\text{aqlife}} < C_{eff\ \text{lim}} \leq C_b .$$

2. Metals: Regulation 61-9.122.45(c) requires that permit limits be expressed in terms of total recoverable metal (with limited exceptions). In order to translate from the water quality criterion to a total recoverable metal, Regulation R.61-68.E.14.c(4) provides for the use of the EPA Office of Water Policy and "Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria", October 1, 1993. A subsequent revision published in the Federal Register (60 FR 22229) on May 4, 1995 updated the data in the original report. See R.61-68 Appendix for CMC and CCC values and equations, Attachment 1 for "Conversion Factors for Dissolved Metals" and Attachment 2 "Parameters for Calculating Freshwater Dissolved Metals Criteria that are Hardness-Dependent".

Per R.61-68.E.14.a(3), the CMC and CCC are based on a hardness of 25 mg/l if the ambient or mixed stream hardness is equal to or less than 25 mg/l. Concentrations of hardness less than 400 mg/l may be based on the mixed stream hardness if it is greater than 25 mg/l and less than 400 mg/l and 400 mg/l if the ambient stream hardness is greater than 400 mg/l. The ambient stream hardness is assumed to be 25 mg/l in the absence of actual stream data. Mixed stream hardness may be determined using flow-weighted effluent hardness and stream hardness.

The following equations and constants will be used to calculate aquatic life metals limits based on these documents. The values of the terms referenced in this section and determined from the equations below are included in the Metals spreadsheet attached to this rationale. The following metals are subject to this section:

arsenic	lead
cadmium	mercury
chromium (III & VI)	nickel
copper	zinc

The equation for C_d below changes the total metal to dissolved metal. From Technical Guidance Manual for Performing Waste Load Allocations Book II, Rivers and Streams, EPA/440/484/022,

$S = CCC \; or \; CMC$ (adjusted for hardness)

$C_d = S \times CF$

where C_d = Dissolved metal concentration (µg/l)
S = a constant to represent the CCC or CMC (µg/l)
CF = Conversion factor considered most relevant in fresh water for aquatic life as defined by EPA for each metal

Once the dissolved metal concentration is known, determine C_p using the equation for C_d above and the following equations.

$$C_p = C_d \times \left\{1 + \left(K_{pb} \times TSS_b \times 10^{-6}\right)\right\}$$

$$K_{p_b} = K_{po} \times (TSS_b)^a$$

where: C_p = Particulate sorbed metal concentration (µg/l). This value represents the revised water quality criterion for the metal to be used for ambient data comparison.
K_{pb} = Linear partition coefficient using the stream TSS (liters/mg)
K_{po} = Metal-specific equilibrium constant (liters/mg)
a = Metal-specific constant
TSS_b = Background or in-stream Total Suspended Solids (TSS) concentration (mg/l). The background TSS is assumed to be 1 mg/l in the absence of actual instream data based on the 5th percentile of ambient TSS data on South Carolina waterbodies from 1993-2000.

To determine the effluent limit (C_{aqlife}), use the following equations to translate the limits into a total recoverable metal concentration.

$$TSS_{avg} = \frac{(Q_d \times TSS_e) + (Q_{7Q10} \times TSS_b)}{Q_d + Q_{7Q10}}$$

where: TSS_e = Effluent Total Suspended Solids (TSS) concentration (mg/l) determined from actual long-term average data or proposed permit limits if no data available.
TSS_{avg} = Average in-stream (mixed) TSS concentration (mg/l)

$$C_t = C_d \times \left\{1 + \left(K_p \times TSS_{avg} \times 10^{-6}\right)\right\}$$

$$K_p = K_{po} \times (TSS_{avg})^a$$

where: C_t = Total metal concentration (µg/l)
K_p = Linear partition coefficient (liters/mg). This is the distribution of metal at equilibrium between the particulate and dissolved forms.

Once C_t has been calculated, it is multiplied by DF_1 and background concentrations are accounted for to obtain the derived limit (max or avg) (C_{aqlife}):

$$C_{aqlife} = (C_t \times DF_1) - \left\{C_b \times \left(\frac{Q_{7Q10}}{Q_d}\right)\right\}$$

monthly average = C_{aqlife} based on CCC
daily maximum = C_{aqlife} based on CMC

3. Where a Water Effects Ratio (WER) is used to adjust a criterion, derived limits for the adjusted aquatic life criterion ($C_{aqlife\text{-}adj}$) are calculated as follows. The WER is a type of site-specific permit effluent limit (as allowed by R.61-68.E.14.c(7)) derived using a ratio determined from EPA methodology. Both DHEC and EPA must approve the WER prior to implementation. See EPA's 1994 "Interim Guidance on the Determination and Use of Water-Effect Ratios (WERs) for Metals." The approved WER will be shown in the water quality spreadsheets on the Data sheet. The revised aquatic life value will be shown with the WER, hardness and dissolved metals adjustments, as appropriate, in the aquatic life columns on the Pollutant spreadsheet.

   a. For metals identified in #2 above, revise the equation for S as follows:

      S = [CCC or CMC (adjusted for hardness)] x WER

      Follow the remaining calculations in #2 above to get an adjusted C_{aqlife} value that will be used to determine derived limits:

      monthly average = $C_{aqlife\text{-}adj}$ based on CCC
      daily maximum = $C_{aqlife\text{-}adj}$ based on CMC

b. For other parameters, use the appropriate equation in #1 above to derive an adjusted C_{aqlife} value. The monthly average will be calculated as follows using the appropriate WQS_{al} and the daily maximum calculated using the appropriate equations in #1 above.

$$C_{aqlife-adj} = (DF_1 \times WQS_{al} \times WER) - \left\{ C_b \times \left(\frac{Q_{7Q10}}{Q_d} \right) \right\}$$

4. Where the Recalculation Procedure is used to adjust a criterion, derived limits for the adjusted aquatic life criterion ($C_{aqlife-adj}$) are calculated as follows. The Recalculation Procedure is intended to cause a site-specific criterion to appropriately differ from the State-adopted national aquatic life criterion if justified by demonstrated pertinent toxicological differences between the aquatic species that occur at the site and those that were used in the derivation of the criterion. It is important to note that the site (the portion of the waterbody or watershed being affected) must be clearly defined. This procedure is used to develop site-specific criteria in accordance with R.61-68.C.12. Both DHEC and EPA must approve the recalculated criterion prior to implementation. The recalculated criterion will require an update to the Water Classifications and Standards Regulations, R.61-68 and 61-69.

   The approved recalculated aquatic life criteria (*SS*-CCC and *SS*-CMC, as appropriate) will be shown adjusted for hardness on the Data spreadsheet. The additional dissolved metals adjustments, as appropriate, will be shown in the aquatic life columns on the Pollutant spreadsheet. If the parameter being adjusted is one of the metals in #2 above, SS will include all the appropriate metals adjustments.

$$C_{aqlife-adj} = (DF_1 \times SS - \left\{ C_b \times \left(\frac{Q_{7Q10}}{Q_d} \right) \right\}$$

   monthly average = $C_{aqlife-adj}$ based on CCC
   daily maximum = $C_{aqlife-adj}$ based on CMC

5. Where a WER and recalculation procedure are combined to adjust a criterion, derived limits ($C_{aqlife-adj}$) for aquatic life protection are calculated by combining the calculations in #3 and #4.

$$C_{aqlife-adj} = (DF_1 \times SS \times WER) - \left\{ C_b \times \left(\frac{Q_{7Q10}}{Q_d} \right) \right\}$$

   monthly average = $C_{aqlife-adj}$ based on CCC
   daily maximum = $C_{aqlife-adj}$ based on CMC

6. Other scientifically defensible methods for developing site-specific aquatic life effluent limits or site-specific criterion may be used on a case-by-case basis.

ii. Determine derived limits for protection of Human Health

1. The following guidelines apply to determining human health limits:

a. The human health criterion given by Regulation 61-68 will be applied as a monthly average derived limit after consideration of dilution and background concentrations ($C_{HH\text{-}avg}$). Exceptions exist based on EPA criteria and are indicated for specific parameters. No limits on human health based on water and organism consumption or drinking water MCLs will be imposed if there is no potential to affect an existing or proposed surface water drinking water intake and no state-approved source water protection area in accordance with Regulation 61-68.E.14.c(5).

b. The daily maximum permit limit will be determined from the monthly average value from (a) above and a multiplier (*M)* determined using a statistical procedure recommended in Section 5.5 using average = 95th percentile from Table 5-3 in the TSD. The permitted or proposed number of samples per month (n) is used with the coefficient of variation (CV) to determine *M*.

$$M = \frac{e^{(Z_m\sigma - 0.5\sigma^2)}}{e^{(Z_a\sigma_n - 0.5\sigma_n^{\ 2})}}$$

where:

$$\sigma_n^{\ 2} = \ln\left(\frac{CV^2}{n} + 1\right)$$

$$\sigma^{\ 2} = \ln\left(CV^2 + 1\right)$$

CV = coefficient of variation of the effluent concentration. For a data set where *n*>10, the *CV* is calculated as standard deviation divided by mean for the data set being evaluated. For data set where *n*<10, the *CV* is estimated to equal 0.6. 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.

n = the number of effluent samples per month (where frequency is less than 1/month, *n* =1)

z_m = the percentile exceedance probability for the daily maximum permit limit (=2.326 for 99th percentile basis)

z_a = the percentile exceedance probability for the monthly average permit limit (=1.645 for 95th percentile basis)

$C_{HH\text{-}max} = M * C_{HH\text{-}avg}$

c. Consider the background concentration (C_b) of the parameter of concern. If the background concentration is equal to or greater than the applicable standard (*WQS,* as defined above) for the parameter of concern, then the derived concentration limit (C_{HHe}) for that parameter and for the protection of that standard is established equal to the standard (*WQS*). An exception exists where the naturally occurring instream

concentration for a substance is higher than the derived permit effluent limitation. In those situations, the Department may establish permit effluent limitations (C_{efflim}) at a level higher than the derived limit, but no higher than the natural background concentration (i.e. a "rise above background" limit). In such cases, the Department may require biological instream monitoring and/or whole effluent toxicity (WET) testing (See R.61-68.E.14.c(3)).

If C_b is not based on naturally occurring concentrations and

$$C_b \geq WQS$$

Then, generally,

$$C_{\mathrm{HH}} = WQS .$$

If C_b is based on naturally occurring concentrations and

$$C_b \geq WQS$$

Then, generally,

$$C_{HH} < C_{eff\ \mathrm{lim}} \leq C_b .$$

2. Human Health – Organism Consumption (C_{org}).

   a. For Carcinogens

   The Monthly Average is calculated as follows:

$$C_{org} = (DF_2 \times WQS_{org}) - \left\{ C_b \times \left(\frac{AAF_d}{Q_d} \right) \right\}$$

   The Daily Maximum is calculated as

   $C_{org\text{-}max} = M * C_{org}$

   b. For Non-carcinogens

   The Monthly Average is calculated as follows:

$$C_{org} = (DF_1 \times WQS_{org}) - \left\{ C_b \times \left(\frac{Q_{7Q10}}{Q_d} \right) \right\}$$

   The Daily Maximum is calculated as

   $C_{org\text{-}max} = M * C_{org}$

3. Human Health – Water and Organism Consumption (C_{wo})

   a. For Carcinogens

   The Monthly Average is calculated as follows:

$$C_{wo} = (DF_4 \times WQS_{wo}) - \left\{ C_b \times \left(\frac{AAF_i}{Q_d} \right) \right\}$$

The Daily Maximum is calculated as

$C_{wo\text{-}max} = M * C_{wo}$

b. For Non-carcinogens
The Monthly Average is calculated as follows:

$$C_{wo} = (DF_3 \times WQS_{wo}) - \left\{ C_b \times \left(\frac{Q_{7Q10i}}{Q_d} \right) \right\}$$

The Daily Maximum is calculated as

$C_{wo\text{-}max} = M * C_{wo}$

4. Human Health – Drinking Water Maximum Contaminant Level (MCL) (C_{mcl}).

a. For Carcinogens
The Monthly Average is calculated as follows:

$$C_{mcl} = (DF_4 \times WQS_{mcl}) - \left\{ C_b \times \left(\frac{AAF_i}{Q_d} \right) \right\}$$

The Daily Maximum is calculated as

$C_{mcl\text{-}max} = M * C_{mcl}$

b. For Non-carcinogens
The Monthly Average is calculated as follows:

$$C_{mcl} = (DF_3 \times WQS_{mcl}) - \left\{ C_b \times \left(\frac{Q_{7Q10i}}{Q_d} \right) \right\}$$

The Daily Maximum is calculated as

$C_{mcl\text{-}max} = M * C_{mcl}$

5. Organoleptic criteria (C_{ol}).

The Monthly Average is calculated as follows:

$$C_{ol} = (DF_2 \times WQS_{ol}) - \left\{ C_b \times \left(\frac{AAF_d}{Q_d} \right) \right\}$$

The Daily Maximum is calculated as

$C_{ol\text{-}max} = M * C_{ol}$

iii. Parameters given in a wasteload allocation for oxygen-demanding pollutants and nutrients will be limited as

monthly average = C_{wla}
daily maximum = 2 x C_{wla}

c. Determine the most stringent of applicable water quality data using the derived limits determined above:

monthly average C_{efflim} = minimum of derived monthly averages (C_{aqlife}, C_{org}, C_{wo}, C_{mcl}, C_{ol} , C_{wla})
daily maximum C_{efflim} = minimum of derived daily maximums (C_{aqlife}, $C_{org\text{-}max}$, $C_{wo\text{-}max}$, $C_{mcl\text{-}max}$, $C_{ol\text{-}max}$, $C_{wla\text{-}max}$)

d. Determine whether the discharge causes, has the reasonable potential to cause or contributes to a water quality violation.

Regulation 61-9.122.44(d)(1)(i) states: "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Department determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

When determining whether a discharge causes, has the reasonable potential to cause or contributes to an instream excursion, the Department will use procedures which account for controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and, where appropriate, the dilution of the effluent in the receiving water (R.61-9.122.44(d)(1)(ii)).

Based on the above statements, there are three scenarios when limitations are required, as follows:

i. When data provided by the permit applicant indicates discharge values greater than the proposed limitation derived above, that discharge may <u>cause</u> an excursion above a narrative or numeric water quality criterion.

ii. A discharge may be determined to <u>contribute</u> to an excursion of a water quality criterion when the waterbody is impaired (e.g., on the 303(d) list) for the parameter of concern and that parameter is also being discharged at levels above the water quality criterion.

iii. <u>Reasonable potential to cause</u> a water quality violation is determined using the following information:

The Department will primarily use EPA's Technical Support Document (TSD) for determining reasonable potential using effluent data. Other methods may be used as well to evaluate data sets. All pollutants given in a wasteload allocation or an effluent limitation guideline will be limited in the permit.

When effluent data consists of non-quantifiable/non-detectable values or when no effluent data is available, other factors and information are considered to determine reasonable potential. In situations where a pollutant is known to be present in the wastestream (due to production data or other information), we know it is being discharged and has the potential to impact even though it may not be quantifiable. The fact that it is present will be enough information to say reasonable potential exists for that pollutant. Therefore, a reasonable

potential decision is based on various data and information, and not just non-quantifiable/non-detectable data. Consideration is given to existing data, dilution in the waterbody, type of receiving water, designated use, type of industry/wastestream, ambient data, history of compliance, and history of toxic impact. If any source of information indicates reasonable potential to cause or contribute to an exceedance of the water quality standard, a water quality limit will be established.

Note: The result of the following calculations may indicate that reasonable potential does not exist. However, as stated above, other information may "override" this numerical determination to justify the need for a limit.

1. The procedure for determining reasonable potential from actual effluent data is explained in Box 3-2 on page 53 of the TSD. Multiplying factors are determined from Table 3-2 at a 95% confidence level and 95% probability in Section 3.3.2. The following describes the procedures used for determining reasonable potential for chemical-specific parameters and WET, under certain circumstances. More information on determining reasonable potential for WET is given in Item 2 below.

   Step 1: Data Analysis: The statistical calculations involved in the "Reasonable Potential" analysis require discrete numerical data. The following describes how the effluent data will be used in determining reasonable potential.

   Actual analytical results should be used whenever possible. Results less than detection and quantification should be used as follows:

   a. If the permittee reports results below the practical quantitation limit (PQL) (as defined by the permit), then the reported "less than PQL" value for a given sample is generally assumed to be zero.

   b. If the permittee uses a detection/quantification level that is **greater** than the PQL, then the reported "less than" value for a given sample is generally assumed to be a discrete value equal to the detection/quantification level used by the permittee.

   c. If the reported data consists of both discrete and non-discrete values and/or the data is reported using varying detection/quantification levels, then, generally, a combination of the above two approaches is used, or the data is evaluated in a manner that is most appropriate for that data set.

   Note: For information on the acceptable analytical methods and PQLs please refer to NPDES permit application attachment titled "Practical Quantitation Limits (PQL) and Approved Test Methods."

   Step 2: Using data from the permit application, other data supplied by the applicant and/or Discharge Monitoring Report (DMR) data, determine the total number of observations (n) for a particular set of effluent data and determine the highest value (C_{max}) from that data set. For the monthly average comparison, the data set

will include monthly average results and *n* will be the number of months in which they sampled in the time period being evaluated. For the daily maximum comparison, the data set will include daily maximum results and *n* will be the total number of samples in the time period being evaluated. Individual results may not necessarily be used in the calculation.

Step 3: Determine the coefficient of variation (*CV*) for the data set. For a data set where *n*>10, the *CV* is calculated as standard deviation divided by mean for the data set being evaluated. For data set where *n*<10, the *CV* is estimated to equal 0.6. 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.

$$CV = 0.6 \quad \text{for} \quad n < 10$$

$$CV = \frac{\sigma}{\mu} \quad \text{for} \quad n > 10$$

where: σ = Standard Deviation of the samples
μ = Mean of the samples

Step 4: Determine the appropriate multiplying factor (*MF*) from either Table 3-2 or using the formulae in Section 3.3.2 of the TSD.

a. Determine the percentile represented by the highest concentration in the sample data.

$$p_n = (1 - Confidence\ Level)^{1/n}$$

where: p_n = Percentile represented by the highest concentration in the data
n = number of samples
Confidence Level = 0.95 i.e. 95%

b. Determine the multiplying factor (*MF*), which is the relationship between the percentile described above (C_p) and the selected upper bound of the lognormal effluent distribution, which in this case will be the 95th percentile (C_{95}).

$$MF = \frac{C_{95}}{C_p} = \frac{e^{(Z_{95}\sigma + 0.5\sigma^2)}}{e^{(Z_p\sigma + 0.5\sigma^2)}}$$

where: Z_{95} is the standardized Z-score for the 95th percentile of the standardized normal distribution = 1.645

Z_p is the standardized Z-score for the p^{th} percentile of the standardized normal distribution.(determined in (b) above)

Note: The values of Z-scores are listed in tables for the normal distribution. If using Microsoft® Excel, this can be calculated using the NORMSINV function.

$$\sigma^2 = \ln(CV^2 + 1)$$

$$\sigma = \sqrt{\ln(CV^2 + 1)}$$

Step 5: Multiply the highest value from the data set (C_{max}) by the multiplying factor (*MF*) determined in Step 4 to obtain the maximum receiving water concentration (*RWC*).

$$RWC = C_{\max} \times MF$$

Step 6: *RWC* ≤ Derived limit (C_{efflim}) implies that reasonable potential does not exist.
RWC > Derived limit (C_{efflim}) implies that reasonable potential exists.

2. Reasonable potential for Whole Effluent Toxicity (WET) may be determined from numerical data using the following procedure:

a. When the effluent data is given in terms of percent effluent as an IC_{25}, LC_{50} and/or NOEC values:

Step 1: Convert the given values to toxic units: TU_a for acute data and TU_c for chronic data, respectively, using the following formulae. Please note that an NOEC derived using the IC_{25} is approximately the analogue of an NOEC derived using hypothesis testing. The IC_{25} is the preferred statistical method for determining the NOEC (EPA TSD, March 1991, p.6).

$$TU_a = \frac{100}{LC_{50}}$$

$$TU_c = \frac{100}{NOEC} \quad \text{or} \quad TU_c = \frac{100}{IC_{25}} \text{ if } IC_{25} \text{ available}$$

Step 2: Using DMR data or other data provided by the applicant, determine the total number of observations (*n*) for a particular set of effluent data and determine the highest value ($TU_{a,\,max}$ or $TU_{c,\,max}$) from that data set.

Step 3: Determine the coefficient of variation (*CV*) for the data set. For a data set where *n*>10, the *CV* is calculated as standard deviation divided by mean. For data set where *n*<10, the *CV* is estimated to equal 0.6. 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 4: Determine the appropriate multiplying factor (*MF*) from either Table 3-2 or using the formulae in Section 3.3.2. (see iii.1, Step 4 above).

Step 5: Multiply the highest value of $TU_{a,\,max}$ or $TU_{c,\,max}$ from the data set by the multiplying factor (*MF*) determined in Step 4 and the dilution at the edge of the mixing zone (the test concentration obtained from mixing zone modeling or demonstration) to obtain the maximum receiving water concentration (*RWC*)

RWC for Acute Toxicity = [$TU_{a,\,max}$ * *MF* * *conc. at MZ boundary]*
RWC for Chronic Toxicity = [$TU_{c,\,max}$ * *MF* * *conc. at MZ boundary*]

Step 6: *RWC* for Acute Toxicity ≤ $0.3TU_a$ implies that a reasonable potential does not exist
RWC for Acute Toxicity > $0.3TU_a$ implies that a reasonable potential exists

RWC for Chronic Toxicity ≤$1.0TU_c$ implies that reasonable potential does not exist
RWC for Chronic Toxicity >$1.0TU_c$ implies that a reasonable potential exists

b. Other methods for determining reasonable potential may be used if appropriately justified.

e. Consider Effluent Limitations Guidelines (ELG or Categorical guidelines)

The more stringent of the effluent limitations guidelines average and maximum derived limits and water quality-derived average and maximum limits shall be used as permit limits, unless other information indicates more stringent limits are needed (e.g. previous permit limits due to backsliding). Categorical limitations based on mass may be converted to concentration using the long-term average flow of the discharge for comparison to the monthly average and daily maximum derived limits.

1. For effluent guidelines based on production, limits will be calculated as follows:

$$ELG\,\text{lim} = \sum (ELGprod)(ELG) \text{ where}$$

*ELG*lim*:* the mass limit, in lbs/day, for an applicable pollutant based on the production
ELGprod: the production rate, in lbs, for the applicable guideline(s), usually based on long-term average data
ELG: the effluent guideline limitation, given as a measure of production (e.g. lbs/1000 lbs), for an applicable pollutant

2. For effluent guidelines based on flow, limits will typically be calculated as follows:

$$ELG\,\text{lim} = \sum (ELGflow)(ELG)(8.345)$$

*ELG*lim: the mass limit, in lbs/day, for the applicable pollutant based on the applicable flow
ELGflow: the long-term average process flow rate, in MGD, for the applicable guideline(s) (unless otherwise specified in the guideline)
ELG: the concentration limitation, in mg/l, for the applicable pollutant from the applicable guideline(s)

H. Other considerations

1. When the derived permit effluent limitation based on aquatic life numeric criteria is below the practical quantitation limit for a substance, the derived permit effluent limitation shall include an accompanying statement in the permit that the practical quantitation limit using approved analytical methods shall be considered as being in compliance with the limit. Appropriate biological monitoring requirements shall be incorporated into the permit to determine compliance with appropriate water quality standards (R.61-68.E.14.c(2)).

2. When the derived permit effluent limitation based on human health numeric criteria is below the practical quantitation limit for a substance, the derived permit effluent limitation shall include an accompanying statement in the permit that the practical quantitation limit using approved analytical methods shall be considered as being in compliance with the limit (R.61-68.E.14.c(3)).

3. The effluent concentration limits determined above may not necessarily be the NPDES permit limit. NPDES Permit limits are determined after a reasonable potential analysis is conducted using these derived limits and also after evaluating other issues such as anti-backsliding and antidegradation.

4. When mass limits are calculated, the formula to be used is as follows.

*Mass (lb/day) = Flow (mgd) * Concentration (mg/l) * 8.345*

5. Per Regulation 61-9.122.45(d), for continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall unless impracticable be stated as maximum daily and average monthly discharge limitations for all dischargers other than publicly owned treatment works.

6. Antibacksliding: When a permit is reissued, the terms and conditions of the reissued permit must be at least as stringent as those final limits in the previous permit unless certain exceptions are met (see Regulation 61-9.122.44.l).

IV. PROCEDURES FOR REACHING A FINAL PERMIT DECISION

A. Comment Period (R.61-9.124.10 and 11)

The Department of Health and Environmental Control proposes to issue an NPDES permit to this applicant subject to the effluent limitations and special conditions outlined in this document. These determinations are tentative.

During the public comment period, any interested person may submit written comments on the draft permit to the following address:

SC Dept. of Health and Environmental Control
Water Facilities Permitting Division
Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

For additional information, interested persons may contact Byron M Amick at 803-898-4236.

All written comments received during the public comment period shall be considered in making the final decision and shall be responded to as prescribed below.

Per R.61-9.124.17, the Department is only required to issue a response to comments when a final permit is issued. This response shall:

1. Specify which provisions, if any, of the draft permit have been changed in the final permit decision, and the reasons for the change; and

2. Briefly describe and respond to all significant comments on the draft permit raised during the public comment period, or during any hearing.

The response to comments shall be available to the public.

B. Public Hearings (R.61-9.124.11 and 12)

During the public comment period, any interested person may request a public hearing, if no hearing has already been scheduled. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing.

Determinations and Scheduling.

1. Within the thirty (30) day comment period or other applicable comment period provided after posting or publishing of a public notice, an applicant, any affected state or interstate agency, the Regional Administrator or any other interested person or agency may file a petition with the Department for a public hearing on an application for a permit. A petition for a public hearing shall indicate the specific reasons why a hearing is requested, the existing or proposed discharge identified therein and specifically indicate which portions of the application or other permit form or information constitutes necessity for a public hearing. If the Department determines that a petition constitutes significant cause or that there is sufficient public interest in an application for a public hearing, it may direct the scheduling of a hearing thereon.

2. A hearing shall be scheduled not less than four (4) nor more than eight (8) weeks after the Department determines the necessity of the hearing in the geographical location of the applicant or, at the discretion of the Department, at another appropriate location, and shall be noticed at least thirty (30) days before the hearing. The notice of public hearing shall be transmitted to the applicant and shall be published in at least one (1) newspaper of general circulation in the geographical area of the existing or proposed discharge identified on the permit application and shall be mailed to any person or group upon request thereof. Notice shall be mailed to all persons and governmental agencies which received a copy of the notice or the fact sheet for the permit application.

3. The Department may hold a single public hearing on related groups of permit applications.

4. The Department may also hold a public hearing at its discretion, whenever, for instance, such a hearing might clarify one or more issues involved in the permit decision;

5. Public notice of the hearing shall be given in accordance with R.61-9.124.10.

Any person may submit oral or written statements and data concerning the draft permit. Reasonable limits may be set upon the time allowed for oral statements, and the submission of statements in writing may be required. The public comment period under R.61-9.124.10 shall automatically be extended to the close of any public hearing under this section. The hearing officer may also extend the comment period by so stating at the hearing.

A tape recording or written transcript of the hearing shall be made available to the public.

C. Obligation to raise issues and provide information during the public comment period. (R.61-9.124.13)

All persons, including applicants, who believe any condition of a draft permit is inappropriate or that the Department's tentative decision to deny an application, terminate a permit, or prepare a draft permit is inappropriate, must raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period (including any public hearing). No issue shall be raised during an appeal by any party that was not submitted to the administrative record as part of the preparation and comment on a draft permit, unless good cause is shown for the failure to submit it. Any supporting materials which are submitted shall be included in full and may not be incorporated by reference, unless they are already part of the administrative record in the same proceeding, or consist of State or Federal statutes and regulations, Department and EPA documents of general applicability, or other generally available reference materials. Commenters shall make supporting materials not already included in the administrative record available. (A comment period longer than 30 days may be necessary to give commenters a reasonable opportunity to comply with the requirements of this section. Additional time shall be granted under R.61-9.124.10 to the extent that a commenter who requests additional time demonstrates the need for such time).

D. Issuance and Effective Date of the Permit

1. After the close of the public comment period on a draft permit, the Department shall issue a final permit decision. The Department shall notify the applicant and each person who has submitted written comments or requested notice of the final permit decision. This notice shall include reference to the procedures for appealing a decision on a permit. For the purposes of this section, a final permit decision means a final decision to issue, deny, modify, revoke and reissue, or terminate a permit.

2. A final permit decision shall become effective 30 days after the service of notice of the decision unless:

   (a) A later effective date is specified in the decision; or

   (b) No comments requested a change in the draft permit, in which case the permit shall become effective on the effective date shown in the issued permit.

3. Issuance or Denial of Permits. An appeal to a final determination of the Department or to a condition of a permit issued or the denial of a permit pursuant to the State law and Regulation 61-9, shall be in accordance with and subject to 48-1-200 of the SC Code (see E below).

E. Adjudicatory Hearings

Please see the Department's Guide to Board Review:
https://www.scdhec.gov/about-dhec/sc-board-health-and-environmental-control/guide-board-review.