FACT SHEET
AND
PERMIT RATIONALE

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Westinghouse Electric Company LLC
Columbia Fuel Site
NPDES Permit No. SC0001848

Permitting Engineer: Byron M Amick May 23, 2012

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, Columbia, SC 29209
County: Richland
Watershed: Basin 02 (Saluda-Edisto River Basin)

Facility Description (include SIC code): 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

Receiving Waters and Classification by outfall: 001- Congaree River (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: S-995, S-996 and S-997, fecal coliform; S-967, copper; and the entire Congaree River from Columbia to the Santee River is listed as impaired for mercury in the 2011 South Carolina Fish Consumption Advisory.

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:

Does any discharge have the potential to affect a threatened or endangered species? Yes (endangered species information from SCDNR Heritage Trust, 2008)
If Yes, list the species and the waterbody in which the species resides: Shortnose Sturgeon - Congaree River

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 adversely 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: NA
☒ 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 with an average flow exceeding 0.5 MGD
☐ Permits for federal facilities with a daily average discharge exceeding 0.05 MGD
☐ 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)
☐ Modification to any permit where the schedule of compliance interim dates are extended more than once

List of Attachments to this Rationale:

Attachment 1	Permit Application
Attachment 2	Water Quality Spreadsheets
Attachment 3	Maps (Drinking Water Intake/Source Water Protection Area Relative to Discharge, Endangered Species, Stream Impairments, etc.)

I. PERMIT LIMITATIONS AND MONITORING REQUIREMENTS

The Westinghouse Columbia Fuel Site 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 a small percentage of erbium. Some pellets are coated with 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: The effluent is pumped approximately 4 miles from the facility for discharge through a diffuser to the Congaree River. The diffuser is approximately fifteen feet below the river surface. There are four operations that contribute to this outfall, each with their own respective treatment systems. These contributing effluents are as follows:

Operation	Average Flow (gpd)	Treatment
a. Chemical conversion of UF6 to UO2 Conversion of Uranyl Nitrate to UO2 Pellet fabrication Scrap recovery operations Scrubber blow-down Lab operations recycle Support operations pH adjustment	55,000	Ammonia Stripping Distillation Flocculation Gas Phase Separation Chemical Precipitation Neutralization Sludge Lagoons
b. Contaminated shower water Support operations Condensate scrubber blow-down Boron coating Erbium addition facility	19,000	Filtration Chemical Precipitation Neutralization Sedimentation
c. Miscellaneous process service waste Labs	7,000	Stabilization Ponds Neutralization Sedimentation
d. Sanitary wastewater Shower water Kitchen wastes Boiler blow-down Cooling tower overflow	60,000	Grit Removal Disinfection Activated Sludge Aerated Lagoons Pre Aeration Stabilization Pond Gravity Thickening Drying Beds Incineration Dechlorination

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.

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).

Information for this outfall is based on NPDES Permit Application: 2C dated 12/18/2008

Data from Discharge Monitoring Reports (DMRs) and NPDES permit application (including all subsequent data presented) from 7/1/04 - 7/31/11 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, but has the potential to affect the intake. The affected intake(s) (Intake #S38102) is owned by the Lake Marion Regional Water System. 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 (or modification) effective date of July 1, 2004.

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, effluent

1. Previous permit limits:
   Monthly Average: MR, MGD
   Daily Maximum: MR, MGD
   Sampling Frequency: daily
   Sample Type: continuous
2. NPDES Application: (No. of flow analyses: 156)
   Long Term Average Value: 0.116 MGD
   Maximum 30-day Value: 0.171 MGD
   Maximum Daily Value: 0.232 MGD
3. DMR Data: The highest flow was reported in 8/08 as 0.2319 MGD
4. Actual long-term average flow (from DMR): 0.1076 MGD
5. Conclusion: Flow monitoring will continue as previously permitted.
   Monthly Average: MR, MGD
   Daily Maximum: MR, MGD
   Sampling Frequency: daily
   Sample Type: continuous

B. Dissolved Oxygen (DO)

1. Previous permit limits:
   Daily Minimum: 1.0 mg/l
   Sampling Frequency: 1/week
   Sample Type: grab
2. NPDES Application: (reporting not required)
3. DMR Data: The lowest DO was reported in 6/11 as 1.46 mg/l

4. Water Quality Modeling (Wasteload Allocation): 1.0 mg/l
5. *S.C. Water Classifications and Standards (S.C. Reg. 61-68)*: The Congaree River is a listed Class **Freshwaters (FW)** stream. 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 1.0 mg/l in the discharge from this facility is needed to ensure that the instream standard is maintained. The limit for DO will remain as previously permitted.
   Daily Minimum: 1.0 mg/l
   Sampling Frequency: 1/week
   Sample Type: grab

C. 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: (No. of BOD analyses: 156)
   Long Term Average Value: 9.89 lbs/day; 10.2 mg/l
   Maximum 30-day Value: 23.2 lbs/day; 23 mg/l
   Maximum Daily Value: 58.5 lbs/day; 81 mg/l
3. DMR Data: The highest BOD was reported in 10/10 as 69.08 lbs/day and 88 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 BOD of 30 mg/l
      Monthly Average: 30 mg/l x 8.34 x 0.055 MGD = 13.76 lbs/day
      Daily Maximum: 2(30 mg/l x 8.34 x 0.055 MGD) = 27.52 lbs/day
   b. Wastewater Flow = 19,000 gpd; assumed average BOD 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 BOD 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 BOD 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: (13.76 + 3.17 + 1.17 + 15.01) lbs/day = 33.11 lbs/day
      Daily Maximum: (27.52 + 6.34 + 2.34 + 30.02) lbs/day = 66.22 lbs/day
5. Water Quality Modeling (Wasteload Allocation): 30 lbs/day
6. PQL: 2.0 mg/l (Method SM5210B)
7. Conclusion: Based on the Water Quality Modeling data, the limitation will remain as previously permitted.
   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

D. pH

1. Previous permit limits: 6.0 – 9.0 standard units.
   Sampling Frequency: daily
   Sample Type: continuous
   Length of longest excursion not to exceed 60 minutes
   Percent of total time exceeding pH limit: 1%
2. NPDES Application: (No. of pH analyses: cont.)
   minimum: 6.0 standard unit
   maximum: 9.0 standard units
3. DMR Data: The highest value was reported on numerous occasions as 8.9 standard units. The lowest value was reported on numerous occasions as 6.1 standard units. Length of longest pH excursion: 0 minutes. Percent of time exceeding pH limit: 0 %
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: The dilution factor provided by the receiving stream is greater than 10, which is large enough that a variance on the pH limits of half a standard unit will not cause an adverse impact to the stream. Therefore, the pH limits shall remain between 6.0 and 9.0.
   Sampling Frequency: daily
   Sample Type: continuous
   Length of longest excursion not to exceed 60 minutes
   Percent of total time exceeding pH limit: 1%

E. Total Suspended Solids (TSS)

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: (No. of TSS analyses: 156)
   Long Term Average Value: 10.63 lbs/day; 11 mg/l
   Maximum 30-day Value: 28.0 lbs/day; 31.4 mg/l
   Maximum Daily Value: 64.07 lbs/day; 49 mg/l
3. DMR Data: The highest TSS mass loading was reported in 4/10 as 93.16 lbs/day and the highest TSS concentration was reported in 5/10 as 79 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 been in compliance with the existing TSS limitation 98% of the time, 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

F. <u>Ammonia-Nitrogen (NH_3-N), Total as N</u>

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: (No. of analyses: 156)
   Long Term Average Value: 16.73 lbs/day; 17.3 mg/l
   Maximum 30-day Value: 33.7 lbs/day; 36.2 mg/l
   Maximum Daily Value: 115.9 lbs/day; 122.5 mg/l
3. DMR Data: The highest Ammonia-Nitrogen was reported in 7/08 as 115.9 lbs/day and 122.5 mg/l
4. Water Quality Modeling (Wasteload Allocation): The dissolved oxygen model suggests that an average of no more than 50 lbs/day would be required to protect the oxygen levels in the receiving stream.
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) = 26.3°C
   Stream temp (seasonal) = 15.0°C
   Headwater concentration = 1.02 mg/l

   Critical months are March – October and November - February is seasonal.

   CCC (critical) = 2.042 mg/l CCC (seasonal) = 4.231 mg/l
   CMC (critical) = 19.89 mg/l CMC (seasonal) = 19.89 mg/l

   With dilution:
   Monthly average (critical): 9999.10 mg/l Monthly average (seasonal): 31417.42 mg/l
   Daily maximum (critical): 184647.51 mg/l Daily maximum (seasonal): 184647.51 mg/l
6. PQL: 0.10 mg/l (Method SM4500NH3 C, F, G or H, or EPA 350.1 (Rev. 2.0 1993))

7. Conclusion: Based on the Wasteload Allocation model, the limit will remain as previously permitted.
   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

G. Phosphorus, total

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: (No. of analyses: 36)
   Long Term Average Value: --
   Maximum 30-day Value: --
   Maximum Daily Value: 2.0 lbs/day; 1.4 mg/l
3. DMR Data: The highest value was reported in 6/07 as 4 mg/l
4. Water Quality Modeling (Wasteload Allocation): Recommend continuing monitor and report.
5. PQL: 0.05 mg/l (Method 365.1(Rev. 2.0 1993), 365.3, 365.4, or SM 4500 P, E, or F)
6. Conclusion: Based on the Water Quality Modeling recommendation for the protection of the downstream lake, the limitation will remain as previously permitted.
   Monthly Average: MR mg/l
   Daily Maximum: MR mg/l
   Sampling Frequency: 1/month
   Sample Type: 24 hr composite

H. Fluoride, total

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: (No. of analyses: 156)
   Long Term Average Value: 3.17 lbs/day; 3.30 mg/l
   Maximum 30-day Value: 3.53 lbs/day; 5.4 mg/l
   Maximum Daily Value: 12.2 lbs/day; 11.6 mg/l
3. DMR Data: The highest value was reported in 6/09 as 23.8 mg/l
4. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: No (using the 28 data points reported on the DMR between 9/04 – 6/11)
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

I. Total Residual Chlorine (TRC)

1. Previous permit limits:
   Monthly Average: --
   Daily Maximum: 1.0 mg/l
   Sampling Frequency: 1/month
   Sample Type: grab
2. NPDES Application: (No. of analyses: 36)
   Long Term Average Value: --
   Maximum 30-day Value: --
   Maximum Daily Value: 0.82 mg/l
3. DMR Data: The highest value was reported in 6/09 as 0.99 mg/l
4. Water Quality Criteria for Protection of freshwater Aquatic Life
   - from SC Reg. 61-68, Appendix 1(2008):
   CCC = 11 µg/l
   monthly average: 11 µg/l x DF_1 (8583.6) = 94,419.6 µg/l or 94.4196 mg/l
   CMC = 19 µg/l
   daily maximum: 19 µg/l x DF_1 (8583.6) = 163088.4 µg/l or 163.0884 mg/l
5. Water Quality Criteria for Protection of Human Health:
   - from SC Reg. 61-68, Appendix 1(2008): none
6. Water Quality Criteria based on Organoleptic Data from Reg. 61-68, Appendix: None
7. Other Information: Regulation 61-9 Section 122.45(d) states that for continuous discharges, maximum daily and average monthly discharge limitations must be included in the NPDES permit conditions.
8. PQL: 0.05 mg/l (Method SM4500Cl B, C, D, E, F or G)
9. Conclusion: Because this facility is a continuous discharger the NPDES regulations require that a monthly average limitation be included. The daily maximum limit will remain as previously permitted, and the monthly average limit will be established as 0.5 mg/l. The Department reviewed 86 TRC results reported on the DMRs, of that data approximately 16% of the results were above 0.5 mg/. This data was based on one sample collected a month and is therefore not a true representation of a monthly average. A compliance schedule will be established with a monitor and report requirement for monthly average and the numerical limit will become effective at a later date. Also to get a true monthly average the monitoring frequency will be increased to once per week, which is consistent with the other conventional parameters in this permit. Therefore the TRC limit will be:
   Monthly Average: 0.5 mg/l (effective 2 years after the permit effective date)
   Daily Maximum: 1.0 mg/l
   Sampling Frequency: 1/week
   Sample Type: grab

J. Fecal Coliform to E. Coli (modified 12/21/2016)

1. Previous permit limits: (Fecal Coliform)
   Monthly Average: 200/100 ml
   Daily Maximum: 400/100 ml
   Sampling Frequency: 1/month
   Sample Type: grab
2. NPDES Application: (No. of analyses: 36)
   Long Term Average Value: --
   Maximum 30-day Value: --
   Maximum Daily Value: 17/100 ml
3. DMR Data (April 2013 - Oct 2016): The highest fecal coliform was reported in 6/16 as 2419.6/100 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. Other information: As noted on page one of this rationale the many upstream monitoring stations are listed in the 2010 303(d) list as impaired for fecal coliform.
6. PQL: 1/100 ml
7. Conclusion: In order to guarantee that the facility's sanitary treatment system continues to operate effectively, and that the new 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

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

1. Previous permit limits: not limited
2. NPDES Application: (No. of analyses: 1)
   Long Term Average Value: --
   Maximum 30-day Value: --
   Maximum Daily Value: ND (<0.010 mg/l)
3. Background Data from Station S-967 from September 2004 to February 2005:
   (6 samples taken; only two were above the State PQL, they are: 10/20/04 – 0.011 mg/l and 12/16/04 – 0.082 mg/l)
   Median: 0.0000 mg/l
   90th percentile: 0.0465 mg/l
4. DMR Data: not limited
5. Water Quality Criteria: See Spreadsheet in Appendix 1.
6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: No
7. Other information: As noted on page one of this rationale the upstream monitoring station (S-967) is listed in the 2010 303(d) list as impaired for copper.
8. PQL: 10.0 µg/l
9. Conclusion: Based on the sampling conducted for the 2C application, there is no reasonable potential for the discharge to violate the standard for copper. Since the receiving stream is listed as impaired for copper, the Department does not believe that basing a reasonable potential determination on one sample is sufficient. Therefore three additional samples will be required in order to do a proper reasonable potential calculation for the next permit reissuance. The samples must be at least 1 month apart and collected early enough so that the data can be included in the permit's re-application package. The application to reissue the permit must be received no later than 180 days prior to the permits expiration date, which means the additional copper samples must be conducted approximately 8 months to 18 months prior to the expiration date.

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

1. Previous permit limits: not limited
2. NPDES Application: (No. of analyses: 1) (low-level mercury data received November 11, 2011)
   Long Term Average Value: --
   Maximum 30-day Value: --
   Maximum Daily Value: 0.739 ng/l (7.39 x 10^{-7} mg/l)
3. Background Data: none available
4. DMR Data: not limited
5. Water Quality Criteria: See Spreadsheet in Appendix 1.
6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: No
7. Other information: As noted on page one of this rationale the entire Congaree River from Columbia to the Santee River is listed as impaired for mercury in the 2011 South Carolina Fish Consumption Advisory.
8. PQL: 0.0005 µg/l

9. Conclusion: Based on the sampling conducted for the 2C application, there is no reasonable potential for the

discharge to violate the standard for mercury. Since the receiving stream is listed as impaired for mercury, the Department does not believe that basing a reasonable potential determination on one sample is sufficient. Therefore three additional samples will be required in order to do a proper reasonable potential calculation for the next permit reissuance. The samples must be at least 1 month apart and collected early enough so that the data can be included in the permit's re-application package. The application to reissue the permit must be received no later than 180 days prior to the permits expiration date, which means the additional mercury samples must be conducted approximately 8 months to 18 months prior to the expiration date.

M. Other Parameters

The Department ran a Reasonable Potential analysis on all other data reported on the 2C application. This analysis indicated that there was no reasonable potential for any other parameters to cause or contribute to a water quality violation.

Whole Effluent Toxicity (WET) Requirements

1. Previous permit requirements:
   Chronic whole effluent toxicity testing at a CTC = 1.0% using the dilution series 0%, 0.5%, 1.0%, 2.0%, 4.0% and 6.0%
   Quarterly Average: MR% effect (total, reproduction, & mortality)
   Maximum: MR% effect (total, reproduction, & mortality)
   Sampling Frequency: 1/year
   Sample Type: 24 hour composite
2. DMR Data: The 6/06 report indicated a total effect of 41.6%, due primarily to reduces reproduction rates. The IC_{25} was not reported.
3. Discharge Method: This facility discharges to the Congaree River through a multi-port diffuser. The river is 128 meters wide and the diffuser is 2 meters long positioned perpendicular to the river flow. The diffuser has three 2-inch ports and is positioned on the river bottom.
4. Mixing Zone and Zone of Initial Dilution (ZID) Information:

   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: ⅓ w = 42.7 m

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

   Chronic concentrations
   Width: NA (plume does not reach this boundary)
   Length: 0.0554%

   Acute concentrations
   Width: 0.044%
   Length: 0.13%

   Plume interacts with the river bottom at 0.28%
5. Conclusion: Toxicity testing will continue as previously permitted, with a CTC of 1.0% and new set of multiple

dilutions.
The limitations are:

Monthly Average* = MR%
Daily Maximum = MR%
Chronic whole effluent toxicity testing shall be performed at a CTC = 1.0% using the dilution series 0% (control), 0.25%, 0.5%, 1.0%, 8.0% and 25%.
Sampling Frequency: 1/year
Sample Type: 24 hour composite

* Please note that monthly average is being used per the requirements of R.61-9.122.45.d. This may be different than was included in previous permits issued to this facility.

Groundwater Monitoring Requirements

Department's Groundwater Management Section has reviewed the groundwater conditions related to the reissuance of this permit. Based on the review, the following item need to be addressed:

1. Groundwater down gradient to these basins has nitrate concentrations at levels well above the groundwater standard of 10 mg/l.
2. The groundwater monitoring wells closest to the basins (W-7A, W-8 and W-30) indicate increasing trends over short time durations (last 3 monitoring cycles) and suggest the integrity of any liner maybe compromised and/or the integrity of any associated plumbing and piping of wastewater may be suspect.

It was recommended that to prevent further groundwater contamination, the facility should evaluate the wastewater treatment basins including the plumbing and piping associated with the system. Leakage from the basins should be addressed prior to reissuing the permit or as a condition of a renewed permit.

In 2010 Westinghouse requested a groundwater mixing zone; in response to this request the Department's Contamination Mitigation Section required a source investigation plan. The facility completed the source investigation plan and as a result of the investigation repairs where made to the system in order to prevent further groundwater contamination. The facility relined the North and South lagoons in January-February 2012, and abandoned underground piping from the West lagoons and replaced them with aboveground lines in March-April. Therefore leakages from the basins have been addressed prior to the reissuance of this permit.

Further more, due to the levels of groundwater contamination, monitoring wells W-46, W-26, W-48, W-33, W-39, W-43 and W-44 will be added to the monitoring program for the wastewater basins.

The more conventional groundwater parameters will continue to be monitored semi-annually.

Based on the recommendations, each of the twenty (20) groundwater monitoring wells (W-7, W-10, W-13, W-15, W-16, W-18, W-22, W-24, W-26, W-29, W-30, W-32, W-33, W-39, W-41, W-43, W-44, W-47, W-48 and RW-2) shall be monitored for the following parameters:

Water Table Elevation	Field pH
Depth to the Water	Field Specific Conductivity

With eighteen (18) groundwater monitoring wells (W-7, W-10, W-13, W-15, W-16, W-18, W-22, W-24, W-26, W-29, W-30, W-32, W-33, W-39, W-43, W-44, W-47 and W-48) also being monitored for the following parameters:

Fluoride
Nitrate

And four (4) groundwater monitoring wells (W-26, W-41, W-48 and RW-2) also being monitored for the following parameters:

Volatile Organic Compounds
Semi-Volatile Organic Compounds

As with the previous permit, all wells listed above will continue to monitor Gross Alpha and Gross Beta. To be consistent with other facilities in the State where there is a groundwater contamination issue and the potential for radiologicals in the groundwater, the Department will also require monitoring semi-annually for the following parameters:

Fission and Activation Products (pCi/L)
Tritium (pCi/L)

Semi-annual samples shall be taken in winter (December, January or February) and summer (June, July or August) of each year.

Pump and Haul Activity

Westinghouse uses UCON 60-H-5300, a diol initialized polyalkelene glycol manufactured by Dow Chemical, as a lubricant to assist with pulling zircalloy fuel rods through the metal grid straps in the process of manufacturing a completed nuclear fuel assembly. The liquid UCON material is not a hazardous material, toxic material or a radioactive material. A pump and haul operation is needed to dispose of UCON wastewater, as an existing treatment process is not currently available. For a number of years Westinghouse has had the UCON wastewater hauled to the Clean Harbors Environmental Services facility located in Chattanooga, Tennessee for disposal. Westinghouse is approved to pump and haul at a rate of up to 2,000 gallons per day. There are no plans to change this disposal method, but if other disposal methods are needed then Departmental approval will be required before any changes occur.

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. It should be noted that while the Department has identified the shortnose sturgeon as potentially living in the entire stretch of the Congaree River in South Carolina, it has only been observed below the confluence of the Congaree and Wateree Rivers, which is more than 20 miles downstream of this facilities discharge.

The Atlantic and shortnose sturgeons are identified with rankings of G3 and S3 (NatureServe 2005), meaning that populations for both species are “vulnerable,” both globally and in South Carolina. In general, populations of both species of sturgeon along the entire Atlantic Coast are reduced from historical levels for at least the past half-century (ASMFC 1990; ASMFC 1998; NMFS 1998). The Atlantic sturgeon was considered for listing under the Endangered Species Act (ESA) in 1998, but the National Marine Fisheries Service (NMFS) determined that listing was unwarranted. However, the gulf sturgeon (*Acipenser oxyrinchus desotoi*), a subspecies of the Atlantic sturgeon restricted to rivers and adjacent waters of the Gulf of Mexico, remains on the candidate list and is currently listed as “threatened” under the ESA. 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 SC DNR concerning the shortnose sturgeon, it was noted that shortnose sturgeons, particularly juveniles, are sensitive to low dissolved oxygen levels. As stated earlier in this rationale the permit DO limit will ensure the instream state standard is met, therefore DO should not impact the sturgeon in the Congaree River. 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 two plant and two animal species 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	Swamp Rabbit	G5, S2S3
Winter Grape-fern	G4?, S1	Banded Killfish	G5, S1

There are also two other species listed within the 5-mile radius, which have both a global and state ranking and a legal status, either Federal or State. Neither of these species lives in the Congaree River. The species are:

Species	Ranking	Legal Status
Rafinesque's Big-Eared Bat	G3G4, S2?	SE – Endangered, State
Bald Eagle	G5, S2	SE – Endangered, State

Global rankings:
G1 - Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction
G2 - Imperiled globally because of rarity or factor(s) making it vulnerable
G3 - Either very rare throughout its range or found locally in a restricted range, or having factors making it vulnerable
G4 - Apparently secure globally, though it may be rare in parts of its range
G5 - Demonstrably secure globally, though it may be rare in parts of its range
G? - Status unknown
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.

State or Subnational rankings:
S1 -Critically imperiled state-wide because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation
S2 -Imperiled state-wide because of rarity or factor(s) making it vulnerable
S3 - Rare or uncommon in state
S4 - Apparently secure in state
S5 - Demonstrably secure in state
S? - Status unknown
SNR - **Unranked**—National or subnational conservation status not yet assessed.
SH - **Possibly Extirpated**— Known from only historical records but still some hope of rediscovery. There is evidence that the species or ecosystem may no longer be present in the jurisdiction, but not enough to state this with certainty. Examples of such evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in the jurisdiction.

There does not appear to be any limitations that could be placed in this permit, which will have any 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,

$$S = CCC\ or\ CMC \quad \text{(adjusted for hardness)}$$

$$C_d = S \times CF$$

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

5. Where a WER and recalculation procedure are combined to adjust a criterion, derived limits

($C_{aqlife\text{-}adj}$) 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 = $C_{aqlife\text{-}adj}$ based on CCC
daily maximum = $C_{aqlife\text{-}adj}$ 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,

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

If C_b is based on naturally occurring concentrations and

$$C_b \geq WQS$$

Then, generally,

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

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: $RWC \leq$ 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).

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

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

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 $\leq 0.3TU_a$ 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 $\leq 1.0TU_c$ implies that a 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

The issuance of this permit by the S.C. Department of Health and Environmental Control (Department) becomes the final agency decision 15 calendar days after notice of the decision has been mailed or otherwise sent to the applicant, permittee, licensee and affected persons who have requested in writing to be notified, unless a written request for final review accompanied by a filing fee in the amount of $100 is filed with the Department by the applicant, permittee, licensee, or affected person. This Department decision relies on the administrative record, which includes the permit rationale, and other supporting documentation contained in the permit file.

An applicant, permittee, licensee, or affected person who wishes to appeal this decision must file a timely written request for final review with the Clerk of the Board at the following address or by facsimile at 803-898-3393. A filing fee in the amount of $100 made payable to SC DHEC must also be received by the Clerk within the time allowed for filing a request for final review. However, if a request for final review is filed by facsimile, the filing fee may be mailed to the Clerk of the Board if the envelope is postmarked within the time allowed for filing a request for final review.

Clerk of the Board
SC DHEC
2600 Bull Street
Columbia, SC 29201

In order to be timely, a request for final review must be received by the Clerk of the Board within 15 calendar days after notice of the decision has been mailed or otherwise sent to persons entitled to receive notice. If the 15th day occurs on a weekend or State holiday, the request is due to be received by the Clerk of the Board on the next working day. The request for final review must be received by the Clerk of the Board by 5:00 p.m. on the date it is due. A request for final review will be returned to the requestor if the filing fee is not received on time as described above.

The request for final review should include the following:

1. The grounds on which the Department's decision is challenged and the specific changes sought in the decision;
2. A statement of any significant issues or factors the Board should consider in deciding whether to conduct a final review conference; and
3. A copy of the Department's decision for which review is requested.

If a timely request for final review is filed with the Clerk of the Board, the Clerk will provide additional information regarding procedures. If the Board declines in writing to schedule a final review conference, the Department's decision becomes the final agency decision and an applicant, permittee, licensee, or affected person may request a contested case hearing before the Administrative Law Court within 30 calendar days after notice is mailed that the Board declined to hold a final review conference.

Information pertaining to adjudicatory matters may be obtained by contacting the Legal Office of the Department of Health and Environmental Control, 2600 Bull Street, Columbia, South Carolina or by calling 803-898-3350.