DEQ/DWR

**FACT SHEET FOR NPDES PERMIT DEVELOPMENT**

**MAJOR MODIFICATION**

NPDES No. NC0038377, Duke Energy Progress, LLC

Mayo Steam Electric Generating Plant

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Facility Information | | | | |
| Applicant/Facility Name: | Duke Energy Progress/Mayo Steam Electric Generating Plant | | | |
| Applicant Address: | 10660 Boston Road, Roxboro, NC 27573 | | | |
| Facility Address: | (same) | | | |
| Permitted Flow | Not limited | | | |
| Type of Waste: | 99.8 % Industrial, 0.2% - domestic | | | |
| Facility/Permit Status: | Existing/Renewal | | | |
| County: | Person | | | |
| Miscellaneous | | | | |
| Receiving Stream: | | Mayo Reservoir and Crutchfield Branch | Regional Office: | RRO |
| Stream Classification: | | WS-V and C | Quad | A23SW |
| 303(d) Listed?: | | No | Permit Writer: | Sergei Chernikov, Ph.D. |
| Subbasin: | | 030205 (Roanoke) | Date: | July 14, 2021 |
| Drainage Area (mi2): | | N/A |  | |
| Summer 7Q10 (cfs) | | 0 |
| 30Q2 (cfs): | | 0 |
| Average Flow (cfs): | | 0 |
| IWC (%): | | 100% (assumed, no modeling info.) |
| Primary SIC Code: | |  |

##### Summary

This is a Minor Modification for the Mayo Electric Generating Plant. The facility is a coal-fired electric generating plant with one unit rated at a maximum dependable capacity of 745 mw. **The permit is being modified to make the following changes:**

1. Include landfill leachate to the lined retention basin from the CCR landfill being constructed to comply with terms of the settlement agreement. The leachate volume generated by the new landfill will vary over time but is expected to be approximately 50,000 gallons per day during the initial phases of development and reducing over time. Only water conditioned ash will be placed in the new CCR landfill.
2. Increase the flow limit from the dewatering system during dewatering activities from 2.0 MGD to 3.0 MGD to accommodate flows from the storm events from the large drainage area during rain events. The limit will be changed from Daily Maximum to Monthly Average to be consistent with other Duke permits.
3. Include ammonia conversion maintenance drainage as a contributing flow to the lined retention basin. The Mayo Station has two Selective Catalytic Reactors (SCR) for NOX control. An ammonia stripping column will be added per SCR utilizing aqueous ammonia as the reagent. Periodic maintenance and or unit shutdown periods, will require the column contents to be drained. Each column could have a maximum of 740 gallons of water (1,480 gallons for both columns) with ammonia concentration less than 1.0 mg/L with the pH being controlled in the system with caustic. The column contents would be drained to the lined retention basin for treatment discharging at internal Outfall 002A.
4. Reduce the sampling frequency for the domestic package plant (internal Outfall 011) from Weekly to Quarterly to be consistent with other Duke permits.
5. Include industrial stormwater from the new CCR landfill to be added as a contributing flow to the lined retention basin before discharging to Mayo Reservoir via Outfall 002.

**All the remaining terms and conditions of the permit remain unchanged.**

Water for plant uses is withdrawn from the Mayo Reservoir as required to make up evaporative losses from the cooling tower, boiler water and drinking water needs. This facility is subject to EPA effluent guideline limits per 40 CFR 423- Steam Electric Power Generating Point Source Category. The facility has a closed cycle cooling system (cooling tower), actual intake flow and design intake flow is less than 125 MGD. The facility has a dry fly ash handling system, dry bottom ash handling system, and one ash pond.

The mixing zone for Chlorides was granted to the facility in December of 2007. The daily maximum limit for Chlorides in the permit was an acute limit, monthly average was allowed to exceed the state water quality standard in the mixing zone, it was set at 672.0 mg/L and was based on the modeling information. However, the Chloride chronic standard was being met at the end of the mixing zone. The size of the mixing zone was established in accordance with the model. The facility requested the removal of the mixing zone with this renewal due to the installation of the Vapor Compressor Evaporator for FGD wastewater. The request was granted.

The facility is located in the Lower Piedmont area of the state, the applicable state water quality temperature standard is 32oC (89.6 F).

In response to North Carolina’s Clean Air Initiative (Clean Smokestacks Bill of 2002), which requires the reduction of S0x and N0x from air emissions, the company installed Flue Gas Desulfurization (FGD) system. The FGD is essentially a scrubber system to remove S0x by mixing flue gas with a limestone slurry.

The FGD blowdown generates a flow of approximately 0.254 MGD, with relatively elevated concentrations of metals and chloride. Duke Energy Progress treats the FGD blowdown via VCE (vapor compression evaporator) whose purpose is to evaporate the majority of the waste water produced from the FGD scrubber system. The VCE became operational in February, 2015. It produces two waste streams, both are utilized in the plant processes. The concentrated wastewater is used for moisture conditioning of fly ash prior to sending to the landfill. The second stream is a clean distillate that is utilized to partially replace water withdrawal from Mayo Reservoir. The VCE system eliminates the FGD blowdown stream from Outfall 002, except during severe rain events.

The ash pond dam has two toe drains that are designed for the stability of the dam. The average discharge of both drains is approximately 11,000 gpd, the discharge is routed to the Crutchfield branch. The Crutchfield Branch does not discharge to the Mayo Reservoir.

The facility proposes to build a new Retention Basin to reroute all waste streams that are currently discharged to the ash basin. This change is necessary to decommission the existing ash pond and meet the requirements of Coal Ash Management Act. The Retention Basin will have a cell where various vacuumed sediments and solids can be decanted prior to disposal.

The facility is also constructing a new FGD settling basin, the waste from the basin will be treated by VCE.

The facility operates the following outfalls:

* Outfall 001. Cooling Tower System (lat. - 360 31’28” long. – 780 52’56”). Less than once per year the cooling towers and circulating water system are drained by gravity and discharged directly to Mayo Reservoir.

• Outfall 002. Ash Pond Treatment System (lat. - 360 32’03” long. – 780 53’27”). Outfall 002 discharges directly to Mayo Reservoir. The ash pond receives coal pile runoff, stormwater runoff, cooling tower blowdown, and various low volume wastes such as boiler blowdown, oily waste treatment, wastes/backwash from the water treatment processes including Reverse-Osmosis (RO) wastewater, plant area wash down water, equipment heat exchanger water, groundwater, yard sump overflows, occasional piping leakage from limestone slurry and FGD system, and treated domestic wastewater.

• Internal Outfall 008. Cooling tower blowdown is directly discharged to the ash pond. Cooling tower blowdown is indirectly discharged to Mayo Reservoir via the ash pond treatment system (Outfall 002).

• Internal Outfall 009**.**  Discharge from the FGD blowdown treatment system. FGD blowdown is indirectly discharged to Mayo Reservoir via the ash pond treatment system (Outfall 002).

* Outfall 002A. Upon completion of construction, discharge from the new lined retention basin. **The flows from the ash basin will be re-directed to the retention basin when the construction of the retention basin is completed. At that point, the ash basin will no longer accept any wastewater.** Retention basin will accept wastes from holding cell (vacuumed sediments and solids), coal pile runoff, stormwater runoff, landfill leachate from CCR landfill, industrial stormwater from CCR landfill, ammonia conversion maintenance drainage, cooling tower blowdown, and various low volume wastes such as boiler blowdown, oily waste treatment, wastes/backwash from the water treatment processes, including Reverse-Osmosis (RO) wastewater, plant area wash down water, equipment heat exchanger water, groundwater, occasional piping leakage from limestone slurry and FGD system, chemical metal cleaning waste, and treated domestic wastewater. The wastewater from this outfall discharges to Mayo Reservoir via Outfall 002.
* Internal Outfall 002B. Yard sump overflows (contain all wastes routed to the new retention basin). The wastewater from this outfall discharges to Mayo Reservoir via Outfall 002.
* Internal outfall 011. Domestic wastewater plant. The wastewater from this outfall discharges to Mayo Reservoir via Outfall 002A.

ASH POND DAMS

Seepage through earthen dams is common and is an expected consequence of impounding water with an earthen embankment.  Even the tightest, best-compacted clays cannot prevent some water from seeping through them. Seepage is not necessarily an indication that a dam has structural problems, but should be kept in check through various engineering controls and regularly monitored for changes in quantity or quality which, over time, may result in dam failure.

REASONABLE POTENTIAL ANALYSIS (RPA)The Division conducted EPA-recommended analyses to determine the reasonable potential for toxicants to be discharged at levels exceeding water quality standards/EPA criteria by this facility. For the purposes of the RPA, the background concentrations for all parameters were assumed to be below detections level. The RPA uses 95% probability level and 95% confidence basis in accordance with the EPA Guidance entitled “Technical Support Document for Water Quality-based Toxics Control.” The RPA included evaluation of dissolved metals’ standards, utilizing a default hardness value of 25 mg/L CaCO3 for hardness-dependent metals. The RPA spreadsheets are attached to this Fact Sheet.

1. RPA for Lined Retention Basin (LRB) (Outfall 002A).

The RPA was conducted for LRB, the calculations included: As, Be, Cd, Chlorides, Total Phenolic Compounds, Cr, Cu, CN, F, Pb, Hg, Mo, Ni, Se, Ag, Zn, Ba, Sb, SO4, and Tl (please see attached). The flow of 10.25 MGD (CCR leachate included) was used for the analysis. The discharge data on the EPA Form 2C was used for the RPA, it was supplemented by leachate data from the modification application. The analysis indicates reasonable potential to violate the surface water quality standards or EPA criteria for the following parameters: As, Chlorides, F, Ba, and Sb. The appropriate limits were added to the permit.

1. RPA for Dewatering of Ash pond (Outfall 002).

To meet the requirements of the Coal Ash Management Act of 2014, the facility needs to dewater two ash ponds by removing the interstitial water and excavate the ash to deposit it in landfills. The facility’s highest discharge rate from the dewatering process will be 3.0 MGD (an increase from original 2.0 MGD). The facility submitted data for the standing surface water in the ash ponds, interstitial water in the ash, and interstitial ash water that was treated by filters of various sizes. To evaluate the impact of the dewatering on the receiving stream the RPA was conducted for the wastewater that will be generated by the dewatering process. To introduce a margin of safety, the highest measured concentration for a particular parameter was used. The RPA was conducted for As, Cd, Chlorides, Cr, Cu, F, Pb, Hg, Mo, Ni, Se, Zn, Ba, Sb, SO4, and Tl. The analysis indicates reasonable potential to violate the surface water quality standards or EPA criteria for the following parameters: As, Cd, Cr (III), Cr (VI), Cu, Pb, Ni, Zn, Ba, and Tl. The appropriate limits were maintained in the permit. The RPA indicated that new limits were not necessary as the flow limit increased from 2.0 MGD to 3.0 MGD.

The proposed permit requires that EPA methods 200.7 or 200.8 (or the most current versions) shall be used for analyses of all metals except for total mercury.

###### MERCURY EVALUATION- Outfall 002 (Ash Pond)

The State of North Carolina has a state-wide mercury impairment. A TMDL has been developed to address this issue in 2012. The TMDL included the implementation strategy, both documents were approved by EPA in 2012. The mercury evaluation was conducted in accordance with the Permitting Guidelines for Statewide Mercury TMDL.

|  |  |  |  |
| --- | --- | --- | --- |
| Year | 2014 | 2015 | 2016 |
| Annual average concentration (ng/L) | 1.85 | 0.91 | 0.1 |
| Maximum sampling result (ng/L) | 7.05 | 1.18 | 0.1 |
| Number of samples | 28 | 43 | 13 |

The allowable mercury concentration for this facility is 12.0 ng/L. All annual average mercury concentrations are below the allowable level. All maximum sampling results are below the TBEL of 47.0 ng/L. Based on the Permitting Guidelines for Statewide Mercury TMDL, the limits are not required.

CWA SECTION 316(a) TEMPERATURE VARIANCE

This section is not applicable since the facility has a closed cycle cooling system, which is considered a BAT. Effluent temperature is monitored daily at the Outfall 001, 002, and 002A, and instream temperature is monitored semi-annually to assure compliance with the state temperature standard.

CWA SECTION 316(b)

The permittee shall comply with the Cooling Water Intake Structure Rule per 40 CFR 125.95. The Division approved the facility request for an alternative schedule in accordance with 40 CFR 125.95(a)(2). The permittee shall submit all the materials required by the Rule with the next renewal application. The Actual Intake Flow and Design Intake Flow for this station is less than 125 MGD.

The rule requires the Director to establish interim BTA requirements in the permit on a site-specific basis based on the Director’s best professional judgment in accordance with §125.90(b) and 40 CFR 401.14. The existing closed-cycle system at Mayo is one of the pre-approved compliance alternatives for impingement in accordance with §125.94(c)(1). EPA also considered it as a pre-approved BTA for entrainment, but excluded it from the rule due to the cost concerns. Based on this information the DEQ has determined that the existing closed-cycle cooling system meets the requirements for an interim BTA.

INSTREAM MONITORING– Outfall 002 (Ash Pond)

The proposed permit will require a monthly monitoring for total arsenic, total selenium, total mercury, total chromium, dissolved lead, dissolved cadmium, dissolved copper, dissolved zinc, total bromide, total hardness (as CaCO3), turbidity, temperature, and total dissolved solids (TDS).

TOXICITY TESTING-Outfall 002 (Ash pond)

Current Requirement: Outfall 002 – Acute P/F @ 90% using *Pimephalis promelas*

Recommended Requirement: Outfall 002 – Acute P/F @ 90% using *Pimephalis promelas*

This facility has passed all toxicity tests (22 out of 22) during the previous permit cycle, please see attached.

For the purposes of the permitting, the long term average flow was used in conjunction with the 7Q10 summer flow to calculate the percent effluent concentrations to be used for WET.

COMPLIANCE SUMMARY

During the last 5 years, the facility had 1 violations of the Fluoride limit (Outfall 002), please see attached.

##### PERMIT LIMITS DEVELOPMENT

* The Free Available Chlorine limits, Total Chromium Limits, Total Zinc Limits, and Priority Pollutant Limits (Outfall 001 and Outfall 008) were established in accordance with the 40 CFR 423.
* The limits for Oil and Grease and Total Suspended Solids (Outfall 002, Outfall 002A, Outfall 002B, Internal Outfall 009, and Internal Outfall 011 (TSS only)) were established in accordance with the 40 CFR 423.
* The pH limits (Outfall 001, Outfall 008, Outfall 002, Outfall 002A, and Outfall 002B in the permit are based on the North Carolina water quality standards (15A NCAC 2B .0200).
* The turbidity limit in the permit (Outfall 002) is based on the North Carolina water quality standards (15A NCAC 2B .0200).
* The Whole Effluent Toxicity limit (Outfall 002) is based on the requirements of 15A NCAC 2B .0500.
* The BOD and Fecal Coliform limits (Outfall 011) were established in accordance with the 40 CFR 133.
* The Technology Based Effluent Limits for Total Arsenic, Total Mercury, Total Selenium, and Nitrate/nitrite as N (Outfall 009) are based on the requirements of 40 CFR 423.
* The Water Quality Based Effluent Limits for Total Beryllium, Total Chlorides, and Total Fluoride in the permit (Outfall 002 – decanting) are based on the North Carolina water quality standards (15A NCAC 2B .0200) and EPA water quality criteria.
* The Water Quality Based Effluent Limits for Total Arsenic, Total Cadmium, Total Chlorides, Chromium (III), Chromium (VI), Total Copper, Total Lead, Total Nickel, Total Zinc, Total Barium, and Total Thallium in the permit (Outfall 002 – dewatering) are based on the North Carolina water quality standards (15A NCAC 2B .0200) and EPA water quality criteria.
* The Water Quality Based Effluent Limits for Total Arsenic, Total Chlorides, Total Fluoride, Total Barium, and Total Antimony in the permit (Outfall 002A – lined retention basin) are based on the North Carolina water quality standards (15A NCAC 2B .0200) and EPA water quality criteria.

## PROPOSED CHANGES

1. Landfill leachate from the CCR landfill was added as a contributing flow to the lined retention basin.
2. The flow limit for Outfall 002 was increased from 2.0 MGD to 3.0 MGD to accommodate large storm events. The limit was changed from the Daily Maximum to the Monthly Average to be consistent with other Duke permits.
3. Ammonia conversion maintenance drainage was added as a contributing flow to the lined retention basin.
4. The sampling frequency for the domestic package plant (Internal Outfall 011) was changed from Weekly to Quarterly to be consistent with other Duke permits.
5. Industrial stormwater from the CCR landfill was added as a contributing flow to the lined retention basin.
6. The Water Quality Based Effluent Limits for Total Arsenic, Total Chlorides, Total Fluoride, Total Barium, and Total Antimony were added to the permit (Outfall 002A – lined retention basin) based on the results of RPA.

#### PROPOSED SCHEDULE

Draft Permit to Public Notice: July 27, 2021

Permit Scheduled to Issue: September 24, 2021

### STATE CONTACT

If you have any questions on any of the above information or on the attached permit, please contact Sergei Chernikov at (919) 707-3606 or sergei.chernikov@ncdenr.gov.

**NPDES Implementation of Instream Dissolved Metals Standards – Freshwater Standards**

The NC 2007-2015 Water Quality Standard (WQS) Triennial Review was approved by the NC Environmental Management Commission (EMC) on November 13, 2014. The US EPA subsequently approved the WQS revisions on April 6, 2016, with some exceptions. Therefore, metal limits in draft permits out to public notice after April 6, 2016 must be calculated to protect the new standards - as approved.

**Table 1. NC Dissolved Metals Water Quality Standards/Aquatic Life Protection**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Acute FW, µg/l  (Dissolved) | Chronic FW, µg/l  (Dissolved) | Acute SW, µg/l  (Dissolved) | Chronic SW, µg/l  (Dissolved) |
| Arsenic | 340 | 150 | 69 | 36 |
| Beryllium | 65 | 6.5 | --- | --- |
| Cadmium | Calculation | Calculation | 40 | 8.8 |
| Chromium III | Calculation | Calculation | --- | --- |
| Chromium VI | 16 | 11 | 1100 | 50 |
| Copper | Calculation | Calculation | 4.8 | 3.1 |
| Lead | Calculation | Calculation | 210 | 8.1 |
| Nickel | Calculation | Calculation | 74 | 8.2 |
| Silver | Calculation | 0.06 | 1.9 | 0.1 |
| Zinc | Calculation | Calculation | 90 | 81 |

Table 1 Notes:

1. FW= Freshwater, SW= Saltwater
2. Calculation = Hardness dependent standard
3. Only the aquatic life standards listed above are expressed in dissolved form. Aquatic life standards for Mercury and selenium are still expressed as Total Recoverable Metals due to bioaccumulative concerns (as are all human health standards for all metals). It is still necessary to evaluate total recoverable aquatic life and human health standards listed in 15A NCAC 2B.0200 (e.g., arsenic at 10 µg/l for human health protection; cyanide at 5 µg/L and fluoride at 1.8 mg/L for aquatic life protection).

**Table 2. Dissolved Freshwater Standards for Hardness-Dependent Metals**

The Water Effects Ratio (WER) is equal to one unless determined otherwise under 15A NCAC 02B .0211 Subparagraph (11)(d)

|  |  |
| --- | --- |
| Metal | NC Dissolved Standard, µg/l |
| Cadmium, Acute | WER\*{1.136672-[*ln* hardness](0.041838)} *∙ e*^{0.9151 [*ln* hardness]-3.1485} |
| Cadmium, Acute Trout waters | WER\*{1.136672-[*ln* hardness](0.041838)} *∙* *e*^{0.9151[*ln* hardness]-3.6236} |
| Cadmium, Chronic | WER\*{1.101672-[*ln* hardness](0.041838)} *∙* *e*^{0.7998[*ln* hardness]-4.4451} |
| Chromium III, Acute | WER\*0.316 *∙* *e*^{0.8190[*ln* hardness]+3.7256} |
| Chromium III, Chronic | WER\*0.860 ∙ *e*^{0.8190[*ln* hardness]+0.6848} |
| Copper, Acute | WER\*0.960 ∙ *e*^{0.9422[*ln* hardness]-1.700} |
| Copper, Chronic | WER\*0.960 ∙ *e*^{0.8545[*ln* hardness]-1.702} |
| Lead, Acute | WER\*{1.46203-[*ln* hardness](0.145712)} ∙ *e*^{1.273[*ln* hardness]-1.460} |
| Lead, Chronic | WER\*{1.46203-[*ln* hardness](0.145712)} ∙ *e*^{1.273[*ln* hardness]-4.705} |
| Nickel, Acute | WER\*0.998 ∙ *e*^{0.8460[*ln* hardness]+2.255} |
| Nickel, Chronic | WER\*0.997 ∙ *e*^{0.8460[*ln* hardness]+0.0584} |
| Silver, Acute | WER\*0.85 ∙ *e*^{1.72[*ln* hardness]-6.59} |
| Silver, Chronic | Not applicable |
| Zinc, Acute | WER\*0.978 ∙ *e*^{0.8473[*ln* hardness]+0.884} |
| Zinc, Chronic | WER\*0.986 ∙ *e*^{0.8473[*ln* hardness]+0.884} |

# General Information on the Reasonable Potential Analysis (RPA)

The RPA process itself did not change as the result of the new metals standards. However, application of the dissolved and hardness-dependent standards requires additional consideration in order to establish the numeric standard for each metal of concern of each individual discharge.

The hardness-based standards require some knowledge of the effluent and instream (upstream) hardness and so must be calculated case-by-case for each discharge.

Metals limits must be expressed as ‘total recoverable’ metals in accordance with 40 CFR 122.45(c). The discharge-specific standards must be converted to the equivalent total values for use in the RPA calculations. We will generally rely on default translator values developed for each metal (more on that below), but it is also possible to consider case-specific translators developed in accordance with established methodology.

**RPA Permitting Guidance/WQBELs for Hardness-Dependent Metals - Freshwater**

The RPA is designed to predict the maximum likely effluent concentrations for each metal of concern, based on recent effluent data, and calculate the allowable effluent concentrations, based on applicable standards and the critical low-flow values for the receiving stream.

If the maximum predicted value is greater than the maximum allowed value (chronic or acute), the discharge has reasonable potential to exceed the standard, which warrants a permit limit in most cases. If monitoring for a particular pollutant indicates that the pollutant is not present (i.e. consistently below detection level), then the Division may remove the monitoring requirement in the reissued permit.

1. To perform a RPA on the Freshwater hardness-dependent metals the Permit Writer compiles the following information:

* Critical low flow of the receiving stream, 7Q10 (the spreadsheet automatically calculates the 1Q10 using the formula 1Q10 = 0.843 (s7Q10, cfs) 0.993
* Effluent hardness and upstream hardness, site-specific data is preferred
* Permitted flow
* Receiving stream classification

1. In order to establish the numeric standard for each hardness-dependent metal of concern and for each individual discharge, the Permit Writer must first determine what effluent and instream (upstream) hardness values to use in the equations.

The permit writer reviews DMR’s, Effluent Pollutant Scans, and Toxicity Test results for any hardness data and contacts the Permittee to see if any additional data is available for instream hardness values, upstream of the discharge.

If no hardness data is available, the permit writer may choose to do an initial evaluation using a default hardness of 25 mg/L (CaCO3 or (Ca + Mg)). Minimum and maximum limits on the hardness value used for water quality calculations are 25 mg/L and 400 mg/L, respectively.

If the use of a default hardness value results in a hardness-dependent metal showing reasonable potential, the permit writer contacts the Permittee and requests 5 site-specific effluent and upstream hardness samples over a period of one week. The RPA is rerun using the new data.

The overall hardness value used in the water quality calculations is calculated as follows:

Combined Hardness (chronic)

= (Permitted Flow, cfs \*Avg. Effluent Hardness, mg/L) + (s7Q10, cfs \*Avg. Upstream Hardness, mg/L)

(Permitted Flow, cfs + s7Q10, cfs)

The Combined Hardness for acute is the same but the calculation uses the 1Q10 flow.

1. The permit writer converts the numeric standard for each metal of concern to a total recoverable metal, using the EPA Default Partition Coefficients (DPCs) or site-specific translators, if any have been developed using federally approved methodology.

EPA default partition coefficients or the “Fraction Dissolved” converts the value for dissolved metal at laboratory conditions to total recoverable metal at in-stream ambient conditions. This factor is calculated using the linear partition coefficients found in *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (EPA 823-B-96-007, June 1996) and the equation:

\_Cdiss\_\_ = \_\_\_\_\_\_\_1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ctotal 1 + { [Kpo] [ss(1+a)] [10-6] }

Where:

ss = in-stream suspended solids concentration [mg/l], minimum of 10 mg/L used, and

Kpo and *a* = constants that express the equilibrium relationship between dissolved and adsorbed forms of metals. A list of constants used for each hardness-dependent metal can also be found in the RPA program under a sheet labeled DPCs.

1. The numeric standard for each metal of concern is divided by the default partition coefficient (or site-specific translator) to obtain a Total Recoverable Metal at ambient conditions.

In some cases, where an EPA default partition coefficient translator does not exist (ie. silver), the dissolved numeric standard for each metal of concern is divided by the EPA conversion factor to obtain a Total Recoverable Metal at ambient conditions. This method presumes that the metal is dissolved to the same extent as it was during EPA’s criteria development for metals. For more information on conversion factors see the June, 1996 EPA Translator Guidance Document.

1. The RPA spreadsheet uses a mass balance equation to determine the total allowable concentration (permit limits) for each pollutant using the following equation:

Ca = (s7Q10 + Qw) (Cwqs) – (s7Q10) (Cb)

Qw

Where: Ca = allowable effluent concentration (µg/L or mg/L)

Cwqs = NC Water Quality Standard or federal criteria (µg/L or mg/L)

Cb = background concentration: assume zero for all toxicants except NH3\* (µg/L or mg/L)

Qw = permitted effluent flow (cfs, match s7Q10)

s7Q10 = summer low flow used to protect aquatic life from chronic toxicity and human health through the consumption of water, fish, and shellfish from noncarcinogens (cfs)

\* Discussions are on-going with EPA on how best to address background concentrations

Flows other than s7Q10 may be incorporated as applicable:

1Q10 = used in the equation to protect aquatic life from acute toxicity

QA = used in the equation to protect human health through the consumption of water, fish, and shellfish from carcinogens

30Q2 = used in the equation to protect aesthetic quality

## The permit writer enters the most recent 2-3 years of effluent data for each pollutant of concern. Data entered must have been taken within four and one-half years prior to the date of the permit application (40 CFR 122.21). The RPA spreadsheet estimates the 95th percentile upper concentration of each pollutant. The Predicted Max concentrations are compared to the Total allowable concentrations to determine if a permit limit is necessary. If the predicted max exceeds the acute or chronic Total allowable concentrations, the discharge is considered to show reasonable potential to violate the water quality standard, and a permit limit (Total allowable concentration) is included in the permit in accordance with the U.S. EPA Technical Support Document for Water Quality-Based Toxics Control published in 1991.

1. When appropriate, permit writers develop facility specific compliance schedules in accordance with the EPA Headquarters Memo dated May 10, 2007 from James Hanlon to Alexis Strauss on 40 CFR 122.47 Compliance Schedule Requirements.
2. The Total Chromium NC WQS was removed and replaced with trivalent chromium and hexavalent chromium Water Quality Standards. As a cost savings measure, total chromium data results may be used as a conservative surrogate in cases where there are no analytical results based on chromium III or VI. In these cases, the projected maximum concentration (95th %) for total chromium will be compared against water quality standards for chromium III and chromium VI.
3. Effluent hardness sampling and instream hardness sampling, upstream of the discharge, are inserted into all permits with facilities monitoring for hardness-dependent metals to ensure the accuracy of the permit limits and to build a more robust hardness dataset.
4. Hardness and flow values used in the Reasonable Potential Analysis for this permit included:

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Value** | **Comments (Data Source)** |
| Average Effluent Hardness (mg/L)  [Total as, CaCO3 or (Ca+Mg)] | 25.0 | Default value |
| Average Upstream Hardness (mg/L)  [Total as, CaCO3 or (Ca+Mg)] | 25.0 | Default value |
| 7Q10 summer (cfs) | 0 | Lake or Tidal |
| 1Q10 (cfs) | 0 | Lake or Tidal |
| Permitted Flow (MGD) | 2.1 | For dewatering |