DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER RESOURCES
FACT SHEET FOR NPDES PERMIT DEVELOPMENT
NPDES No. NC0005088

Facility Information			
Applicant/Facility	Duke Energy Carolinas, LLC / Rogers Energy Complex		
Applicant Address:	526 Church St., Charlotte, NC 28202		
Facility Address:	573 Duke Power Road, Mooresboro, NC 28024		
Permitted Flow (MGD):	Not limited		
Type of Waste:	Industrial & domestic		
Facility Classification:	II		
Permit Status:	Renewal		
County:	Rutherford & Cleveland		
Miscellaneous			
Receiving Stream:	Broad River/UT to Broad River (Outfall 106)	State Grid:	G11NE
Stream Classification:	WS-IV	USGS Quad:	Chesnee
Drainage Area (mi^2):	849 - Broad River	Basin/Subbasin:	Broad/03-08-02
Summer 7Q10 (cfs)	287 Broad River	303(d) Listed?	No
Winter 7Q10 (cfs):	440 Broad River	HUC:	03050105
30Q2 (cfs)	635 Broad River	Regional Office:	Asheville
Average Flow (cfs):	1460 Broad River	Permit Writer:	Teresa Rodriguez
IWC (%):	7.7 (002) 3.1 (005)	Date:	4/3/2018

SUMMARY

Duke Energy Carolinas operates the Rogers Energy Complex (REC); formerly known as Cliffside Steam Station; a two-unit coal fired steam electric generating facility. Units 1-4 have been removed from service. The station now operates only two units; Units 5 and 6. The total combined output is 1500 megawatts. Each unit has a Flue Gas Desulfurization (FGD) system. The site has an industrial landfill for combustion byproducts where fly ash, bottom ash, gypsum and WWTP sludge is deposited.

Water for cooling is withdrawn from the Broad River. Both units use cooling towers for heat dissipation. Blowdown from Unit 5 is discharged to the ash basin. Blowdown from Unit 6 can be used in the unit's make up water or discharged to the ash basin.

The receiving water is the Broad River, class WS-IV waters in the Broad River Basin. Previous permits had this section classified as C. The correct classification is WS-IV and it will be modified in the permit.

REC is subject to EPA effluent guideline limits per 40 CFR 423 - Steam Electric Power Generating Point Source Category. The facility is also subject to the Cooling Water Intake Structures Rules (40

CFR 125) effective October 14, 2014 and to the North Carolina Senate Bill 729 - Coal Ash Management Act.

Outfall Descriptions:

Outfall 002 - Ash basin
The ash basin receives wastewaters collected in the Yard Drainage Basin (effluent from the domestic WWTP, cooling tower blowdown from Unit 5, landfill leachate, floor drains, treated FGD wet scrubber water, limestone unloading and storage area, and stormwater), sluiced ash, cooling tower blowdown from Unit 6, equipment backwashes, boiler blowdown, drainage from recirculating cooling systems, demineralizing resin, cooling water from heat exchangers, rinse water from limestone unloading and storage area, stormwater, low volume waste including flight conveyor quench water overflow), and miscellaneous waste streams. This outfall discharges to the Broad River.

Outfall 002A - Emergency Yard Drainage Overflow
This outfall was closed in 2016. This was an emergency outfall from the yard drainage basin.

Internal Outfall 004 - FGD
If the wastewater from the FGD system is not used in Unit 6 it is treated in the FGD WWTS which consists of equalization tank, reaction tank, flocculating clarifier, and gravity filters. The effluent is discharged to the Yard Drainage Basin. A new treatment system will be installed for the FGD wastewaters. The effluent of the treatment system will be combined with the effluent from proposed outfall 005 before discharging to the Broad River.

Proposed Outfalls:
Outfall 005 - New Wastewater Treatment System
A new treatment system will be installed to treat wastewaters from the holding basin effluent (Outfall 002C – fly ash silo sump, coal, gypsum and limestone piles runoff), Basement Basin effluent (RO reject, stormwater and Unit 6 sanitary system), Unit 6 cooling tower blowdown, landfill leachate, Unit 6 process sump (mechanical drag chain overflow, and low volume waste including flight conveyor quench water overflow) Unit 5 process sump (sanitary system, low volume wastes, mechanical drag chain overflow and cooling tower blowdown), and ash basin dewatering/decanting. The FGD WWTS discharge (Internal Outfall 004) and heat exchanger non-contact cooling water will be combined with the discharge from the WWTS before discharge to the Broad River. The treatment system will be a physical/chemical treatment system with flow equalization, pH neutralization, coagulation and flocculation, and filters. This outfall will discharge to the Broad River.

Outfall 002B – Basement Basin
This will be an emergency outfall from the Basement Basin if a significant rain event overflows the system. An existing structure will be used as a holding cell for process wastewater, treated sanitary wastewater and stormwater that currently go to the P-5 yard basin. The effluent from this holding cell will be pumped to the ash basin during normal operations. When the new WWTS starts operations the holding cell will receive stormwater runoff from Unit 6, RO reject wastewater, Unit 6 treated sanitary wastewater and process and stormwater from Unit 5. Effluent will be pumped to the new WWTS. An auxiliary basin will hold excess water during storm events. The emergency outfall will discharge to the Broad River.

Outfall 002C – Holding Basin
This will be an emergency outfall from a new holding basin if a significant rain event overflows the system. This holding basin will receive stormwater, coal pile runoff, gypsum pile runoff, limestone pile runoff and flows from the holding cell auxiliary basin (stormwater runoff from Unit 6, RO reject wastewater, treated sanitary wastewater and process and stormwater from Unit 5). The effluent from

this holding basin will be pumped to the new WWTS. The emergency overflow will discharge to the Broad River.

Outfalls 104 and 106 Constructed Seeps
Outfalls 104 discharge seepage from the ash basin into the Broad River and Outfall 106 discharges seepage to an UT to the Broad River. A Special Order by Consent ("Special Order"), EMC SOC 17-009, also addresses Outfalls 104 and 106. In this Special Order, these outfalls are called "engineered seeps." Duke Energy shall follow the requirements of the Special Order with regard to these engineered seeps, including but not limited to the requirement that if any of the engineered seeps are not dispositioned (as described in EMC SOC 17-009 § 2(c)(3)) following decanting of the ash basins (as described in EMC SOC 17-009 § 1(a)) at Rogers Energy Complex, Duke Energy shall submit an amendment to its groundwater Corrective Action Plan and/or Closure Plan for the Rogers Energy Complex describing how any of the non-dispositioned engineered seeps will be remediated in a manner sufficient to protect public health, safety, and welfare, the environment, and natural resources (as described in EMC SOC 17-009 § 2(d))

COMPLIANCE REVIEW/PROPOSED ACTIONS

Outfall 002 – Ash Basin – Decanting/Normal Operations
This outfall is subject to the Effluent Limitations Guidelines (ELG) in Table 1.
Table 1. ELG Outfall 002

Pollutant	Daily Maximum (DM)	Monthly Average (MA)	ELG
TSS	50 mg/l	30 mg/l	40 CFR 423(b)(4) (monthly average) 423(b) (9) (daily max)
Oil & Grease	20 mg/l	15 mg/l	40 CFR 423.12 (b) (4)
pH	6 to 9 SU		40 CFR 423.12 (b) (1)

As per 40 CFR 423.13 (h) (1) (i) and (k) (1) (i) bottom ash and fly ash transport water shall not be discharged, compliance with this section shall be as soon as possible beginning on November 1, 2018 for fly ash and November 1, 2020 for bottom ash, but no later than December 31, 2023. Duke has submitted the following proposed schedule for meeting the rule:

Bottom ash: An underneath the boiler mechanical drag system will be installed and will be operational by November 1, 2020. This technology will not generate bottom ash.

Fly ash: dry fly ash is handled dry at this facility.

DMR review:
DMR data were review for the period of January 2011 to April 2016. There were no violations of permit limits.

Table 2. DMR Summary Outfall 002

Parameter	Average	Maximum	Minimum
Flow (MGD)	6.753	29.8	0.40
TSS (mg/l)	6.8	18	< 5
Temperature °F	66.4	88.3	45.5
O & G (mg/l)	< 5	< 5	< 5
Total Nitrogen (mg/l)	0.93	1.5	0.54

Total Phosphorus (mg/l)	0.09	0.19	0.01
pH (S.U.)	7.4	8.6	6.1

RPA Outfall 002:
The need for toxicant limits is based upon a demonstration of reasonable potential to exceed water quality standards, a statistical evaluation that is conducted during every permit renewal utilizing the most recent effluent data for each outfall. The RPA is conducted in accordance with 40 CFR 122.44 (d) (i). The NC RPA procedure utilizes the following: 1) 95% Confidence Level/95% Probability; 2) assumption of zero background; 3) use of ½ detection limit for "less than" values; and 4) streamflows used for dilution consideration based on 15A NCAC 2B.0206. Effective April 6, 2016, NC began implementation of dissolved metals criteria in the RPA process in accordance with guidance titled *NPDES Implementation of Instream Dissolved Metals Standards*, dated June 10, 2016.

The current permit included monitoring for various metals to evaluate the impact from FGD wastewaters. A reasonable potential analysis was performed for arsenic, cadmium, chlorides, chromium, copper, fluoride, lead, molybdenum, nickel, selenium, silver, zinc, antimony, barium, sulfates and thallium. A reasonable potential analysis was conducted on effluent toxicant data collected between January 2011 and May 2016. Pollutants of concern for the decant wastewater included toxicants with positive detections and associated water quality standards/criteria. None of the parameters presented reasonable potential.

TOXICITY TESTING:
Current Requirement: Outfall 002 – Chronic P/F @ 7.14% using Ceriodaphnia
Recommended Requirement: Outfall 002 – Chronic P/F @ 7.7% using Ceriodaphnia
Instream waste concentration is based on the maximum monthly flow during the previous permit cycle.
This facility has passed 21 out of 21 toxicity tests during previous permit cycle.

Mercury Evaluation:

Table 3. Mercury Data Evaluation

	2011	2012	2013	2014	2015
# of Samples	18	12	12	13	12
Annual Average, ng/L	3.1	1.8	1.7	1.5	1.1
Maximum Value, ng/L	11.30	3.50	3.10	3.90	2.30
TBEL, ng/L	47				
WQBEL, ng/L	159.1				

Annual averages are below the TBEL and WQBEL, no limit is required for mercury.

Table 4. Monitoring Requirements/Proposed Changes Outfall 002

Parameter	Monitoring requirements	Changes	Basis
Flow	Monitor	No changes	15A NCAC 2B.0505
TSS	30 mg/l MA 100 mg/l DM	Daily maximum for TSS changed to 50 mg/L	MA - 40 CFR 423.12(b)(4) DM - 40 CFR 423 (b) (9) coal pile runoff is discharged through this outfall
Oil & Grease	15 mg/l MA 20 mg/l DM	No changes	40 CFR 423.12(b)(4)

Total iron	1 mg/l MA 1 mg/l DM	No changes	40 CFR 423.12(b)(5) Only monitored during discharge of metal cleaning wastes
Total cooper	1 mg/l MA 1 mg/l DM	101 µg/l MA 111 µg/l DM	State WQ standards, 15A NCAC 2B .0200. Only monitored during discharge of metal cleaning wastes. Water quality limits more stringent than ELG.
Total chromium	Monitoring	0.2 mg/L MA 0.2 mg/L DM	40 CFR 423.13 (d)(1)
Total zinc	Monitoring	1.0 mg/L MA 1.0 mg/L DM	40 CFR 423.13 (d)(1)
Total nickel, total silver	Monitor weekly	Eliminate monitoring	Previous permit had monitoring to evaluate impact from FGD. There is no ELG for these parameters and no reasonable potential to exceed wqs.
Total cadmium	Monitor weekly	Monitor Monthly	Maximum predicted concentration greater than 50% of the allowable
Total selenium,	Monthly monitoring	Monitor Monthly	Pollutant of concern for ash.
Total arsenic	Monthly monitoring	Monitor Monthly	Pollutant of concern for ash.
Total thallium, total lead	No requirement	Monitor Monthly	Reasonable potential to exceed EPA water quality criteria.
Total mercury	Monitor monthly	No changes	Pollutant of concern for ash.
Total Hardness	No requirement	Quarterly monitoring	Collect data for RPA
BOD5	No requirement	30 mg/L MA 45 mg/L DM	Outfall discharges treated domestic wastes
Fecal Coliform	No requirement	200/100 mL MA 400/100 mL DM	Outfall discharges treated domestic wastes
Total Nitrogen Total Phosphorus	Quarterly Monitoring	No changes	15A NCAC 2B .0500
pH	6 to 9 SU	No changes	State WQ standards, 15A NCAC 2B .0200

Outfall 002 – Ash Basin Dewatering

To meet the requirements of the Coal Ash Management Act of 2014, the facility needs to dewater the ash pond 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 1 MGD. The facility submitted data for the standing surface water in the ash pond, interstitial water in the ash, and interstitial ash water that was treated by filters of various sizes. To introduce a margin of safety the highest measured concentration of a parameter was used in the RPA. RPA analysis was done for arsenic, cadmium, chlorides, aluminum, TDS, copper, fluoride, lead, molybdenum, nickel, selenium, zinc, barium, sulfates and thallium. None of the parameters showed reasonable potential.

Internal Outfall 004 - FGD

This outfall is subject to the ELG in Table 5. These are new limitations promulgated November 3, 2015. The permittee has to meet the limitations as soon as possible beginning November 1, 2020 but no later than December 31, 2023.

Table 5. ELG Outfall 004

Pollutant	Daily Maximum	Monthly Average	ELG
pH	6 to 9 SU		40 CFR 423.12 (b) (1)
TSS	100 mg/l	30 mg/l	40 CFR 423.12 (b) (11)
Oil and grease	20 mg/l	15 mg/l	40 CFR 423.12 (b) (11)
Total Arsenic	11 µg/l	8 µg/l	40 CFR 423.13 (g) (1) (i)
Total Mercury	788 ng/l	356 ng/l	40 CFR 423.13 (g) (1) (i)
Total Selenium	23 µg/l	12 µg/l	40 CFR 423.13 (g) (1) (i)
Nitrate/nitrite	17 mg/l	4.4 mg/l	40 CFR 423.13 (g) (1) (i)

Schedule of Compliance for ELG:

The new rule establishes compliance dates for the new limitations. Permittee must meet limits as soon as possible beginning on November 1, 2020 but no later than December 31, 2023. Duke requested a compliance schedule to evaluate, install and test a new treatment system with a proposed compliance date of December 31, 2023. Duke estimates 22 months for technology evaluation, engineering design, and siting. 27 months are estimated for procurement, 16 for construction and 15 for startup and optimization. The permit will require compliance by December 31, 2023.

Table 6. Monitoring Requirements/Proposed Changes Outfall 004

Parameter	Monitoring requirements	Changes	Basis
Flow	Monitor	No changes	15A NCAC 2B.0505
TSS	Monitor	Limits of 30 mg/l (MA) and 100 mg/l (DM)	40 CFR 423.13 (b) (11)
Oil and grease	No Monitor	Limits of 15 mg/l (MA) and 20 mg/l (DM)	40 CFR 423.13 (b) (11)
Total Arsenic	Monitor	Add limits of 11 µg/l daily max and 8 µg/l monthly average	40 CFR 423.13 (g) (1) (i)
Total Cadmium	Monitor	Remove monitoring	Internal outfall, not a parameter of concern.
Total Chromium	Monitor	Remove monitoring	Internal outfall, not a parameter of concern.
Chloride	Monitor	Remove monitoring	Internal outfall, not a parameter of concern.
Total Mercury	Monitor	Add limits of 788 ng/l daily max and 356 ng/l monthly average.	40 CFR 423.13 (g) (1) (i)
Total Nickel	Monitor	Remove monitoring	Internal outfall, not a parameter of concern.
Total Selenium	Monitor	Add limits of 23 µg/l daily max and 12 µg/l monthly average	40 CFR 423.13 (g) (1) (i)
Total Silver	Monitor	Remove monitoring	Internal outfall, not a parameter of concern.
Total Zinc	Monitor	Remove monitoring	Internal outfall, not a parameter of concern.

Nitrate/Nitrite	No monitoring	Add limits of 17 mg/l daily max and 4.4 mg/l monthly average	40 CFR 423.13 (g) (1) (i)

Proposed Outfalls:

Outfall 005 – New Wastewater Treatment System (WWTS)

This new outfall will discharge treated process wastewaters from the plant including low volume wastes and cooling tower blowdown. This treatment system is expected to be in place by the end of 2018. Proposed limits and monitoring requirements are described in Table 7.

Table 7. Monitoring Requirements/Limits Proposed Outfall 005

Parameter	Limits/Monitoring requirements	Basis
Flow	Monitor	15A NCAC 2B.0505
TSS	30 mg/L MA 50 mg/L DM	MA - 40 CFR 423.12(b)(4) DM - 40 CFR 423 (b) (9) coal pile runoff is discharged through this outfall
Oil & Grease	15 mg/L MA 20 mg/L DM	40 CFR 423.12(b)(4)
Total Iron	1 mg/L MA 1 mg/L DM	40 CFR 423.13 (b) (5) Parameter only monitored during discharge of metal cleaning wastes
Total Cooper	251 µg/L MA 272 µg/L DM	State WQ standards, 15A NCAC 2B .0200. Parameters only monitored during discharge of metal cleaning wastes.
Total Chromium	0.2 mg/L MA 0.2 mg/L DM	40 CFR 423.13 (d)(1)
Total Zinc	1.0 mg/L MA 1.0 mg/L DM	40 CFR 423.13 (d)(1)
Total Hardness	Quarterly Monitoring	Collect data for RPA
Total Nitrogen Total Phosphorus	Quarterly Monitoring	15A NCAC 2B .0500
pH	6 to 9 SU	State WQ standards, 15A NCAC 2B .0200
BOD5	30 mg/L MA 45 mg/L DM	Outfall discharges treated domestic wastes
Fecal Coliform	200/100 mL MA 400/100 mL DM	Outfall discharges treated domestic wastes
TRC	28 µg/L DM	State WQ standards, 15A NCAC 2B .0200
Whole Effluent Toxicity	Chronic toxicity test at 3.14%	State WQ standards, 15A NCAC 2B .0200
Total Cadmium, Total Mercury, Total Selenium, Total Arsenic, Total Thallium	Monitor Monthly	Only applicable if the decanting and dewatering is discharged through the WWTS

Outfall 002B:

This outfall will discharge from the Basement Basin only during excessive rain events (100-yr 24 hr rain). The holding cell will collect stormwater runoff from Unit 6, RO reject wastewater, treated sanitary wastewater and process and stormwater from Unit 5.

Table 8. Monitoring Requirements/Limits Proposed Outfall 002B

Parameter	Limits/Monitoring requirements	Basis
Flow	Monitor	15A NCAC 2B.0505
TSS	30 mg/L MA 100 mg/L DM	40 CFR 423.12(b)(3)
Oil & Grease	15 mg/L MA 20 mg/L DM	40 CFR 423.12(b)(4)
Total iron	1 mg/L MA 1 mg/L DM	40 CFR 423.13 (b) (5) Parameter only monitored during discharge of metal cleaning wastes
Total cooper	251 µg/L MA 272 µg/L DM	State WQ standards, 15A NCAC 2B .0200. Parameters only monitored during discharge of metal cleaning wastes.
pH	6 to 9 SU	State WQ standards, 15A NCAC 2B .0200
BOD5	30 mg/L MA 45 mg/L DM	Outfall discharges treated domestic wastes
Fecal Coliform	200/100 mL MA 400/100 mL DM	Outfall discharges treated domestic wastes
Whole Effluent Toxicity	Acute episodic test	State WQ standards, 15A NCAC 2B .0200

Outfall 002C:

This outfall will discharge from the proposed Holding Basin only during excessive rain events (100-yr 24 hr rain). The holding cell will collect stormwater, coal pile runoff, gypsum pile runoff and limestone storage area runoff and flows from the Basement Basin auxiliary basin (stormwater runoff from Unit 6, RO reject wastewater, treated sanitary wastewater and process and stormwater from Unit 5).

Table 9. Monitoring Requirements/Limits Proposed Outfall 002C

Parameter	Limits/Monitoring requirements	Basis
Flow	Monitor	15A NCAC 2B.0505
TSS	30 mg/L MA 50 mg/L DM	MA - 40 CFR 423.12(b)(4) DM - 40 CFR 423 (b) (9) coal pile runoff is discharged through this outfall
Oil & Grease	15 mg/L MA 20 mg/L DM	40 CFR 423.12(b)(4)
Total Iron	1 mg/L MA 1 mg/L DM	40 CFR 423.13 (b) (5) Parameter only monitored during discharge of metal cleaning wastes
Total Cooper	102 µg/L MA 111 µg/L DM	State WQ standards, 15A NCAC 2B .0200. Parameters only monitored during discharge of metal cleaning wastes.
pH	6 to 9 SU	State WQ standards, 15A NCAC 2B .0200
BOD5	30 mg/L MA	Outfall discharges treated domestic wastes

	45 mg/L DM	
Fecal Coliform	200/100 mL MA 400/100 mL DM	Outfall discharges treated domestic wastes
Whole Effluent Toxicity	Acute episodic test	State WQ standards, 15A NCAC 2B .0200

Outfalls 104 and 106 – constructed seeps outfalls:

Two constructed seeps, Outfalls 104 and 106, discharge from the ash basin into the Broad River (104) and an UT to the Broad River (106). A Special Order by Consent ("Special Order"), EMC SOC 17-009, also addresses Outfalls 104 and 106. In this Special Order, these outfalls are called "engineered seeps." Duke Energy shall follow the requirements of the Special Order with regard to these engineered seeps, including but not limited to the requirement that if any of the engineered seeps are not dispositioned (as described in EMC SOC 17-009 § 2(c)(3)) following decanting of the ash basins (as described in EMC SOC 17-009 § 1(a)) at Rogers Energy Complex, Duke Energy shall submit an amendment to its groundwater Corrective Action Plan and/or Closure Plan for the Rogers Energy Complex Station describing how any of the non-dispositioned engineered seeps will be remediated in a manner sufficient to protect public health, safety, and welfare, the environment, and natural resources (as described in EMC SOC 17-009 § 2(d))

Table 10. Toe drains Coordinates and Assigned Outfall Numbers

ID	Latitude	Longitude	Outfall number
S-4	35° 13′ 3.5″	81° 45′ 9.3″	104
S-6	35° 13′ 6.3	81° 44′ 53.7″	106

RPA Seeps

A RPA was conducted for the seeps. RPA was conducted for total arsenic, cadmium, chlorides, total chromium, total copper, total lead, total boron, total mercury, total molybdenum, total nickel, selenium, total zinc, antimony, sulfate and total thallium. Maximum flow recorded for toe drain 104 was 0.032 mgd. The maximum flow recorded for toe drain 106 was 0.164 mgd. The flows were multiplied by a factor of safety of 10 for the RPA. Based on the RPA Outfall 106 include limits for total aluminum and total dissolved solids.

These outfalls will have monitoring requirements for fluoride, total mercury, total barium, total iron, total manganese, total zinc, total arsenic, total cadmium, total chromium, total copper, total lead, total nickel, and total selenium, chlorides, nitrate/nitrite, total dissolved solids, hardness, turbidity, conductivity and limits as described in Table 11.

Table 11. Monitoring Requirements Proposed Toe Drain Outfalls Monitoring:

Parameter	**Limits/Monitoring requirements**	**Basis**
Flow	Monitor	15A NCAC 2B.0505
pH	6.0 to 9.0 S.U.	State WQ standards, 15A NCAC 2B .0200
TSS	30 mg/l MA 100 mg/l DM	40 CFR 423.12(b)(4)
Oil & Grease	15 mg/l MA 20 mg/l DM	40 CFR 423.12(b)(4)

316(b) REQUIREMENTS

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 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 REC 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.

316 (a) CWA

The thermal variance and temperature mixing zone once included in the permit for outfall 002 is no longer applicable. The special conditions referring to the variance and mixing zone were eliminated.

FISH TISSUE STUDIES

The facility performed fish tissue analysis for arsenic, selenium and mercury as required by the permit. The Division reviewed the information and concluded that all the fish tissue levels reported are below the Department of Health screening values.

INSTREAM MONITORING

The current permit did not require instream monitoring. The proposed permit will require monthly upstream and downstream monitoring for total arsenic, total selenium, total mercury, total chromium, dissolved lead, dissolved cadmium, dissolved copper, dissolved zinc, total bromide, total hardness (as $CaCO_3$), temperature, turbidity, and total dissolved solids (TDS).

SUMMARY OF CHANGES:

1. Eliminated outfall 002A since it has been shut down.
2. Added effluent pages for outfalls 002B, 002C and 005.
3. A separate effluent page for the dewatering of the ash ponds (Outfall 002) was added to the permit. Please see Special Condition A. (2)
4. Special Condition A. (24) Section 316(b) of CWA was updated to reflect the new regulations.
5. Special Condition A. (8) Section 316(a) Thermal Variance in the old permit was eliminated since the facility no longer requires a thermal variance.
6. Special Condition A. (26) Ash Pond Closure was added to the permit to facilitate the decommissioning of the ash ponds.
7. Special Condition A. (13) Instream Monitoring was added to the permit to monitor the impact of the discharges on the receiving stream.
8. Special Condition A. (25) Applicable State Law was added to the permit to meet the requirements of Senate Bill 729 (Coal Ash Management Act).
9. Special Condition A. (23) Domestic Wastewater Treatment Plant was added to the permit to assure compliance with the 40 CFR 133.102.
10. Special Condition A. (28) Electronic Reporting was added to the permit describing requirements for electronic reporting of DMRs. Starting December 21, 2016, federal regulations require electronic submittal of all discharge monitoring reports (DMRs) and specify that, if a state does not establish a

system to receive such submittals, then permittees must submit DMRs electronically to the Environmental Protection Agency (EPA).

11. Special Condition A. (29) Notification of Start-up – Outfall 005 was added to the permit.

Changes to the September 21, 2016 draft permit:

1. Steam Electric ELG - In September 2017, the EPA delayed the implementation date for effluent guidelines for the Steam Electric Power Generating Point Source Category to allow time to revise some of the BAT limitations for FGD wastewaters and bottom ash transport water. The earliest compliance date for the FGD wastewater in §123.13(g)(1)(i) and for the bottom ash transport water in §123.13(k)(1)(i) were delayed from November 1, 2018 to November 1, 2020. A reopener was added to outfall 004 specifying that the Division may reopen the permit to implement limits as revised in the ELGs.
2. Seeps Discharges - Effluent Limitations and Monitoring Requirements for Outfalls 102, 103, 110, 111, 113,114, 115, 116, 117, 121, 127, 128, 129, 130, 131, and 132 were eliminated from the draft permit transmitted on September 21, 2016. The seeps will be covered under a Special Order by Consent. Constructed seeps 104 and 106 will remain in the permit.
3. Added monitoring for lead and TDS for dewatering and decanting in response to EPA comments.
4. The footnote under outfall 002 requiring physical/chemical treatment was modified to allow the installation of treatment if it is necessary.
5. A statement was added to condition A. (6) Effluent Limitations and Monitoring Requirements for outfall 005 to require submittal of Form 2C Parts V and VI within 180 days of commencement of operations.
6. Special conditions for instream sampling and fish tissue monitoring were modified to clarify requirements (See A. (13) and A. (14)).
7. The mixing zone for outfall 002 was removed from the permit. Recent data shows that the temperature standard is not exceeded at outfall 002. The Division does not consider that the mixing zone in the current permit is justified since the conditions are different from when the mixing zone was established.
8. Added limits for 126 pollutants for outfall 005 since this outfall will discharge the cooling tower blowdown.
9. The groundwater monitoring well construction and sampling condition was eliminated from the permit.
10. Special condition A. (30) Compliance Boundary was added to the permit.
11. The groundwater compliance boundary map was added to the permit.

Outfall 005 Temperature Mixing Zone:

Duke requested a mixing zone for temperature for Outfall 005. Outfall 005 is a proposed outfall that will discharge among other flows, the cooling tower blowdown. A Cormix analysis was developed to evaluate a mixing zone. Both summer and winter conditions were considered in the analysis. The model was run under conservative assumption such as the use of maximum design flow rate of 6 MGD for both summer and winter and a sensitivity analysis resulted in the use of the most conservative river depth.

Summer Analysis - The summer maximum effluent discharge temperature was estimated as 100°F. Maximum ambient temperature was recorded as 86.3°F.

Winter Analysis - The winter maximum effluent discharge temperature was estimated as 93.7°F. The minimum ambient temperature was 35.5°F.

The temperature water quality standard has two components: not to exceed 2.8 °C (5.04 °F) above natural background and not to exceed 32 °C (89.6 °F). The critical condition modeled for the summer was the maximum temperature. The critical condition modeled for the winter was the temperature exceedance over background conditions.

The model includes the following assumptions/inputs:

Outfall 005	
Flow	6 MGD
Max summer temperature	100 °F
Max winter temperature	93.7 °F
Outfall structure	36" pipe followed by 10 feet wide rip rap channel

Ambient Conditions – Broad River	
Summer 7Q10	287 cfs
Winter 7Q10	440 cfs
Summer max temperature	86.3 °F
Winter min temperature	35.5 °F
Summer ΔT	3.3 °F
Winter ΔT	58.2 °F
River width	200 ft (60.9 m)
River depth	2.5 ft

Model results:

	Mixing Zone		**Dilution**
	Distance downstream (x)	**Plume width (y)**	
Summer	130 m (426.8 ft)	37 m (121.4 ft)	4.1
Winter	145 m (476 ft)	24.5 m (80.4 ft)	10.8

A mixing zone will be implemented comprising a distance of 145 meters downstream of the outfall and 37 meters wide. The mixing zone length is maximized for the winter condition and the width is maximized for the summer condition. For both summer and winter conditions the effluent is buoyant providing for passage of fish through the mixing zone. The mixing zone shall not result in acute toxicity, prevent free passage of aquatic organisms, result in offensive conditions, produce undesirable aquatic life or result in a dominance of nuisance species outside of the assigned mixing zone; or endanger the public health or welfare.

Temperature monitoring will be implemented upstream and downstream at the edge of the mixing zone to evaluate compliance with the temperature criteria outside of the mixing zone and to verify the model predictions. If model predictions are not validated the permit will be reopened to implement more stringent requirements.

The permit includes requirements to submit a mixing zone verification study and an assessment to verify that the mixing zone does not prevent the passage of fish around the mixing zone. The assessment would include a biological component but is not intended to be a full BIP demonstration due to the greatly reduced area of the historic thermal mixing zone. The study is intended to confirm the projected impacts of the discharge that were presented in the CORMIX model.

PROPOSED SCHEDULE FOR PERMIT ISSUANCE

Draft Permit to Public Notice: May 2, 2018
Permit Scheduled to Issue: June 16, 2018

NPDES DIVISION CONTACT

If you have questions regarding any of the above information or on the attached permit, please contact Teresa Rodriguez at (919) 807-6387.

NAME: TERESA RODRIGUEZ DATE: 5/2/2018

Modifications included in the final permit:

1. The discharge from Outfall 106 was reclassified as discharging to a UT to the Broad River. The RPA was revised which resulted in the implementation of limits for TDS and aluminum.
2. Sampling frequency for metals during dewatering was modified to weekly. Total bromide monitoring was added to the monitoring requirements.
3. Sampling frequency for total arsenic, total mercury and total selenium during decanting was modified to weekly. Total bromide monitoring was added to the monitoring requirements.
4. A footnote was added for the decanting and dewatering effluent pages that requires the facility to discontinue the discharge if pollutant levels reach 85% of the allowable concentrations and to report the event to the Division.
5. Footnote 8 for outfall 005 was modified to clarify that monthly monitoring is required during normal operations and during decanting. In addition, the fecal coliform sample type was changed to grab.
6. The downstream sample location for the instream monitoring required by special condition A.(13) was modified to approximately 250 meters from the discharge.
7. Special condition A.(24) was modified to require the submittal of materials required by the 316(b) rule by 3.5 years from the issuance of the permit and to add language stating that the Division determined that operating and maintaining the existing Closed-cycle recirculating system meets the requirements for an interim BTA.
8. The Division evaluated the schedule of compliance for the FGD limits and determined that Duke did not provide sufficient justification to delay the completion of the project until December 31, 2023. The compliance date was modified to December 31, 2021.

Rogers Energy Complex
NC0005088

Freshwater RPA - 95% Probability/95% Confidence Using Metal Translators

MAXIMUM DATA POINTS = 58

Outfall 002 - Dewatering
Qw = 1 MGD

Qw (MGD) = **1.00**
1Q10S (cfs) = **232.54**
7Q10S (cfs) = **287.00**
7Q10W (cfs) = **440.00**
30Q2 (cfs) = **NO 30Q2 DATA**
Avg. Stream Flow, QA (cfs) = **1460.00**
Receiving Stream: **NO HUC NUMBER**

WWTP/WTP Class:
IWC% @ 1Q10S = **0.662138494**
IWC% @ 7Q10S = **0.537168602**
IWC% @ 7Q10W = **0.351036123**
IWC% @ 30Q2 = **N/A**
IW%C @ QA = **0.106051794**
Stream Class: **WS-IV**

COMBINED HARDNESS (mg/L)
Acute = 25 mg/L
Chronic = 25 mg/L
YOU HAVE DESIGNATED THIS RECEIVING STREAM AS WATER SUPPLY
Effluent Hard: 0 value > 100 mg/L
Effluent Hard Avg = 25 mg/L

PARAMETER	TYPE (1)	NC STANDARDS OR EPA CRITERIA			PQL	UNITS	REASONABLE POTENTIAL RESULTS				RECOMMENDED ACTION
		Chronic	Applied Standard	Acute			n	# Det.	Max Pred Cw	Allowable Cw	
Arsenic	C	150	FW(7Q10s)	340		ug/L	1	1	3,366.6 Default C.V.	Acute (FW): 51,348.8 Chronic (FW): 27,924.2 No value > Allowable Cw	No RP
Arsenic	C	10	HH/WS(Qavg)			ug/L	Note: n ≤ 9 Limited data set			Chronic (HH): 9,429.4 No value > Allowable Cw	
Beryllium	NC	6.5	FW(7Q10s)	65		ug/L	0	0	N/A	Acute: 9,816.68 Chronic: 1,210.05	
Cadmium	NC	0.5899	FW(7Q10s)	3.2396		ug/L	1	0	*NO DETECTS*	Acute: 489.265 Chronic: 109.813	No RP
							Note: n ≤ 9 Limited data set			Max MDL = 1	
Chlorides	NC	250	WS(7Q10s)			mg/L	29	28	109.4	Acute: NO WQS Chronic: 46,540.3 No value > Allowable Cw	No RP
Aluminum	NC	6.5	WS(7Q10s)			mg/L	1	1	403.0 Default C.V.	Acute: NO WQS Chronic: 1,210.0 No value > Allowable Cw	No RP
							Note: n ≤ 9 Limited data set				
Total Dissolved Solids	NC	500	WS(7Q10s)			mg/L	1	1	2,728.0 Default C.V.	Acute: NO WQS Chronic: 93,080.6 No value > Allowable Cw	No RP
							Note: n ≤ 9 Limited data set				
Chromium III	NC	117.7325	FW(7Q10s)	905.0818		µg/L	0	0	N/A	Acute: 136,690.7 Chronic: 21,917.2	
Chromium VI	NC	11	FW(7Q10s)	16		µg/L	0	0	N/A	Acute: 2,416.4 Chronic: 2,047.8	
Chromium, Total	NC					µg/L	1	1	FALSE 372.0 Default C.V.	Max reported value = 60	No RP
							Note: n ≤ 9 Limited data set				
Copper	NC	7.8806	FW(7Q10s)	10.4720		ug/L	8	8	326.80 Default C.V.	Acute: 1,581.54 Chronic: 1,467.07	No RP
							Note: n ≤ 9				

Freshwater RPA - 95% Probability/95% Confidence Using Metal Translators

MAXIMUM DATA POINTS = 58

C *REQUIRED DATA ENTRY*

Table 1. Project Information

☐CHECK IF HQW OR ORW WQS

Facility Name	Rogers Energy Complex
WWTP/WTP Class	
NPDES Permit	NC0005088
Outfall	002 - Dewatering
Flow, Qw (MGD)	1.000
Receiving Stream	Broad River
HUC Number	
Stream Class	WS-IV
☐Apply WS Hardness WQC	
7Q10s (cfs)	287.00
7Q10w (cfs)	440.00
30Q2 (cfs)	
QA (cfs)	1460.00
1Q10s (cfs)	232.54
Effluent Hardness	25 mg/L (Avg)
Upstream Hardness	25 mg/L (Avg)
Combined Hardness Chronic	25 mg/L
Combined Hardness Acute	25 mg/L
Data Source(s)	Data collected: 6/17/15, 6/23/16, 9/9/15, 4/13/16, 6/20/16, 12/19/16, 2/13/17, 5/16/17
☐CHECK TO APPLY MODEL	

Table 2. Parameters of Concern

	Name	WQS	Type	Chronic	Modifier	Acute	PQL	Units
Par01	Arsenic	Aquactic Life	C	150	FW	340		ug/L
Par02	Arsenic	Human Health Water Supply	C	10	HH/WS	N/A		ug/L
Par03	Beryllium	Aquatic Life	NC	6.5	FW	65		ug/L
Par04	Cadmium	Aquatic Life	NC	0.5899	FW	3.2396		ug/L
Par05	Chlorides	Water Supply	NC	250	WS			mg/L
Par06	Aluminum	Water Supply	NC	6.5	WS			mg/L
Par07	Total Dissolved Solids	Water Supply	NC	500	WS			mg/L
Par08	Chromium III	Aquatic Life	NC	117.7325	FW	905.0818		ug/L
Par09	Chromium VI	Aquatic Life	NC	11	FW	16		µg/L
Par10	Chromium, Total	Aquatic Life	NC	N/A	FW	N/A		µg/L
Par11	Copper	Aquatic Life	NC	7.8806	FW	10.4720		ug/L
Par12	Cyanide	Aquatic Life	NC	5	FW	22	10	ug/L
Par13	Fluoride	Aquatic Life	NC	1,800	FW			ug/L
Par14	Lead	Aquatic Life	NC	2.9416	FW	75.4871		ug/L
Par15	Mercury	Aquatic Life	NC	12	FW		0.5	ng/L
Par16	Molybdenum	Water Supply	NC	160	WS			ug/L
Par17	Nickel	Aquatic Life	NC	37.2313	FW	335.2087		µg/L
Par18	Nickel	Water Supply	NC	25.0000	WS	N/A		µg/L
Par19	Selenium	Aquatic Life	NC	5	FW	56		ug/L
Par20	Boron	Aquatic Life	NC	7	FW			mg/l
Par21	Zinc	Aquatic Life	NC	126.7335	FW	125.7052		ug/L
Par22	Antimony	Water Supply	NC	5.6	WS			µg/L
Par23	Barium	Water Supply	NC	1	WS			mg/L
Par24	Sulfates	Water Supply	NC	250	WS			µg/L

REASONABLE POTENTIAL ANALYSIS

H1

Effluent Hardness

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL
1		25	25
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Results	
Std Dev.	0.0000
Mean	25.0000
C.V. (default)	0.6000
n	1
10th Per value	25.00 mg/L
Average Value	25.00 mg/L
Max. Value	25.00 mg/L

H2

Upstream Hardness

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL
1		25	25
2			
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Results	
Std Dev.	0.0000
Mean	25.0000
C.V. (default)	0.6000
n	1
10th Per value	25.00 mg/L
Average Value	25.00 mg/L
Max. Value	25.00 mg/L

REASONABLE POTENTIAL ANALYSIS

Par01 & Par02					Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58
			Arsenic		
	Date	Data	BDL=1/2DL	Results	
1		543	543	Std Dev.	0.0000
2				Mean	543.0000
3				C.V. (default)	0.6000
4				n	1
5					
6				Mult Factor =	6.20
7				Max. Value	543.0 ug/L
8				Max. Pred Cw	3366.6 ug/L
9					
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REASONABLE POTENTIAL ANALYSIS

Par04

Cadmium

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data		BDL=1/2DL	Results	
1		<	1	0.5	Std Dev.	0.0000
2					Mean	0.5000
3					C.V. (default)	0.6000
4					n	1
5						
6					Mult Factor =	6.20
7					Max. Value	0.500 ug/L
8					Max. Pred Cw	O DETECTS ug/L
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Par05

Chlorides

Use "PASTE SPE Values" then "CC Maximum data po 58

	Date	Data	BDL=1/2DL	Results	
1		56	56	Std Dev.	18.7058
2		28.6	28.6	Mean	45.7
3		< 1	0.5	C.V.	0.4098
4		27.6	27.6	n	29
5		40	40		
6		51.9	51.9	Mult Factor =	1.2
7		57.5	57.5	Max. Value	95.1
8		55.8	55.8	Max. Pred Cw	109.4
9		47.6	47.6		
10		29.9	29.9		
11		33.8	33.8		
12		36.6	36.6		
13		33.9	33.9		
14		32.5	32.5		
15		30.8	30.8		
16		31.1	31.1		
17		52.7	52.7		
18		67.8	67.8		
19		47.1	47.1		
20		54.3	54.3		
21		58.3	58.3		
22		47.7	47.7		
23		52.7	52.7		
24					
25					
26		41.1	41.1		
27		70	70		
28		95.1	95.1		
29		80.2	80.2		
30		34	34		
31		28.8	28.8		
32					
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REASONABLE POTENTIAL ANALYSIS

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Par06

Aluminum

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL	Results	
1		65	65	Std Dev.	0.0000
2				Mean	65.0000
3				C.V. (default)	0.6000
4				n	1
5					
6				Mult Factor =	6.20
7				Max. Value	65.0 mg/L
8				Max. Pred Cw	403.0 mg/L
9					
10					
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mg/L
mg/L

Par07

Total Dissolved Solids

Use "PASTE SF Values" then "C Maximum data = 58

	Date	Data	BDL=1/2DL	Results	
1		440	440	Std Dev.	0.0000
2				Mean	440.0000
3				C.V. (default)	0.6000
4				n	1
5					
6				Mult Factor =	6.20
7				Max. Value	440.0
8				Max. Pred Cw	2728.0
9					
10					
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REASONABLE POTENTIAL ANALYSIS

	Par10				Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58
	Chromium, Total				
	Date	Data	BDL=1/2DL	Results	
1		60	60	Std Dev.	0.0000
2				Mean	60.0000
3				C.V. (default)	0.6000
4				n	1
5					
6				Mult Factor =	6.20
7				Max. Value	60.0 µg/L
8				Max. Pred Cw	372.0 µg/L
9					
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mg/L
mg/L

	Pa11				Use "PASTE SP-Values" then "C Maximum data = 58
	Copper				
	Date	Data	BDL=1/2DL	Results	
1		172	172	Std Dev.	60.2889
2		1	1	Mean	22.8225
3				C.V. (default)	0.6000
4		1.3	1.3	n	8
5		1.4	1.4		
6				Mult Factor =	1.90
7				Max. Value	172.00
8		0.55	0.55	Max. Pred Cw	326.80
9		1.1	1.1		
10		0.83	0.83		
11		4.4	4.4		
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REASONABLE POTENTIAL ANALYSIS

ECIAL COPY" points	Par13	Fluoride			Use "PASTE SPECIAL Values" then "COPY" Maximum data points = 58	Par14	Lead			Use "PASTE SF Values" then "C Maximum data = 58
		Date	Data	BDL=1/2DL	Results		Date		BDL=1/2DL	Results
	1		0.38	0.38	Std Dev.	0.0000		80	80	Std Dev. 16.2635
	2				Mean	0.3800		0.46	0.46	Mean 3.6650
	3				C.V. (default)	0.6000		0.2	0.2	C.V. 4.4375
	4				n	1		0.3	0.3	n 24
	5							0.37	0.37	
	6				Mult Factor =	6.20		0.14	0.14	Mult Factor = 2.21
ug/L	7				Max. Value	0.4 ug/L		0.13	0.13	Max. Value 80.000
ug/L	8				Max. Pred Cw	2.4 ug/L		0.23	0.23	Max. Pred Cw 176.800
	9							0.55	0.55	
	10							0.27	0.27	
	11							1.9	1.9	
	12							0.23	0.23	
	13						<	1	0.5	
	14						<	1	0.5	
	15							0.12	0.12	
	16							0.18	0.18	
	17						<	0.1	0.05	
	18							0.41	0.41	
	19									
	20							0.1	0.1	
	21						<	1	0.5	
	22						<	1	0.5	
	23							0.16	0.16	
	24							0.11	0.11	
	25						<	0.1	0.05	
	26									
	27									
	28									
	29									
	30									
	31									
	32									
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REASONABLE POTENTIAL ANALYSIS

ECIAL COPY" points	Par15				Use "PASTE SPECIAL Values" then "COPY" Maximum data points = 58	Par16				Use "PASTE SF Values" then "C Maximum data = 58
	Mercury					Molybdenum				
		Date	Data	BDL=1/2DL	Results		Date	Data	BDL=1/2DL	Results
	1		39	39	Std Dev.	0.0000		2750	2750	Std Dev.	568.7004
	2				Mean	39.0000		53.9	53.9	Mean	469.3633
	3				C.V. (default)	0.6000		98.8	98.8	C.V.	1.2116
	4				n	1		25.1	25.1	n	30
	5							63.4	63.4		
	6				Mult Factor =	6.20		69.7	69.7	Mult Factor =	1.37
ug/L	7				Max. Value	39.0 ng/L		79.1	79.1	Max. Value	2750.0
ug/L	8				Max. Pred Cw	241.8 ng/L		95.2	95.2	Max. Pred Cw	3767.5
	9							39.7	39.7		
	10							166	166		
	11							180	180		
	12							161	161		
	13							160	160		
	14							167	167		
	15							181	181		
	16							168	168		
	17							948	948		
	18							1250	1250		
	19							745	745		
	20							936	936		
	21							813	813		
	22							902	902		
	23							773	773		
	24							876	876		
	25										
	26							1020	1020		
	27							172	172		
	28							164	164		
	29							389	389		
	30							269	269		
	31							366	366		
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	33										
	34										
	35										
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REASONABLE POTENTIAL ANALYSIS

ECIAL. OPY" . points	Par17 & Par18					Use "PASTE SPECIAL, Values" then "COPY" . Maximum data points = 58	Par19				
	Nickel						Selenium				
		Date	Data	BDL=1/2DL	Results			Date	Data	BDL=1/2DL	Results
	1		72	72	Std Dev.	13.2869	1		21.5	21.5	Std Dev.
	2		2.3	2.3	Mean	5.2500	2				Mean
	3		1.9	1.9	C.V.	2.5308	3				C.V.
	4		6.2	6.2	n	28	4		6.6	6.6	n
	5		6.8	6.8			5		4.4	4.4	
	6		3	3	Mult Factor =	1.69	6		2.7	2.7	Mult Factor =
ug/L	7		1.7	1.7	Max. Value	72.0 µg/L	7		2.3	2.3	Max. Value
ug/L	8		10.3	10.3	Max. Pred Cw	121.7 µg/L	8		1.4	1.4	Max. Pred Cw
	9		3	3			9		1.6	1.6	
	10						10		1.5	1.5	
	11		1.2	1.2			11		0.76	0.76	
	12		0.74	0.74			12				
	13		8.2	8.2			13		0.56	0.56	
	14		0.96	0.96			14		10	10	
	15						15		11.6	11.6	
	16		1.3	1.3			16		0.56	0.56	
	17		3.5	3.5			17		0.69	0.69	
	18		1.9	1.9			18		0.76	0.76	
	19	<	5	2.5			19				
	20	<	5	2.5			20				
	21		1.8	1.8			21				
	22		2.8	2.8			22				
	23		2	2			23				
	24		1.4	1.4			24				
	25						25				
	26		0.83	0.83			26				
	27	<	5	2.5			27				
	28	<	5	2.5			28				
	29		0.97	0.97			29				
	30		1.1	1.1			30				
	31		1.1	1.1			31				
	32						32				
	33						33				
	34						34				
	35						35				
	36						36				
	37						37				
	38						38				
	39						39				
	40						40				
	41						41				
	42						42				
	43						43				
	44						44				
	45						45				
	46						46				
	47						47				
	48						48				
	49						49				
	50						50				
	51						51				
	52						52				
	53						53				
	54						54				
	55						55				
	56						56				
	57						57				
	58						58				

REASONABLE POTENTIAL ANALYSIS

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58	Par20					Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58	Par21				
	Boron						Zinc				
		Date	Data	BDL=1/2DL	Results			Date	Data	BDL=1/2DL	Results
5.8718	1				Std Dev.	2.6957	1		0.158	0.158	Std Dev.
4.4620	2				Mean	3.3556	2				Mean
1.3160	3				C.V.	0.8033	3				C.V. (default)
15	4		< 0.05	0.025	n	28	4				n
	5		3.55	3.55			5				
2.09	6		3.18	3.18	Mult Factor =	1.30	6				Mult Factor =
21.5 ug/L	7		2.99	2.99	Max. Value	11.300 mg/l	7				Max. Value
44.9 ug/L	8		2.46	2.46	Max. Pred Cw	14.690 mg/l	8				Max. Pred Cw
	9		2.46	2.46			9				
	10		3.07	3.07			10				
	11		0.92	0.92			11				
	12		0.97	0.97			12				
	13		0.895	0.895			13				
	14		0.948	0.948			14				
	15		0.984	0.984			15				
	16		1.01	1.01			16				
	17		0.975	0.975			17				
	18		3.3	3.3			18				
	19		4.6	4.6			19				
	20		2.94	2.94			20				
	21		3.8	3.8			21				
	22		3.85	3.85			22				
	23		4.05	4.05			23				
	24		3.44	3.44			24				
	25		8	8			25				
	26						26				
	27		11.3	11.3			27				
	28		1.96	1.96			28				
	29		2.14	2.14			29				
	30		3.35	3.35			30				
	31		7.56	7.56			31				
	32		9.23	9.23			32				
	33						33				
	34						34				
	35						35				
	36						36				
	37						37				
	38						38				
	39						39				
	40						40				
	41						41				
	42						42				
	43						43				
	44						44				
	45						45				
	46						46				
	47						47				
	48						48				
	49						49				
	50						50				
	51						51				
	52						52				
	53						53				
	54						54				
	55						55				
	56						56				
	57						57				
	58						58				

REASONABLE POTENTIAL ANALYSIS

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58	Par22				Antimony			Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58	Par23				Barium	
		Date	Data		BDL=1/2DL	Results				Date	Data		BDL=1/2DL
0.0000	1			4.9	4.9	Std Dev.	1.4087		1			1.29	1.29
0.1580	2		<	0.39	0.195	Mean	1.8353		2			0.07	0.07
0.6000	3			0.63	0.63	C.V.	0.7675		3		<	0.005	0.0025
1	4		<	5	2.5	n	30		4			0.0767	0.0767
	5		<	5	2.5				5			0.0708	0.0708
6.20	6			0.52	0.52	Mult Factor =	1.26		6			0.0569	0.0569
0.2 ug/L	7			0.55	0.55	Max. Value	4.900000 µg/L		7			0.0649	0.0649
1.0 ug/L	8			0.68	0.68	Max. Pred Cw	6.174000 µg/L		8			0.0777	0.0777
	9		<	0.39	0.195				9			0.0797	0.0797
	10			3.3	3.3				10			0.17	0.17
	11			4.2	4.2				11			0.19	0.19
	12			3.1	3.1				12			0.199	0.199
	13			3.4	3.4				13			0.193	0.193
	14			3.6	3.6				14			0.24	0.24
	15			4.4	4.4				15			0.181	0.181
	16			3.5	3.5				16			0.179	0.179
	17			1	1				17			0.21	0.21
	18			0.64	0.64				18			0.26	0.26
	19		<	5	2.5				19			0.196	0.196
	20		<	5	2.5				20			0.234	0.234
	21			0.83	0.83				21			0.273	0.273
	22			1	1				22			0.258	0.258
	23			0.81	0.81				23			0.23	0.23
	24			0.72	0.72				24			0.15	0.15
	25								25				
	26			0.61	0.61				26			0.24	0.24
	27		<	2.6	1.3				27			0.142	0.142
	28		<	3.8	1.9				28			0.303	0.303
	29			1.7	1.7				29			0.277	0.277
	30			0.58	0.58				30			0.25	0.25
	31			0.8	0.8				31			0.23	0.23
	32								32				
	33								33				
	34								34				
	35								35				
	36								36				
	37								37				
	38								38				
	39								39				
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	42								42				
	43								43				
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	57								57				
	58								58				

REASONABLE POTENTIAL ANALYSIS

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

Par24

Sulfates

Results	
Std Dev.	0.2185
Mean	0.2131
C.V.	1.0250
n	30
Mult Factor =	1.33
Max. Value	1.290000 mg/L
Max. Pred Cw	1.715700 mg/L

	Date	Data		BDL=1/2DL
1			712	712
2		<	1	0.5
3			1060	1060
4			487	487
5			532	532
6			234	234
7			231	231
8			439	439
9			76.3	76.3
10			79.8	79.8
11			76	76
12			72	72
13			67.8	67.8
14			70.6	70.6
15			68.3	68.3
16			105	105
17			118	118
18			111	111
19			98.2	98.2
20			74.6	74.6
21			72.2	72.2
22			70.9	70.9
23			172	172
24				
25			307	307
26			95.1	95.1
27			99.3	99.3
28			127	127
29			107	107
30		<	135	67.5
31				
32				
33				
34				
35				
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58				

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

Par25

Thallum

Results	
Std Dev.	235.5910
Mean	201.0724
C.V.	1.1717
n	29
Mult Factor =	1.39
Max. Value	########## µg/L
Max. Pred Cw	########## µg/L

	Date	Data		BDL=1/2DL
1			7.08	7.08
2			0.56	0.56
3			0.6	0.6
4			0.77	0.77
5			0.75	0.75
6			0.69	0.69
7			0.5	0.5
8			0.47	0.47
9			0.76	0.76
10			0.24	0.24
11			0.12	0.12
12			0.093	0.093
13			0.11	0.11
14			0.11	0.11
15			0.1	0.1
16			0.085	0.085
17			0.18	0.18
18			0.11	0.11
19		<	1	0.5
20		<	1	0.5
21			0.095	0.095
22			0.13	0.13
23			0.069	0.069
24			0.04	0.04
25				
26			0.023	0.023
27		<	1	0.5
28			0.54	0.54
29			0.25	0.25
30			0.063	0.063
31				
32				
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REASONABLE POTENTIAL ANALYSIS

	Use "PASTE SPECIAL-Values" then "COPY" . Maximum data points = 58
Results	
Std Dev.	1.2806
Mean	0.5530
C.V.	2.3156
n	29
Mult Factor =	1.62
Max. Value	7.080000 µg/L
Max. Pred Cw	11.469600 µg/L

Rogers Energy Complex
NC0005088

Outfall 002 (decanting/normal operations)

Freshwater RPA - 95% Probability/95% Confidence Using Metal Translators

Qw = 15.15 MGD

MAXIMUM DATA POINTS = 58

Qw (MGD) = **15.15**
1Q10S (cfs) = **232.54**
7Q10S (cfs) = **287.00**
7Q10W (cfs) = **440.00**
30Q2 (cfs) = **NO 30Q2 DATA**
Avg. Stream Flow, QA (cfs) = **1460.00**
Receiving Stream: **NO HUC NUMBER**

WWTP/WTP Class:
IWC% @ 1Q10S = **9.172045426**
IWC% @ 7Q10S = **7.563228201**
IWC% @ 7Q10W = **5.066534335**
IWC% @ 30Q2 = **N/A**
IW%C @ QA = **1.582930705**
Stream Class: **WS-IV**

COMBINED HARDNESS (mg/L)
Acute = 25 mg/L
Chronic = 25 mg/L
YOU HAVE DESIGNATED THIS RECEIVING STREAM AS WATER SUPPLY
Effluent Hard: 0 value > 100 mg/L
Effluent Hard Avg = 25 mg/L

PARAMETER	TYPE (1)	NC STANDARDS OR EPA CRITERIA			PQL	UNITS	REASONABLE POTENTIAL RESULTS				RECOMMENDED ACTION
		Chronic	Applied Standard	Acute			n	# Det.	Max Pred Cw	Allowable Cw	
Arsenic	C	150	FW(7Q10s)	340		ug/L	58	58	139.0	Acute (FW): 3,706.9	No RP
										Chronic (FW): 1,983.3	
										No value > Allowable Cw	
Arsenic	C	10	HH/WS(Qavg)			ug/L				Chronic (HH): 631.7	
										No value > Allowable Cw	
Beryllium	NC	6.5	FW(7Q10s)	65		ug/L	0	0	N/A	Acute: 708.68	
										Chronic: 85.94	
Cadmium	NC	0.5899	FW(7Q10s)	3.2396		ug/L	58	15	4.830	Acute: 35.320	No RP, > 50% monitor
										Chronic: 7.799	
										No value > Allowable Cw	
Chlorides	NC	250	WS(7Q10s)			mg/L	1	1	239.9	Acute: NO WQS	No RP
							Note: n ≤ 9		Default C.V.	Chronic: 3,305.5	
							Limited data set			No value > Allowable Cw	
Aluminum	NC	6.5	WS(7Q10s)			mg/L	1	1	0.8	Acute: NO WQS	No RP
							Note: n ≤ 9		Default C.V.	Chronic: 85.9	
							Limited data set			No value > Allowable Cw	
Total Dissolved Solids	NC	500	WS(7Q10s)			mg/L	1	1	1,178.0	Acute: NO WQS	No RP
							Note: n ≤ 9		Default C.V.	Chronic: 6,610.9	
							Limited data set			No value > Allowable Cw	
Chromium III	NC	117.7325	FW(7Q10s)	905.0818		µg/L	0	0	N/A	Acute: 9,867.8	
										Chronic: 1,556.6	
Chromium VI	NC	11	FW(7Q10s)	16		µg/L	0	0	N/A	Acute: 174.4	
										Chronic: 145.4	
Chromium, Total	NC						Tot Cr value(s) < 50 and < Cr VI Allowable Cw				
						µg/L	58	26	15.4	Max reported value = 15.4	No RP
Copper	NC	7.8806	FW(7Q10s)	10.4720		ug/L	16	11	18.48	Acute: 114.17	No RP

Rogers Energy Complex
NC0005088

Outfall 002 (decanting/normal operations)
Qw = 15.15 MGD

Freshwater RPA - 95% Probability/95% Confidence Using Metal Translators

										Chronic: 104.20 No value > Allowable Cw	
Fluoride	NC	1800	FW(7Q10s)			ug/L	1 1 Note: n ≤ 9 Limited data set	0.8 Default C.V.	Acute: NO WQS Chronic: 23,799.4 No value > Allowable Cw	No RP
Lead	NC	2.9416	FW(7Q10s)	75.4871		ug/L	13 10	6.390	Acute: 823.013 Chronic: 38.894 No value > Allowable Cw	No RP
Mercury	NC	12	FW(7Q10s)		0.5	ng/L	0 0	N/A	Acute: NO WQS Chronic: 158.7	
Molybdenum	NC	160	WS(7Q10s)			ug/L	1 1 Note: n ≤ 9 Limited data set	93.0 Default C.V.	Acute: NO WQS Chronic: 2,115.5 No value > Allowable Cw	No RP
Nickel	NC	37.2313	FW(7Q10s)	335.2087		µg/L	58 58	11.1	Acute (FW): 3,654.7 Chronic (FW): 492.3 No value > Allowable Cw	No RP
Nickel	NC	25.0000	WS(7Q10s)			µg/L			Chronic (WS): 330.5 No value > Allowable Cw	
Selenium	NC	5	FW(7Q10s)	56		ug/L	58 58	42.3	Acute: 610.6 Chronic: 66.1 No value > Allowable Cw	No RP, > 50% monitor
Silver	NC	0.06	FW(7Q10s)	0.29639789		ug/L	58 0	*NO DETECTS*	Acute: 3.2 Chronic: 0.8 Max MDL = 1	No RP
Zinc	NC	126.7335	FW(7Q10s)	125.7052		ug/L	58 40	42.2	Acute: 1,370.5 Chronic: 1,675.7 No value > Allowable Cw	No RP
Antimony	NC	5.6	WS(7Q10s)			µg/L	1 1 Note: n ≤ 9 Limited data set	7.25400 Default C.V.	Acute: NO WQS Chronic: 74.04246 No value > Allowable Cw	No RP
Barium	NC	1	WS(7Q10s)			mg/L	1 1 Note: n ≤ 9 Limited data set	0.39680 Default C.V.	Acute: NO WQS Chronic: 13.22187 No value > Allowable Cw	No RP
Sulfates	NC	250	WS(7Q10s)			mg/L	15 15	128.87100	Acute: NO WQS Chronic: 3305.46684 No value > Allowable Cw	No RP
Thallium	NC	2	WS(7Q10s)			µg/L	15 14	5.23260	Acute: NO WQS Chronic: 26.44373 No value > Allowable Cw	No RP

Freshwater RPA - 95% Probability/95% Confidence Using Metal Translators

MAXIMUM DATA POINTS = 58

REQUIRED DATA ENTRY

Table 1. Project Information

	☐CHECK IF HQW OR ORW WQS
Facility Name	Rogers Energy Complex
WWTP/WTP Class	
NPDES Permit	NC0005088
Outfall	002 (decanting/normal operations)
Flow, Qw (MGD)	15.150
Receiving Stream	Broad River
HUC Number	
Stream Class	WS-IV
☐Apply WS Hardness WQC	
7Q10s (cfs)	287.00
7Q10w (cfs)	440.00
30Q2 (cfs)	
QA (cfs)	1460.00
1Q10s (cfs)	232.54
Effluent Hardness	25 mg/L (Avg)
Upstream Hardness	25 mg/L (Avg)
Combined Hardness Chronic	25 mg/L
Combined Hardness Acute	25 mg/L
Data Source(s)	
☐CHECK TO APPLY MODEL	

Follow directions for data entry. In some cases a comment menu list the available choices or a dropdown menu will provide a list you may select from. Error message occur if data entry does not meet input criteria.

Table 2. Parameters of Concern

	Name	WQS	Type	Chronic	Modifier	Acute	PQL	Units
Par01	Arsenic	Aquactic Life	C	150	FW	340		ug/L
Par02	Arsenic	Human Health Water Supply	C	10	HH/WS	N/A		ug/L
Par03	Beryllium	Aquatic Life	NC	6.5	FW	65		ug/L
Par04	Cadmium	Aquatic Life	NC	0.5899	FW	3.2396		ug/L
Par05	Chlorides	Water Supply	NC	250	WS			mg/L
Par06	Aluminum	Water Supply	NC	6.5	WS			mg/L
Par07	Total Dissolved Solids	Water Supply	NC	500	WS			mg/L
Par08	Chromium III	Aquatic Life	NC	117.7325	FW	905.0818		ug/L
Par09	Chromium VI	Aquatic Life	NC	11	FW	16		µg/L
Par10	Chromium, Total	Aquatic Life	NC	N/A	FW	N/A		µg/L
Par11	Copper	Aquatic Life	NC	7.8806	FW	10.4720		ug/L
Par12	Cyanide	Aquatic Life	NC	5	FW	22	10	ug/L
Par13	Fluoride	Aquatic Life	NC	1,800	FW			ug/L
Par14	Lead	Aquatic Life	NC	2.9416	FW	75.4871		ug/L
Par15	Mercury	Aquatic Life	NC	12	FW		0.5	ng/L
Par16	Molybdenum	Water Supply	NC	160	WS			ug/L
Par17	Nickel	Aquatic Life	NC	37.2313	FW	335.2087		µg/L
Par18	Nickel	Water Supply	NC	25.0000	WS	N/A		µg/L
Par19	Selenium	Aquatic Life	NC	5	FW	56		ug/L
Par20	Silver	Aquatic Life	NC	0.06	FW	0.2964		ug/L
Par21	Zinc	Aquatic Life	NC	126.7335	FW	125.7052		ug/L
Par22	Antimony	Water Supply	NC	5.6	WS			µg/L
Par23	Barium	Water Supply	NC	1	WS			mg/L
Par24	Sulfates	Water Supply	NC	250	WS			mg/L
Par25	Thallum	Water Supply	NC	2	WS			µg/L

REASONABLE POTENTIAL ANALYSIS

H1

Effluent Hardness

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL
1		25	25
2			
3			
4			
5			
6			
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56			
57			
58			

Results	
Std Dev.	0.0000
Mean	25.0000
C.V. (default)	0.6000
n	1
10th Per value	25.00 mg/L
Average Value	25.00 mg/L
Max. Value	25.00 mg/L

H2

Upstream Hardness

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL
1		25	25
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
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56			
57			
58			

Results	
Std Dev.	0.0000
Mean	25.0000
C.V. (default)	0.6000
n	1
10th Per value	25.00 mg/L
Average Value	25.00 mg/L
Max. Value	25.00 mg/L

Par01 & Par02

Arsenic

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL
1	1/11/2011	87.5	87.5
2	6/12/2011	70.3	70.3
3	3/1/2012	25.8	25.8
4	7/2/2012	43.1	43.1
5	7/3/2012	36.5	36.5
6	3/4/2012	16.8	16.8
7	1/5/2012	13.4	13.4
8	5/6/2012	31.7	31.7
9	2/7/2012	42.5	42.5
10	7/8/2012	51.6	51.6
11	4/9/2012	47.2	47.2
12	1/10/2012	76.4	76.4
13	6/11/2012	64	64
14	4/12/2012	72.6	72.6
15	2/1/2013	55.7	55.7
16	5/2/2013	29.9	29.9
17	5/3/2013	34.9	34.9
18	2/4/2013	32	32
19	7/5/2013	82.8	82.8
20	4/6/2013	40.5	40.5
21	2/7/2013	139	139
22	6/8/2013	38.2	38.2
23	3/9/2013	31.8	31.8
24	1/10/2013	43.2	43.2
25	5/11/2013	23.3	23.3
26	3/12/2013	77.5	77.5
27	7/1/2014	39.1	39.1
28	4/2/2014	36.2	36.2
29	4/3/2014	35.4	35.4
30	1/3/2015	31.1	31.1
31	1/4/2014	34.9	34.9
32	6/5/2014	16.1	16.1
33	3/6/2014	17.8	17.8
34	1/7/2014	53.6	53.6
35	8/7/2014	56.7	56.7
36	5/8/2014	45.2	45.2
37	2/9/2014	78.6	78.6
38	7/10/2014	42.3	42.3
39	4/11/2014	34.3	34.3
40	2/12/2014	36.4	36.4
41	6/1/2015	27.5	27.5
42	3/2/2015	29.5	29.5
43	3/3/2015	46.3	46.3
44	7/4/2015	20.7	20.7
45	5/5/2015	2.9	2.9
46	2/6/2015	11.4	11.4
47	7/7/2015	66.3	66.3
48	9/7/2016	44.7	44.7
49	4/8/2015	49.5	49.5
50	1/9/2015	52.9	52.9
51	4/9/2016	31.7	31.7
52	6/10/2015	55.6	55.6
53	3/11/2015	13.1	13.1
54	1/12/2015	6.6	6.6
55	5/1/2016	8.3	8.3
56	2/2/2016	11.4	11.4
57	1/3/2016	9.8	9.8
58	5/4/2016	9.7	9.7

Results	
Std Dev.	24.6229
Mean	40.7552
C.V.	0.6042
n	58
Mult Factor =	1.00
Max. Value	139.0 ug/L
Max. Pred Cw	139.0 ug/L

REASONABLE POTENTIAL ANALYSIS

Par04

Cadmium

Use "PASTE SPECIAL-Values" then "COPY" Maximum data points = 58

	Date	Data		BDL=1/2DL
1	3/31/2015	<	1	0.5
2	4/7/2015	<	1	0.5
3	4/14/2015	<	1	0.5
4	4/21/2015	<	1	0.5
5	4/28/2015	<	1	0.5
6	5/5/2015	<	1	0.5
7	5/12/2015	<	1	0.5
8	5/19/2015	<	1	0.5
9	5/26/2015	<	1	0.5
10	6/2/2015	<	1	0.5
11	6/9/2015	<	1	0.5
12	6/16/2015	<	1	0.5
13	6/23/2015	<	1	0.5
14	6/30/2015	<	1	0.5
15	7/7/2015	<	1	0.5
16	7/14/2015	<	1	0.5
17	7/21/2015	<	1	0.5
18	7/28/2015	<	1	0.5
19	8/4/2015	<	1	0.5
20	8/11/2015	<	1	0.5
21	8/18/2015	<	1	0.5
22	8/25/2015	<	1	0.5
23	9/1/2015	<	1	0.5
24	9/8/2015	<	1	0.5
25	9/15/2015	<	1	0.5
26	9/16/2015		0.09	ERR
27	9/22/2015	<	1	0.5
28	9/29/2015	<	1	0.5
29	10/6/2015		4.02	4.02
30	10/13/2015		3.99	3.99
31	10/20/2015		4.55	4.55
32	10/27/2015		4.83	4.83
33	11/3/2015		3.79	3.79
34	11/10/2015		3.23	3.23
35	11/17/2015		2.81	2.81
36	11/23/2015		2.58	2.58
37	12/1/2015		2.29	2.29
38	12/8/2015		1.7	1.7
39	12/15/2015		1.52	1.52
40	12/21/2015		1.21	1.21
41	12/29/2015		1.04	1.04
42	1/5/2016		1.46	1.46
43	1/12/2016	<	1	0.5
44	1/19/2016	<	1	0.5
45	1/26/2016	<	1	0.5
46	2/2/2016	<	1	0.5
47	2/9/2016	<	1	0.5
48	2/16/2016	<	1	0.5
49	2/23/2016	<	1	0.5
50	3/1/2016	<	1	0.5
51	3/8/2016	<	1	0.5
52	3/15/2016	<	1	0.5
53	3/22/2016	<	1	0.5
54	3/29/2016	<	1	0.5
55	4/5/2016	<	1	0.5
56	4/12/2016	<	1	0.5
57	4/19/2016	<	1	0.5
58	4/26/2016	<	1	0.5

Results	
Std Dev.	1.1732
Mean	1.0618
C.V.	1.1049
n	57
Mult Factor =	1.00
Max. Value	4.830 ug/L
Max. Pred Cw	4.830 ug/L

Par10

Chromium, Total

Use "PASTE SPECIAL-Values" then "COPY" Maximum data points = 58

	Date	Data		BDL=1/2DL
1	3/31/2015		2.1	2.1
2	4/7/2015		1.81	1.81
3	4/14/2015	<	1	0.5
4	4/21/2015	<	1	0.5
5	4/28/2015	<	1	0.5
6	5/5/2015	<	1	0.5
7	5/12/2015	<	1	0.5
8	5/19/2015	<	1	0.5
9	5/26/2015	<	1	0.5
10	6/2/2015	<	1	0.5
11	6/9/2015	<	1	0.5
12	6/16/2015		1.01	1.01
13	6/23/2015		3.37	3.37
14	6/30/2015		4.76	4.76
15	7/7/2015		4.92	4.92
16	7/14/2015		6.5	6.5
17	7/21/2015		11.7	11.7
18	7/28/2015		15.4	15.4
19	8/4/2015		11.6	11.6
20	8/11/2015		11.4	11.4
21	8/18/2015		10.2	10.2
22	8/25/2015		7.51	7.51
23	9/1/2015		5.06	5.06
24	9/8/2015		3.41	3.41
25	9/15/2015		2.29	2.29
26	9/16/2015		1.8	1.8
27	9/22/2015		2.09	2.09
28	9/29/2015		3.7	3.7
29	10/6/2015		3.24	3.24
30	10/13/2015		1.81	1.81
31	10/20/2015		1.66	1.66
32	10/27/2015		1.01	1.01
33	11/3/2015	<	1	0.5
34	11/10/2015	<	1	0.5
35	11/17/2015	<	1	0.5
36	11/23/2015	<	1	0.5
37	12/1/2015	<	1	0.5
38	12/8/2015	<	1	0.5
39	12/15/2015	<	1	0.5
40	12/21/2015	<	1	0.5
41	12/29/2015	<	1	0.5
42	1/5/2016	<	1	0.5
43	1/12/2016	<	1	0.5
44	1/19/2016	<	1	0.5
45	1/26/2016	<	1	0.5
46	2/2/2016	<	1	0.5
47	2/9/2016	<	1	0.5
48	2/16/2016	<	1	0.5
49	2/23/2016		1.68	1.68
50	3/1/2016		1.46	1.46
51	3/8/2016		1.12	1.12
52	3/15/2016	<	1	0.5
53	3/22/2016	<	1	0.5
54	3/29/2016	<	1	0.5
55	4/5/2016	<	1	0.5
56	4/12/2016	<	1	0.5
57	4/19/2016	<	1	0.5
58	4/26/2016	<	1	0.5

Results	
Std Dev.	3.4348
Mean	2.3898
C.V.	1.4372
n	58
Mult Factor =	1.00
Max. Value	15.4 µg/L
Max. Pred Cw	15.4 µg/L

Pa11

Copper

Use "PASTE SPECIAL-Values" then "COPY" Maximum data points = 58

	Date	Data		BDL=1/2DL
1	10/28/2011	<	5	2.5
2	12/6/2011	<	5	2.5
3	3/13/2014	<	5	2.5
4	7/8/2014	<	5	2.5
5	9/16/2015		1	1
6			2.62	2.62
7			3.7	3.7
8			10	10
9				
10			1.9	1.9
11			11.2	11.2
12			2.2	2.2
13			4	4
14				
15				
16				
17				
18			8.1	8.1
19		<	0.5	0.25
20			3.4	3.4
21				
22			2.2	2.2
23				
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Results	
Std Dev.	3.1541
Mean	3.7856
C.V.	0.8332
n	16
Mult Factor =	1.65
Max. Value	11.20 ug/L
Max. Pred Cw	18.48 ug/L

Par1:

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REASONABLE POTENTIAL ANALYSIS

3

Fluoride

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

Date	Data	BDL=1/2DL	Results	
	0.127	0.127	Std Dev.	0.0000
			Mean	0.1270
			C.V. (default)	0.6000
			n	1
			Mult Factor =	6.20
			Max. Value	0.1 ug/L
			Max. Pred Cw	0.8 ug/L

Par14

Lead

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date		BDL=1/2DL	Results	
1		< 1	0.5	Std Dev.	0.8435
2		0.9	0.9	Mean	0.7323
3		0.19	0.19	C.V.	1.1519
4		< 1	0.5	n	13
5		0.5	0.5		
6		0.99	0.99	Mult Factor =	2.13
7		0.48	0.48	Max. Value	3.000 ug/L
8		1.9	1.9	Max. Pred Cw	6.390 ug/L
9					
10					
11					
12					
13		3	3		
14		< 0.1	0.05		
15		0.18	0.18		
16		0.12	0.12		
17		0.21	0.21		
18					
19					
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Par17 & Par18

Nickel

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL	Results	
1	3/31/2015	1.83	1.83	Std Dev.	2.9951
2	4/7/2015	2.87	2.87	Mean	5.3045
3	4/14/2015	5.99	5.99	C.V.	0.5646
4	4/21/2015	6.32	6.32	n	58
5	4/28/2015	7.15	7.15		
6	5/5/2015	8.94	8.94	Mult Factor =	1.00
7	5/12/2015	9.14	9.14	Max. Value	11.1 µg/L
8	5/19/2015	6.78	6.78	Max. Pred Cw	11.1 µg/L
9	5/26/2015	5.71	5.71		
10	6/2/2015	3.31	3.31		
11	6/9/2015	2.84	2.84		
12	6/16/2015	3.06	3.06		
13	6/23/2015	2.15	2.15		
14	6/30/2015	3.23	3.23		
15	7/7/2015	4.42	4.42		
16	7/14/2015	2.49	2.49		
17	7/21/2015	1.99	1.99		
18	7/28/2015	1.62	1.62		
19	8/4/2015	1.4	1.4		
20	8/11/2015	1.73	1.73		
21	8/18/2015	1.32	1.32		
22	8/25/2015	1.38	1.38		
23	9/1/2015	1.37	1.37		
24	9/8/2015	1.06	1.06		
25	9/15/2015	1.68	1.68		
26	9/16/2015	1	1		
27	9/22/2015	2.03	2.03		
28	9/29/2015	2.2	2.2		
29	10/6/2015	4.34	4.34		
30	10/13/2015	4.73	4.73		
31	10/20/2015	5.16	5.16		
32	10/27/2015	6.26	6.26		
33	11/3/2015	6.14	6.14		
34	11/10/2015	7.09	7.09		
35	11/17/2015	7.07	7.07		
36	11/23/2015	8.36	8.36		
37	12/1/2015	8.51	8.51		
38	12/8/2015	8.44	8.44		
39	12/15/2015	7.91	7.91		
40	12/21/2015	7.88	7.88		
41	12/29/2015	7.67	7.67		
42	1/5/2016	9.2	9.2		
43	1/12/2016	10.3	10.3		
44	1/19/2016	11.1	11.1		
45	1/26/2016	10.4	10.4		
46	2/2/2016	9.77	9.77		
47	2/9/2016	9.85	9.85		
48	2/16/2016	9.02	9.02		
49	2/23/2016	9.05	9.05		
50	3/1/2016	8.38	8.38		
51	3/8/2016	7.03	7.03		
52	3/15/2016	5.5	5.5		
53	3/22/2016	3.98	3.98		
54	3/29/2016	3.95	3.95		
55	4/5/2016	3.8	3.8		
56	4/12/2016	3.27	3.27		
57	4/19/2016	3.91	3.91		
58	4/26/2016	4.58	4.58		

Par1

REASONABLE POTENTIAL ANALYSIS

9

Selenium

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

Date	Data	BDL=1/2DL
3/31/2015	42.3	42.3
4/7/2015	31.8	31.8
4/14/2015	21.6	21.6
4/21/2015	15.4	15.4
4/28/2015	14.9	14.9
5/5/2015	8.6	8.6
5/12/2015	6.6	6.6
5/19/2015	24	24
5/26/2015	26.4	26.4
6/2/2015	15.7	15.7
6/9/2015	11.2	11.2
6/16/2015	14.6	14.6
6/23/2015	10.2	10.2
6/30/2015	14.1	14.1
7/7/2015	12.2	12.2
7/14/2015	11.7	11.7
7/21/2015	19.1	19.1
7/28/2015	18.3	18.3
8/4/2015	16.8	16.8
8/11/2015	7.4	7.4
8/18/2015	16.9	16.9
8/25/2015	7.6	7.6
9/1/2015	4.6	4.6
9/8/2015	4	4
9/15/2015	3.5	3.5
9/16/2015	9.8	9.8
9/22/2015	5.7	5.7
9/29/2015	6.2	6.2
10/6/2015	7.7	7.7
10/13/2015	9.7	9.7
10/20/2015	8.4	8.4
10/27/2015	3.7	3.7
11/3/2015	2.3	2.3
11/10/2015	28	28
11/17/2015	30.7	30.7
11/23/2015	24.1	24.1
12/1/2015	26.9	26.9
12/8/2015	20.5	20.5
12/15/2015	13.3	13.3
12/21/2015	20	20
12/29/2015	13	13
1/5/2016	11.9	11.9
1/12/2016	22.3	22.3
1/19/2016	11.5	11.5
1/26/2016	5.1	5.1
2/2/2016	4.1	4.1
2/9/2016	17	17
2/16/2016	14.7	14.7
2/23/2016	15.7	15.7
3/1/2016	12.4	12.4
3/8/2016	6.2	6.2
3/15/2016	12.9	12.9
3/22/2016	7.2	7.2
3/29/2016	5.8	5.8
4/5/2016	4.8	4.8
4/12/2016	5.2	5.2
4/19/2016	5.9	5.9
4/26/2016	2.4	2.4

Results	
Std Dev.	8.4627
Mean	13.3552
C.V.	0.6337
n	58
Mult Factor =	1.00
Max. Value	42.3 ug/L
Max. Pred Cw	42.3 ug/L

Par20

Silver

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL
1	3/31/2015	< 1	0.5
2	4/7/2015	< 1	0.5
3	4/14/2015	< 1	0.5
4	4/21/2015	< 1	0.5
5	4/28/2015	< 1	0.5
6	5/5/2015	< 1	0.5
7	5/12/2015	< 1	0.5
8	5/19/2015	< 1	0.5
9	5/26/2015	< 1	0.5
10	6/2/2015	< 1	0.5
11	6/9/2015	< 1	0.5
12	6/16/2015	< 1	0.5
13	6/23/2015	< 1	0.5
14	6/30/2015	< 1	0.5
15	7/7/2015	< 1	0.5
16	7/14/2015	< 1	0.5
17	7/21/2015	< 1	0.5
18	7/28/2015	< 1	0.5
19	8/4/2015	< 1	0.5
20	8/11/2015	< 1	0.5
21	8/18/2015	< 1	0.5
22	8/25/2015	< 1	0.5
23	9/1/2015	< 1	0.5
24	9/8/2015	< 1	0.5
25	9/15/2015	< 1	0.5
26	9/16/2015	< 1	0.5
27	9/22/2015	< 1	0.5
28	9/29/2015	< 1	0.5
29	10/6/2015	< 1	0.5
30	10/13/2015	< 1	0.5
31	10/20/2015	< 1	0.5
32	10/27/2015	< 1	0.5
33	11/3/2015	< 1	0.5
34	11/10/2015	< 1	0.5
35	11/17/2015	< 1	0.5
36	11/23/2015	< 1	0.5
37	12/1/2015	< 1	0.5
38	12/8/2015	< 1	0.5
39	12/15/2015	< 1	0.5
40	12/21/2015	< 1	0.5
41	12/29/2015	< 1	0.5
42	1/5/2016	< 1	0.5
43	1/12/2016	< 1	0.5
44	1/19/2016	< 1	0.5
45	1/26/2016	< 1	0.5
46	2/2/2016	< 1	0.5
47	2/9/2016	< 1	0.5
48	2/16/2016	< 1	0.5
49	2/23/2016	< 1	0.5
50	3/1/2016	< 1	0.5
51	3/8/2016	< 1	0.5
52	3/15/2016	< 1	0.5
53	3/22/2016	< 1	0.5
54	3/29/2016	< 1	0.5
55	4/5/2016	< 1	0.5
56	4/12/2016	< 1	0.5
57	4/19/2016	< 1	0.5
58	4/26/2016	< 1	0.5

Results	
Std Dev.	0.0000
Mean	0.5000
C.V.	0.0000
n	58
Mult Factor =	1.00
Max. Value	0.500 ug/L
Max. Pred Cw	O DETECTS ug/L

Par21

Zinc

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL
1		< 5	2.5
2		6.61	6.61
3		21.2	21.2
4		26.2	26.2
5		26	26
6		28.9	28.9
7		25.5	25.5
8		14.3	14.3
9		8.94	8.94
10		5.43	5.43
11		< 5	2.5
12		< 5	2.5
13		< 5	2.5
14		< 5	2.5
15		< 5	2.5
16		< 5	2.5
17		< 5	2.5
18		< 5	2.5
19		< 5	2.5
20		< 5	2.5
21		< 5	2.5
22		8.43	8.43
23		8.07	8.07
24		< 5	2.5
25		6.9	6.9
26		12	12
27		< 5	2.5
28		< 5	2.5
29		10.5	10.5
30		7.6	7.6
31		12.2	12.2
32		15.4	15.4
33		16.3	16.3
34		20.7	20.7
35		21.6	21.6
36		24.9	24.9
37		25.4	25.4
38		23.4	23.4
39		18.6	18.6
40		23.7	23.7
41		22.5	22.5
42		23.5	23.5
43		28.7	28.7
44		42.2	42.2
45		38.1	38.1
46		37.1	37.1
47		40.3	40.3
48		31.6	31.6
49		27.9	27.9
50		23.9	23.9
51		18.1	18.1
52		11	11
53		5.29	5.29
54		< 5	2.5
55		< 5	2.5
56		< 5	2.5
57		6.25	6.25
58		11.1	11.1

Results	
Std Dev.	11.6357
Mean	14.3331
C.V.	0.8118
n	58
Mult Factor =	1.00
Max. Value	42.2 ug/L
Max. Pred Cw	42.2 ug/L

Par2:

REASONABLE POTENTIAL ANALYSIS

2

Antimony

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

Date	Data	BDL=1/2DL	Results	
	1.17	1.17	Std Dev.	0.0000
			Mean	1.1700
			C.V. (default)	0.6000
			n	1
			Mult Factor =	6.20
			Max. Value	1.170000 µg/L
			Max. Pred Cw	7.254000 µg/L

Par23

Barium

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL	Results	
1		0.064	0.064	Std Dev.	0.0000
2				Mean	0.0640
3				C.V. (default)	0.6000
4				n	1
5					
6				Mult Factor =	6.20
7				Max. Value	0.064000 mg/L
8				Max. Pred Cw	0.396800 mg/L
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
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54					
55					
56					
57					
58					

Par24

Sulfates

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL	Results		Par2
1		52.6	52.6	Std Dev.	20.6523	1
2		68.1	68.1	Mean	58.3200	2
3		36	36	C.V.	0.3541	3
4		72.8	72.8	n	15	4
5		41.8	41.8			5
6		83.1	83.1	Mult Factor =	1.29	6
7		25.4	25.4	Max. Value	99.900000 mg/L	7
8		99.9	99.9	Max. Pred Cw	128.871000 mg/L	8
9						9
10						10
11		70.1	70.1			11
12		39.4	39.4			12
13		63.1	63.1			13
14		43.6	43.6			14
15		62.6	62.6			15
16		39.7	39.7			16
17		76.6	76.6			17
18						18
19						19
20						20
21						21
22						22
23						23
24						24
25						25
26						26
27						27
28						28
29						29
30						30
31						31
32						32
33						33
34						34
35						35
36						36
37						37
38						38
39						39
40						40
41						41
42						42
43						43
44						44
45						45
46						46
47						47
48						48
49						49
50						50
51						51
52						52
53						53
54						54
55						55
56						56
57						57
58						58

REASONABLE POTENTIAL ANALYSIS

5

Thallium

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

Date	Data		BDL=1/2DL	Results	
		3.06	3.06	Std Dev.	0.9497
		0.71	0.71	Mean	1.1213
				C.V.	0.8470
		0.43	0.43	n	15
		1.9	1.9		
				Mult Factor =	1.71
		0.24	0.24	Max. Value	3.060000 µg/L
		2.2	2.2	Max. Pred Cw	5.232600 µg/L
		0.13	0.13		
		2.6	2.6		
		1.3	1.3		
		0.58	0.58		
		0.53	0.53		
	<	0.1	0.05		
		1.2	1.2		
		0.39	0.39		
		1.5	1.5		

Rogers Energy Complex
NC0005088

Freshwater RPA - 95% Probability/95% Confidence Using Metal Translators

MAXIMUM DATA POINTS = 58

Outfall Seep 104
Qw = 1.3 MGD

Qw (MGD) = **1.30**
1Q10S (cfs) = **232.54**
7Q10S (cfs) = **287.00**
7Q10W (cfs) = **440.00**
30Q2 (cfs) = **365.00**
Avg. Stream Flow, QA (cfs) = **1460.00**
Receiving Stream: **NO HUC NUMBER**

WWTP/WTP Class:
IWC% @ 1Q10S = **0.859073565**
IWC% @ 7Q10S = **0.697195647**
IWC% @ 7Q10W = **0.455866882**
IWC% @ 30Q2 = **0.549023882**
IW%C @ QA = **0.137823483**
Stream Class: **WS-IV**

COMBINED HARDNESS (mg/L)
Acute = 25.64 mg/L
Chronic = 25.52 mg/L
YOU HAVE DESIGNATED THIS RECEIVING STREAM AS WATER SUPPLY
Effluent Hard: 1 value > 100 mg/L
default 99 mg/L -Ws (Eff Hard Avg = 100 mg/L)

PARAMETER	TYPE (1)	NC STANDARDS OR EPA CRITERIA			PQL	UNITS	REASONABLE POTENTIAL RESULTS				RECOMMENDED ACTION
		Chronic	Applied Standard	Acute			n	# Det.	Max Pred Cw	Allowable Cw	
Arsenic	C	150	FW(7Q10s)	340		ug/L	10	10	72.1	Acute (FW): 39,577.5 Chronic (FW): 21,514.8 No value > Allowable Cw	No RP
Arsenic	C	10	HH/WS(Qavg)			ug/L				Chronic (HH): 7,255.7 No value > Allowable Cw	
Beryllium	NC	6.5	FW(7Q10s)	65		ug/L	0	0	N/A	Acute: 7,566.29 Chronic: 932.31	
Cadmium	NC	0.5991	FW(7Q10s)	3.3114		ug/L	10	4	0.960	Acute: 385.466 Chronic: 85.925 No value > Allowable Cw	No RP
Chlorides	NC	250	WS(7Q10s)			mg/L	10	10	50.2	Acute: NO WQS Chronic: 35,857.9 No value > Allowable Cw	No RP
Aluminum	NC	6.5	WS(7Q10s)			mg/L	10	5	1.1	Acute: NO WQS Chronic: 932.3 No value > Allowable Cw	No RP
Total Dissolved Solids	NC	500	WS(7Q10s)			mg/L	10	10	570.6	Acute: NO WQS Chronic: 71,715.9 No value > Allowable Cw	No RP
Chromium III	NC	119.7187	FW(7Q10s)	923.8881		µg/L	0	0	N/A	Acute: 107,544.7 Chronic: 17,171.5	
Chromium VI	NC	11	FW(7Q10s)	16		µg/L	0	0	N/A	Acute: 1,862.5 Chronic: 1,577.7	All values < detection
Chromium, Total	NC					µg/L	10	5	#REF! #REF! #REF!	#REF!	No RP
Copper	NC	8.0194	FW(7Q10s)	10.7227		ug/L	10	2	6.05	Acute: 1,248.17 Chronic: 1,150.24 No value > Allowable Cw	No RP
										Acute: NO WQS	

Fluoride	NC	1800	FW(7Q10s)			ug/L	0	0	N/A	Chronic: 258,177.2	
Lead	NC	3.0101	FW(7Q10s)	77.6519		ug/L	10	1	2.640	Acute: 9,039.029 Chronic: 431.740 No value > Allowable Cw	No RP
Mercury	NC	12	FW(7Q10s)		0.5	ng/L	7 Note: n ≤ 9 Limited data set	7	10.7 Default C.V.	Acute: NO WQS Chronic: 1,721.2 No value > Allowable Cw	
Molybdenum	NC	160	WS(7Q10s)			ug/L	10	9	4.4	Acute: NO WQS Chronic: 22,949.1 No value > Allowable Cw	No RP
Nickel	NC	37.8803	FW(7Q10s)	342.4059		µg/L	10	5	4.7	Acute (FW): 39,857.6 Chronic (FW): 5,433.2 No value > Allowable Cw	No RP
Nickel	NC	25.0000	WS(7Q10s)			µg/L				Chronic (WS): 3,585.8 No value > Allowable Cw	
Selenium	NC	5	FW(7Q10s)	56		ug/L	10	4	5.8	Acute: 6,518.7 Chronic: 717.2 No value > Allowable Cw	
Boron	NC	7	FW(7Q10s)	0		mg/l	0	0	N/A	Acute: 0.0 Chronic: 1,004.0	No RP
Zinc	NC	128.9460	FW(7Q10s)	128.4084		ug/L	10	4	148.1	Acute: 14,947.3 Chronic: 18,495.0 No value > Allowable Cw	
Antimony	NC	5.6	WS(7Q10s)			µg/L	11	0	*NO DETECTS*	Acute: NO WQS Chronic: 803.21787 Max MDL = 5	No RP
Barium	NC	1	WS(7Q10s)			mg/L	10	10	0.14224	Acute: NO WQS Chronic: 143.43176 No value > Allowable Cw	No RP
Sulfates	NC	250	WS(7Q10s)			mg/L	10	10	224.94000	Acute: NO WQS Chronic: 35857.9 No value > Allowable Cw	No RP
Thallum	NC	2	WS(7Q10s)			µg/L	11	5	1.14000	Acute: NO WQS Chronic: 286.86352 No value > Allowable Cw	No RP

REASONABLE POTENTIAL ANALYSIS

H1

Effluent Hardness

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL
1		100	100
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

Results		
Std Dev.	0.0000	
Mean	100.0000	
C.V. (default)	0.6000	
n	1	
10th Per value	100.00	mg/L
Average Value	99.00	mg/L
Max. Value	100.00	mg/L

H2

Upstream Hardness

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL
1		25	25
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

Results		
Std Dev.	0.0000	
Mean	25.0000	
C.V. (default)	0.6000	
n	1	
10th Per value	25.00	mg/L
Average Value	25.00	mg/L
Max. Value	25.00	mg/L

Par01 & Par02

Arsenic

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL
1		**48.4**	48.4
2		**29**	29
3		**20**	20
4		**1**	1
5		**45**	45
6		**41**	41
7		**37**	37
8		**38**	38
9		**36**	36
10		**35**	35
11			
12			
13			
14			
15			
16			
17			
18			

Results		
Std Dev.	13.7766	
Mean	33.0400	
C.V.	0.4170	
n	10	
Mult Factor =	1.49	
Max. Value	48.4	ug/L
Max. Pred Cw	72.1	ug/L

REASONABLE POTENTIAL ANALYSIS

Par03 — **Beryllium**

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL	Results	
1				Std Dev.	NO DATA
2				Mean	NO DATA
3				C.V.	NO DATA
4				n	0
5					
6				Mult Factor =	N/A
7				Max. Value	N/A ug/L
8				Max. Pred Cw	N/A ug/L
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

Par04 — **Cadmium**

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data		BDL=1/2DL	Results	
1		<	1	0.5	Std Dev.	0.2082
2		<	1	0.5	Mean	0.2850
3		<	0.1	0.05	C.V.	0.7306
4			0.1	0.1	n	10
5		<	1	0.5		
6		<	0.8	0.4	Mult Factor =	1.92
7		<	1	0.5	Max. Value	0.500 ug/L
8			0.1	0.1	Max. Pred Cw	0.960 ug/L
9			0.1	0.1		
10			0.1	0.1		
11						
12						
13						
14						
15						
16						
17						
18						

Par05 — **Chlorides**

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL	Results	
1		**18**	18	Std Dev.	8.7490
2		**27**	27	Mean	30.9
3		**13**	13	C.V.	0.2831
4		**34**	34	n	10
5		**35**	35		
6		**34**	34	Mult Factor =	1.3
7		**36**	36	Max. Value	38.0 mg/L
8		**38**	38	Max. Pred Cw	50.2 mg/L
9		**37**	37		
10		**37**	37		
11					
12					
13					
14					
15					
16					
17					
18					

Par0

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REASONABLE POTENTIAL ANALYSIS

6					Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58
Aluminum					
Date	Data	BDL=1/2DL	Results		
	0.03	0.03	Std Dev.	0.1130	
	0.05	0.05	Mean	0.0870	
	0.4	0.4	C.V.	1.2994	
	< **0.1**	0.05	n	10	
	0.02	0.02			
	< **0.1**	0.05	Mult Factor =	2.70	
	0.12	0.12	Max. Value	0.4	mg/L
	< **0.1**	0.05	Max. Pred Cw	1.1	mg/L
	< **0.1**	0.05			
	< **0.1**	0.05			

Par07					Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58
Total Dissolved Solids					
	Date	Data	BDL=1/2DL	Results	
1		**300**	300	Std Dev.	94.1880
2		**92**	92	Mean	325.4000
3		**344**	344	C.V.	0.2895
4		**350**	350	n	10
5		**335**	335		
6		**340**	340	Mult Factor =	1.33
7		**280**	280	Max. Value	429.0 mg/L
8		**362**	362	Max. Pred Cw	570.6 mg/L
9		**422**	422		
10		**429**	429		
11					
12					
13					
14					
15					
16					
17					
18					

Par08					Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58
Chromium III					
	Date	Data	BDL=1/2DL	Results	
1				Std Dev.	NO DATA
2				Mean	NO DATA
3				C.V.	NO DATA
4				n	0
5					
6				Mult Factor =	N/A
7				Max. Value	N/A µg/L
8				Max. Pred Cw	N/A µg/L
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

Par09	
	Date
1	
2	
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14	
15	
16	
17	
18	

REASONABLE POTENTIAL ANALYSIS

Chromium VI

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

Data	BDL=1/2DL	Results	
		Std Dev.	NO DATA
		Mean	NO DATA
		C.V.	NO DATA
		n	0
		Mult Factor =	N/A
		Max. Value	N/A µg/L
		Max. Pred Cw	N/A µg/L

Par10

Chromium, Total

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL	Results	
1		< 1	0.5	Std Dev.	#REF!
2		< 1	0.5	Mean	#REF!
3		0.47	2.5	C.V. (default)	0.6000
4		0.22	0.5	n	8
5		< 5	0.5		
6		< 1	0.35	Mult Factor =	1.74
7		< 1	0.14	Max. Value	#REF! µg/L
8		0.35	0.25	Max. Pred Cw	#REF! µg/L
9		0.14	#REF!		
10		0.25	#REF!		
11					
12					
13					
14					
15					
16					
17					
18					

Pa11

Copper

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL	Results	
1		< 1	0.5	Std Dev.	0.6754
2		< 1	0.5	Mean	0.6200
3		0.55	0.55	C.V.	1.0894
4		< 1	0.5	n	10
5		< 1	0.5		
6		< 5	2.5	Mult Factor =	2.42
7		< 1	0.5	Max. Value	2.50 ug/L
8		0.15	0.15	Max. Pred Cw	6.05 ug/L
9		< 0.5	0.25		
10		< 0.5	0.25		
11					
12					
13					
14					
15					
16					
17					
18					

Par12

	Date	Data
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

REASONABLE POTENTIAL ANALYSIS

Cyanide

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

BDL=1/2DL

Results	
Std Dev.	NO DATA
Mean	NO DATA
C.V.	NO DATA
n	0
Mult Factor =	N/A
Max. Value	N/A ug/L
Max. Pred Cw	N/A ug/L

Par13

Fluoride

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

Results	
Std Dev.	NO DATA
Mean	NO DATA
C.V.	NO DATA
n	0
Mult Factor =	N/A
Max. Value	N/A ug/L
Max. Pred Cw	N/A ug/L

Par14

Lead

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date			BDL=1/2DL
1			**1.2**	1.2
2		<	**1**	0.5
3		<	**0.1**	0.05
4		<	**1**	0.5
5		<	**1**	0.5
6		<	**1**	0.5
7		<	**1**	0.5
8		<	**0.1**	0.05
9		<	**0.1**	0.05
10		<	**0.1**	0.05
11				
12				
13				
14				
15				
16				
17				
18				

Results	
Std Dev.	0.3619
Mean	0.3900
C.V.	0.9280
n	10
Mult Factor =	2.20
Max. Value	1.200 ug/L
Max. Pred Cw	2.640 ug/L

Par15

Mercury

	Date	Data	BDL=1/2DL
1			
2		**4**	4
3			
4			
5		**5.3**	5.3
6		**2.6**	2.6
7		**2.8**	2.8
8		**4.9**	4.9
9		**4.4**	4.4
10		**4.2**	4.2
11			
12			
13			
14			
15			
16			
17			
18			

REASONABLE POTENTIAL ANALYSIS

Use "PASTE SPECIAL Values" then "COPY" Maximum data points = 58

Par16

Molybdenum

Results	
Std Dev.	1.0078
Mean	4.0286
C.V. (default)	0.6000
n	7
Mult Factor =	2.01
Max. Value	5.3 ng/L
Max. Pred Cw	10.7 ng/L

	Date	Data	BDL=1/2DL
1		**2.4**	2.4
2		**2.9**	2.9
3		< **0.5**	0.25
4		**3.1**	3.1
5		**3.2**	3.2
6		**2.4**	2.4
7		**2.6**	2.6
8		**2.8**	2.8
9		**2.9**	2.9
10		**3.2**	3.2
11			
12			
13			
14			
15			
16			
17			
18			

Use "PASTE SPECIAL Values" then "COPY" Maximum data points = 58

Par17 & Par18

Nickel

Results	
Std Dev.	0.8683
Mean	2.5750
C.V.	0.3372
n	10
Mult Factor =	1.39
Max. Value	3.2 ug/L
Max. Pred Cw	4.4 ug/L

	Date	Data	BDL=1/2DL
1		**0.7**	0.7
2		**0.6**	0.6
3		< **1**	0.5
4		< **1**	0.5
5		< **5**	2.5
6		< **1**	0.5
7		< **1**	0.5
8		**1.1**	1.1
9		**1**	1
10		**1**	1
11			
12			
13			
14			
15			
16			
17			
18			

Use "PASTE SPECIAL Values" then "COPY" Maximum data points = 58

Par19

Selenium

Results	
Std Dev.	0.6136
Mean	0.8900
C.V.	0.6895
n	10
Mult Factor =	1.86
Max. Value	2.5 µg/L
Max. Pred Cw	4.7 µg/L

	Date	Data	BDL=1/2DL
1		< **1**	0.5
2		< **1**	0.5
3		< **0.5**	0.25
4		**0.22**	0.22
5		< **1**	0.5
6		< **5**	2.5
7		< **1**	0.5
8		**0.41**	0.41
9		**0.42**	0.42
10		**0.73**	0.73
11			
12			
13			
14			
15			
16			
17			
18			

REASONABLE POTENTIAL ANALYSIS

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

Par20

Boron

Results	
Std Dev.	0.6645
Mean	0.6530
C.V.	1.0176
n	10
Mult Factor =	2.32
Max. Value	2.5 ug/L
Max. Pred Cw	5.8 ug/L

	Date	Data	BDL=1/2DL
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

Results	
Std Dev.	NO DATA
Mean	NO DATA
C.V.	NO DATA
n	0
Mult Factor =	N/A
Max. Value	N/A mg/l
Max. Pred Cw	N/A mg/l

Par21

Zinc

	Date	Data	BDL=1/2DL
1		**46**	46
2		**6**	6
3		< **5**	2.5
4		< **5**	2.5
5		< **10**	5
6		< **5**	2.5
7		< **5**	2.5
8		**3.2**	3.2
9		< **10**	5
10		**3.3**	3.3
11			
12			
13			
14			
15			
16			
17			
18			

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

Results	
Std Dev.	13.4656
Mean	7.8500
C.V.	1.7154
n	10
Mult Factor =	3.22
Max. Value	46.0 ug/L
Max. Pred Cw	148.1 ug/L

Par22

Antimony

	Date	Data	BDL=1/2DL
1		< 0.5	0.25
2		< 0.5	0.25
3		< 0.5	0.25
4		< 0.5	0.25
5		< 0.5	0.25
6		< 5	2.5
7		< 1	0.5
8		< 1	0.5
9		< 1	0.5
10		< 1	0.5
11		< 1	0.5
12			
13			
14			
15			
16			
17			
18			

REASONABLE POTENTIAL ANALYSIS

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

Par23

Barium

Results	
Std Dev.	0.6528
Mean	0.5682
C.V.	1.1489
n	11
Mult Factor =	2.35
Max. Value	2.500000 µg/L
Max. Pred Cw	O DETECTS µg/L

	Date	Data	BDL=1/2DL
1		**0.1**	0.1
2		**0.1**	0.1
3		**0.03**	0.03
4		**0.1**	0.1
5		**0.1**	0.1
6		**0.1**	0.1
7		**0.1**	0.1
8		**0.112**	0.112
9		**0.1**	0.1
10		**0.1**	0.1
11			
12			
13			
14			
15			
16			
17			
18			

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

Par24

Sulfates

Results	
Std Dev.	0.0229
Mean	0.0942
C.V.	0.2428
n	10
Mult Factor =	1.27
Max. Value	0.112000 mg/L
Max. Pred Cw	0.142240 mg/L

	Date	Data	BDL=1/2DL
1		**90**	90
2		**104**	104
3		**31**	31
4		**119**	119
5		**120**	120
6		**115**	115
7		**130**	130
8		**148**	148
9		**160**	160
10		**163**	163
11			
12			
13			
14			
15			
16			
17			
18			

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

Par25

Thallum

Results	
Std Dev.	38.5804
Mean	118.0000
C.V.	0.3270
n	10
Mult Factor =	1.38
Max. Value	163.000000 mg/L
Max. Pred Cw	224.940000 mg/L

	Date	Data	BDL=1/2DL
1		< **0.2**	0.1
2		< **0.2**	0.1
3		**0.04**	0.04
4		**0.08**	0.08
5		< **0.2**	0.1
6		< **1**	0.5
7		< **0.2**	0.1
8		**0.1**	0.1
9		**0.07**	0.07
10		**0.02**	0.02
11		< 0.2	0.1
12			
13			
14			
15			
16			
17			
18			

REASONABLE POTENTIAL ANALYSIS

	Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 56	
Results		
Std Dev.	0.1293	
Mean	0.1191	
C.V.	1.0861	
n	11	
Mult Factor =	2.28	
Max. Value	0.500000	µg/L
Max. Pred Cw	1.140000	µg/L

Freshwater RPA - 95% Probability/95% Confidence Using Metal Translators

MAXIMUM DATA POINTS = 58

REQUIRED DATA ENTRY

Table 1. Project Information

	☐CHECK IF HQW OR ORW WQS
Facility Name	Rogers Energy Complex
WWTP/WTP Class	
NPDES Permit	NC0005088
Outfall	Seep 104
Flow, Qw (MGD)	1.300
Receiving Stream	Broad River
HUC Number	
Stream Class	WS-IV
☐Apply WS Hardness WQC	
7Q10s (cfs)	287.00
7Q10w (cfs)	440.00
30Q2 (cfs)	365.00
QA (cfs)	1460.00
1Q10s (cfs)	232.54
Effluent Hardness	default 99 mg/L -Ws (Eff Hard Avg = 100 mg/L)
Upstream Hardness	25 mg/L (Avg)
Combined Hardness Chronic	25.52 mg/L
Combined Hardness Acute	25.64 mg/L
Data Source(s)	
☐CHECK TO APPLY MODEL	

Follow directions for data entry. In some cases a comment menu list the available choices or a dropdown menu will provide a list you may select from. Error message occur if data entry does not meet input criteria.

Table 2. Parameters of Concern

	Name	WQS	Type	Chronic	Modifier	Acute	PQL	Units
Par01	Arsenic	Aquactic Life	C	150	FW	340		ug/L
Par02	Arsenic	Human Health Water Supply	C	10	HH/WS	N/A		ug/L
Par03	Beryllium	Aquatic Life	NC	6.5	FW	65		ug/L
Par04	Cadmium	Aquatic Life	NC	0.5991	FW	3.3114		ug/L
Par05	Chlorides	Water Supply	NC	250	WS			mg/L
Par06	Aluminum	Water Supply	NC	6.5	WS			mg/L
Par07	Total Dissolved Solids	Water Supply	NC	500	WS			mg/L
Par08	Chromium III	Aquatic Life	NC	119.7187	FW	923.8881		ug/L
Par09	Chromium VI	Aquatic Life	NC	11	FW	16		µg/L
Par10	Chromium, Total	Aquatic Life	NC	N/A	FW	N/A		µg/L
Par11	Copper	Aquatic Life	NC	8.0194	FW	10.7227		ug/L
Par12	Cyanide	Aquatic Life	NC	5	FW	22	10	ug/L
Par13	Fluoride	Aquatic Life	NC	1,800	FW			ug/L
Par14	Lead	Aquatic Life	NC	3.0101	FW	77.6519		ug/L
Par15	Mercury	Aquatic Life	NC	12	FW		0.5	ng/L
Par16	Molybdenum	Water Supply	NC	160	WS			ug/L
Par17	Nickel	Aquatic Life	NC	37.8803	FW	342.4059		µg/L
Par18	Nickel	Water Supply	NC	25.0000	WS	N/A		µg/L
Par19	Selenium	Aquatic Life	NC	5	FW	56		ug/L
Par20	Boron	Aquatic Life	NC	7	FW			mg/l
Par21	Zinc	Aquatic Life	NC	128.9460	FW	128.4084		ug/L
Par22	Antimony	Water Supply	NC	5.6	WS			µg/L
Par23	Barium	Water Supply	NC	1	WS			mg/L
Par24	Sulfates	Water Supply	NC	250	WS			mg/L
Par25	Thallum	Water Supply	NC	2	WS			µg/L

Rogers Energy Complex
NC0005088

Freshwater RPA - 95% Probability/95% Confidence Using Metal Translators

MAXIMUM DATA POINTS = 58

Outfall Seep 106
Qw = 1.9 MGD

Qw (MGD) = **1.90**
1Q10S (cfs) = **0.00**
7Q10S (cfs) = **0.00**
7Q10W (cfs) = **0.00**
30Q2 (cfs) = **0.00**
Avg. Stream Flow, QA (cfs) = **0.00**
Receiving Stream: **NO HUC NUMBER**

WWTP/WTP Class:
IWC% @ 1Q10S = **100**
IWC% @ 7Q10S = **100**
IWC% @ 7Q10W = **100**
IWC% @ 30Q2 = **100**
IW%C @ QA = **100**
Stream Class: **WS-IV**

COMBINED HARDNESS (mg/L)
Acute = 99 mg/L
Chronic = 99 mg/L
YOU HAVE DESIGNATED THIS RECEIVING STREAM AS WATER SUPPLY
Effluent Hard: 1 value > 100 mg/L
default 99 mg/L -Ws (Eff Hard Avg = 100 mg/L)

PARAMETER	TYPE (1)	NC STANDARDS OR EPA CRITERIA			PQL	UNITS	REASONABLE POTENTIAL RESULTS				RECOMMENDED ACTION
		Chronic	Applied Standard	Acute			n	# Det.	Max Pred Cw	Allowable Cw	
Arsenic	C	150	FW	340		ug/L	9	5	2.9	Acute (FW): 340.0 Chronic (FW): 150.0	No RP
							Note: n ≤ 9		Default C.V.	No value > Allowable Cw	
Arsenic	C	10	HH/WS			ug/L	Limited data set			Chronic (HH): 10.0 No value > Allowable Cw	
Beryllium	NC	6.5	FW	65		ug/L	6	1	1.07	Acute: 65.00	
							Note: n ≤ 9		Default C.V.	Chronic: 6.50	
							Limited data set			No value > Allowable Cw	
Cadmium	NC	1.6678	FW	10.7582		ug/L	10	1	1.130	Acute: 10.758	No RP
										Chronic: 1.668	
										No value > Allowable Cw	
Chlorides	NC	250	WS			mg/L	9	9	126.7	Acute: NO WQS	No RP
							Note: n ≤ 9		Default C.V.	Chronic: 250.0	
							Limited data set			No value > Allowable Cw	
Aluminum	NC	6.5	WS			mg/L	9	4	11.1	Acute: NO WQS	RP
							Note: n ≤ 9		Default C.V.	Chronic: 6.5	
							Limited data set			No value > Allowable Cw	
Total Dissolved Solids	NC	500	WS			mg/L	9	9	894.1	Acute: NO WQS	RP
							Note: n ≤ 9		Default C.V.	Chronic: 500.0	
							Limited data set			No value > Allowable Cw	
Chromium III	NC	363.4201	FW	2793.8313		µg/L	0	0	N/A	Acute: 2,793.8	
										Chronic: 363.4	
Chromium VI	NC	11	FW	16		µg/L	0	0	N/A	Acute: 16.0	Max reported value < 11
										Chronic: 11.0	
Chromium, Total	NC					µg/L	Tot Cr value(s) < 50 and < Cr VI Allowable Cw				
							9	4	11.1	Max reported value = 6.14	
							Note: n ≤ 9		Default C.V.		
							Limited data set				
Copper	NC	25.5442	FW	38.2981		ug/L	9	4	7.38	Acute: 38.30	No RP
							Note: n ≤ 9		Default C.V.	Chronic: 25.54	
							Limited data set			No value > Allowable Cw	
										Acute: NO WQS	

Freshwater RPA - 95% Probability/95% Confidence Using Metal Translators

Fluoride	NC	1800	FW			ug/L	0	0	N/A	Chronic: 1,800.0	
Lead	NC	13.5358	FW	347.3518		ug/L	9	2	6.950 Default C.V.	Acute: 347.352 Chronic: 13.536	No RP
							Note: n ≤ 9 Limited data set			No value > Allowable Cw	
Mercury	NC	12	FW		0.5	ng/L	7	7	9.0 Default C.V.	Acute: NO WQS Chronic: 12.0	No RP
							Note: n ≤ 9 Limited data set			No value > Allowable Cw	
Molybdenum	NC	160	WS			ug/L	9	4	4.5 Default C.V.	Acute: NO WQS Chronic: 160.0	No RP
							Note: n ≤ 9 Limited data set			No value > Allowable Cw	
Nickel	NC	119.2776	FW	1073.9039		µg/L	9	8	5.5 Default C.V.	Acute (FW): 1,073.9 Chronic (FW): 119.3	No RP
							Note: n ≤ 9 Limited data set			No value > Allowable Cw	
Nickel	NC	25.0000	WS			µg/L				Chronic (WS): 25.0 No value > Allowable Cw	
Selenium	NC	5	FW	56		ug/L	9	0	*NO DETECTS*	Acute: 56.0 Chronic: 5.0	No RP
							Note: n ≤ 9 Limited data set			Max MDL = 5	
Silver	NC	0.06	FW	3.1616284		ug/L	0	0	N/A	Acute: 3.2 Chronic: 0.1	
Zinc	NC	406.7415	FW	403.4414		ug/L	9	2	30.8 Default C.V.	Acute: 403.4 Chronic: 406.7	No RP
							Note: n ≤ 9 Limited data set			No value > Allowable Cw	
Antimony	NC	5.6	WS			µg/L	9	0	*NO DETECTS*	Acute: NO WQS Chronic: 5.60000	No RP
							Note: n ≤ 9 Limited data set			Max MDL = 5	
Barium	NC	1	WS			mg/L	9	9	0.12670 Default C.V.	Acute: NO WQS Chronic: 1.00000	No RP
							Note: n ≤ 9 Limited data set			No value > Allowable Cw	
Sulfates	NC	250	WS			mg/L	9	9	119.46000 Default C.V.	Acute: NO WQS Chronic: 250.00000	No RP
							Note: n ≤ 9 Limited data set			No value > Allowable Cw	
Thallum	NC	2	WS			µg/L	9	4	0.90500 Default C.V.	Acute: NO WQS Chronic: 2.00000	No RP
							Note: n ≤ 9 Limited data set			No value > Allowable Cw	

REASONABLE POTENTIAL ANALYSIS

H1

Effluent Hardness

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data	BDL=1/2DL	Results	
1		100	100	Std Dev.	0.0000
2				Mean	100.0000
3				C.V. (default)	0.6000
4				n	1
5				10th Per value	100.00 mg/L
6				Average Value	99.00 mg/L
7				Max. Value	100.00 mg/L
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

H2

Upstream Hardness

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Data	BDL=1/2DL	Results	
1	25	25	Std Dev.	0.0000
2			Mean	25.0000
3			C.V. (default)	0.6000
4			n	1
5			10th Per value	25.00 mg/L
6			Average Value	25.00 mg/L
7			Max. Value	25.00 mg/L
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

Par01 & Par02

Arsenic

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data		BDL=1/2DL	Results	
1		<	1	0.5	Std Dev.	0.3983
2		<	1	0.5	Mean	0.6022
3			0.3	0.3	C.V. (default)	0.6000
4			1.62	1.62	n	9
5		<	1	0.5		
6		<	1	0.5	Mult Factor =	1.81
7			0.69	0.69	Max. Value	1.6 ug/L
8			0.49	0.49	Max. Pred Cw	2.9 ug/L
9			0.32	0.32		
10						
11						
12						
13						
14						
15						
16						
17						
18						

REASONABLE POTENTIAL ANALYSIS

Par03

Beryllium

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data		BDL=1/2DL	Results	
1		<	0.2	0.1	Std Dev.	0.1772
2			0.1	0.1	Mean	0.1417
3		<	1	0.5	C.V. (default)	0.6000
4		<	0.1	0.05	n	6
5		<	0.1	0.05		
6		<	0.1	0.05	Mult Factor =	2.14
7					Max. Value	0.50 ug/L
8					Max. Pred Cw	1.07 ug/L
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						

Par04

Cadmium

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data		BDL=1/2DL	Results	
1		<	0.1	0.05	Std Dev.	0.2286
2		<	0.1	0.05	Mean	0.2350
3		<	0.1	0.05	C.V.	0.9727
4			0.1	0.1	n	10
5		<	0.1	0.05		
6		<	0.1	0.05	Mult Factor =	2.26
7		<	1	0.5	Max. Value	0.500 ug/L
8		<	1	0.5	Max. Pred Cw	1.130 ug/L
9		<	1	0.5		
10		<	1	0.5		
11						
12						
13						
14						
15						
16						
17						
18						

Par05

Chlorides

	Date	Data	BDL=1/2DL	Results
1		49	49	Std Dev.
2		55	55	Mean
3		62	62	C.V. (default)
4		70	70	n
5		58	58	
6		61.3	61.3	Mult Factor =
7		66.5	66.5	Max. Value
8		64.9	64.9	Max. Pred Cw
9		63.9	63.9	
10				
11				
12				
13				
14				
15				
16				
17				
18				

REASONABLE POTENTIAL ANALYSIS

Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58	Par06					Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58	Par07					Use "PASTE SPECIAL-Values" then "COPY". Maximum data points = 58	Par10				
	Aluminum						Total Dissolved Solids						Chromium, Tot				
		Date	Data	BDL=1/2DL	Results			Date	Data	BDL=1/2DL	Results			Date	Data	BDL=1/2DL	
6.3706	1		0.121	0.121	Std Dev.	2.6415	1		280	280	Std Dev.	79.9152	1		< 1	0.5	
61.2	2		< 0.009	0.0045	Mean	1.4862	2		280	280	Mean	290.2222	2		< 1	0.5	
0.6000	3		6.1	6.1	C.V. (default)	0.6000	3		494	494	C.V. (default)	0.6000	3		< 0.5	0.25	
9	4		< 0.1	0.05	n	9	4		300	300	n	9	4		6.14	6.14	
	5		6.15	6.15			5		250	250			5		< 1	0.5	
1.8	6		0.8	0.8	Mult Factor =	1.81	6		236	236	Mult Factor =	1.81	6		< 1	0.5	
70.0 mg/L	7		< 0.1	0.05	Max. Value	6.2 mg/L	7		230	230	Max. Value	494.0 mg/L	7		0.62	0.62	
126.7 mg/L	8		< 0.1	0.05	Max. Pred Cw	11.1 mg/L	8		284	284	Max. Pred Cw	894.1 mg/L	8		0.76	0.76	
	9		< 0.1	0.05			9		258	258			9		0.26	0.26	
	10						10						10				
	11						11						11				
	12						12						12				
	13						13						13				
	14						14						14				
	15						15						15				
	16						16						16				
	17						17						17				
	18						18						18				

REASONABLE POTENTIAL ANALYSIS

al

Use "PASTE SPECIAL Values" then "COPY" . Maximum data points = 58

Results	
Std Dev.	1.8912
Mean	1.1144
C.V. (default)	0.6000
n	9
Mult Factor =	1.81
Max. Value	6.1 µg/L
Max. Pred Cw	11.1 µg/L

Pa11

Copper

	Date	Data		BDL=1/2DL
1		<	1	0.5
2		<	1	0.5
3			0.25	0.25
4			4.08	4.08
5		<	1	0.5
6		<	5	2.5
7			0.26	0.26
8			0.21	0.21
9		<	0.5	0.25
10				
11				
12				
13				
14				
15				
16				
17				
18				

Use "PASTE SPECIAL Values" then "COPY" . Maximum data points = 58

Results	
Std Dev.	1.3594
Mean	1.0056
C.V. (default)	0.6000
n	9
Mult Factor =	1.81
Max. Value	4.08 ug/L
Max. Pred Cw	7.38 ug/L

Par14

Lead

	Date			BDL=1/2DL
1		<	1	0.5
2		<	1	0.5
3			0.1	0.1
4			3.84	3.84
5		<	1	0.5
6		<	1	0.5
7		<	0.1	0.05
8		<	0.1	0.05
9		<	0.1	0.05
10				
11				
12				
13				
14				
15				
16				
17				
18				

Use "PASTE SPECIAL Values" then "COPY" . Maximum data points = 58

Results	
Std Dev.	1.2063
Mean	0.6767
C.V. (default)	0.6000
n	9
Mult Factor =	1.81
Max. Value	3.840 ug/L
Max. Pred Cw	6.950 ug/L

Par15

	Date	Data
1		
2		2.3
3		
4		3.8
5		3.7
6		4.5
7		3.2
8		2.7
9		3
10		
11		
12		
13		
14		
15		
16		
17		
18		

REASONABLE POTENTIAL ANALYSIS

Mercury

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

BDL=1/2DL	Results	
	Std Dev.	0.7426
2.3	Mean	3.3143
	C.V. (default)	0.6000
3.8	n	7
3.7		
4.5	Mult Factor =	2.01
3.2	Max. Value	4.5 ng/L
2.7	Max. Pred Cw	9.0 ng/L
3		

Par16

Molybdenum

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data		BDL=1/2DL	Results	
1		<	1	0.5	Std Dev.	0.6605
2		<	1	0.5	Mean	0.7433
3			0.63	0.63	C.V. (default)	0.6000
4		<	1	0.5	n	9
5		<	1	0.5		
6		<	5	2.5	Mult Factor =	1.81
7			0.57	0.57	Max. Value	2.5 ug/L
8			0.47	0.47	Max. Pred Cw	4.5 ug/L
9			0.52	0.52		
10						
11						
12						
13						
14						
15						
16						
17						
18						

Par17 & Par18

Nickel

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

	Date	Data		BDL=1/2DL	Results	
1			1.82	1.82	Std Dev.	0.4432
2			1.69	1.69	Mean	2.1367
3			1.9	1.9	C.V. (default)	0.6000
4			3.03	3.03	n	9
5			1.99	1.99		
6		<	5	2.5	Mult Factor =	1.81
7			2.2	2.2	Max. Value	3.0 µg/L
8			2.4	2.4	Max. Pred Cw	5.5 µg/L
9			1.7	1.7		
10						
11						
12						
13						
14						
15						
16						
17						
18						

Par19

	Date
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	

REASONABLE POTENTIAL ANALYSIS

Selenium

Data		BDL=1/2DL	Results	
<	1	0.5	Std Dev.	0.7193
<	1	0.5	Mean	0.6111
<	0.5	0.25	C.V. (default)	0.6000
<	1	0.5	n	9
<	1	0.5		
<	5	2.5	Mult Factor =	1.81
<	0.5	0.25	Max. Value	2.5 ug/L
<	0.5	0.25	Max. Pred Cw O DETECTS	ug/L
<	0.5	0.25		

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

Par21

Zinc

	Date	Data		BDL=1/2DL	Results	
1		<	5	2.5	Std Dev.	4.5329
2		<	5	2.5	Mean	5.3222
3		<	10	5	C.V. (default)	0.6000
4			17	17	n	9
5		<	5	2.5		
6		<	10	5	Mult Factor =	1.81
7		<	10	5	Max. Value	17.0 ug/L
8			3.4	3.4	Max. Pred Cw	30.8 ug/L
9		<	10	5		
10						
11						
12						
13						
14						
15						
16						
17						
18						

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

Par22

Antimony

	Date	Data		BDL=1/2DL	Results	
1		<	1	0.5	Std Dev.	0.7193
2		<	1	0.5	Mean	0.6111
3		<	0.5	0.25	C.V. (default)	0.6000
4		<	1	0.5	n	9
5		<	1	0.5		
6		<	5	2.5	Mult Factor =	1.81
7		<	0.5	0.25	Max. Value	2.500000 µg/L
8		<	0.5	0.25	Max. Pred Cw O DETECTS	µg/L
9		<	0.5	0.25		
10						
11						
12						
13						
14						
15						
16						
17						
18						

Use "PASTE SPECIAL Values" then "COPY". Maximum data points = 58

Par2:

1	
2	
3	
4	
5	
6	
7	
8	
9	
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12	
13	
14	
15	
16	
17	
18	

REASONABLE POTENTIAL ANALYSIS

3					Use "PASTE SPECIAL Values" then "COPY" . Maximum data points = 58	Par24					Use "PASTE SPECIAL Values" then "COPY" . Maximum data points = 58	Par25					Use "PASTE SP Values" then " . Maximum points = 5
Barium						**Sulfates**						**Thallum**					
Date	**Data**		**BDL=1/2DL**	**Results**			**Date**	**Data**	**BDL=1/2DL**	**Results**			**Date**	**Data**	**BDL=1/2DL**	**Results**	
	0.05		0.05	Std Dev.	0.0083	1		63	63	Std Dev.	4.3614	1		<	0.2	0.1	Std Dev.	0.1373
	0.05		0.05	Mean	0.0524	2		59	59	Mean	58.6778	2		<	0.2	0.1	Mean	0.1367
	0.05		0.05	C.V. (default)	0.6000	3		62	62	C.V. (default)	0.6000	3			0.08	0.08	C.V. (default)	0.6000
	0.07		0.07	n	9	4		66	66	n	9	4		<	0.2	0.1	n	9
	0.06		0.06			5		59	59			5		<	0.2	0.1		
	0.05		0.05	Mult Factor =	1.81	6		57.1	57.1	Mult Factor =	1.81	6		<	1	0.5	Mult Factor =	1.81
	0.052		0.052	Max. Value	0.070000 mg/L	7		54.5	54.5	Max. Value	66.000000 mg/L	7			0.1	0.1	Max. Value	0.500000
	0.05		0.05	Max. Pred Cw	0.126700 mg/L	8		53.5	53.5	Max. Pred Cw	119.460000 mg/L	8			0.1	0.1	Max. Pred Cw	0.905000
	0.04		0.04			9		54	54			9			0.05	0.05		
						10						10						
						11						11						
						12						12						
						13						13						
						14						14						
						15						15						
						16						16						
						17						17						
						18						18						

REASONABLE POTENTIAL ANALYSIS

ECIAL-
COPY"
data
8

µg/L
µg/L

Freshwater RPA - 95% Probability/95% Confidence Using Metal Translators

MAXIMUM DATA POINTS = 58

REQUIRED DATA ENTRY

Table 1. Project Information

☐ CHECK IF HQW OR ORW WQS

Facility Name	Rogers Energy Complex
WWTP/WTP Class	
NPDES Permit	NC0005088
Outfall	Seep 106
Flow, Qw (MGD)	1.900
Receiving Stream	UT Broad River
HUC Number	
Stream Class	WS-IV
☐ Apply WS Hardness WQC	
7Q10s (cfs)	0.00
7Q10w (cfs)	0.00
30Q2 (cfs)	0.00
QA (cfs)	0.00
1Q10s (cfs)	0.00
Effluent Hardness	default 99 mg/L -Ws (Eff Hard Avg = 100 mg/L)
Upstream Hardness	25 mg/L (Avg)
Combined Hardness Chronic	99 mg/L
Combined Hardness Acute	99 mg/L
Data Source(s)	
☐ CHECK TO APPLY MODEL	

Follow directions for data entry. In some cases a comment menu list the available choices or a dropdown menu will provide a list you may select from. Error message occur if data entry does not meet input criteria.

Table 2. Parameters of Concern

	Name	WQS	Type	Chronic	Modifier	Acute	PQL	Units
Par01	Arsenic	Aquactic Life	C	150	FW	340		ug/L
Par02	Arsenic	Human Health Water Supply	C	10	HH/WS	N/A		ug/L
Par03	Beryllium	Aquatic Life	NC	6.5	FW	65		ug/L
Par04	Cadmium	Aquatic Life	NC	1.6678	FW	10.7582		ug/L
Par05	Chlorides	Water Supply	NC	250	WS			mg/L
Par06	Aluminum	Water Supply	NC	6.5	WS			mg/L
Par07	Total Dissolved Solids	Water Supply	NC	500	WS			mg/L
Par08	Chromium III	Aquatic Life	NC	363.4201	FW	2793.8313		ug/L
Par09	Chromium VI	Aquatic Life	NC	11	FW	16		µg/L
Par10	Chromium, Total	Aquatic Life	NC	N/A	FW	N/A		µg/L
Par11	Copper	Aquatic Life	NC	25.5442	FW	38.2981		ug/L
Par12	Cyanide	Aquatic Life	NC	5	FW	22	10	ug/L
Par13	Fluoride	Aquatic Life	NC	1,800	FW			ug/L
Par14	Lead	Aquatic Life	NC	13.5358	FW	347.3518		ug/L
Par15	Mercury	Aquatic Life	NC	12	FW		0.5	ng/L
Par16	Molybdenum	Water Supply	NC	160	WS			ug/L
Par17	Nickel	Aquatic Life	NC	119.2776	FW	1073.9039		µg/L
Par18	Nickel	Water Supply	NC	25.0000	WS	N/A		µg/L
Par19	Selenium	Aquatic Life	NC	5	FW	56		ug/L
Par20	Silver	Aquatic Life	NC	0.06	FW	3.1616		ug/L
Par21	Zinc	Aquatic Life	NC	406.7415	FW	403.4414		ug/L
Par22	Antimony	Water Supply	NC	5.6	WS			µg/L
Par23	Barium	Water Supply	NC	1	WS			mg/L
Par24	Sulfates	Water Supply	NC	250	WS			mg/L
Par25	Thallum	Water Supply	NC	2	WS			µg/L

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

2. 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)

$$= \frac{\text{(Permitted Flow, cfs *Avg. Effluent Hardness, mg/L) + (s7Q10, cfs *Avg. Upstream Hardness, mg/L)}}{\text{(Permitted Flow, cfs + s7Q10, cfs)}}$$

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

3. 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:
>
> $$\frac{C_{diss}}{C_{total}} = \frac{1}{1 + \{ [K_{po}] [ss^{(1+a)}] [10^{-6}] \}}$$
>
> 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.

4. 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.

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

$$Ca = \frac{(s7Q10 + Qw)(Cwqs) - (s7Q10)(Cb)}{Qw}$$

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 NH_3* (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

6. 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.

7. 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.

8. 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.

9. 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.

10. 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, $CaCO_3$ or (Ca+Mg)]	25	No data (002)
Average Upstream Hardness (mg/L) [Total as, $CaCO_3$ or (Ca+Mg)]	25	No data
7Q10 summer (cfs)	849	
1Q10 (cfs)	232	
Permitted Flow (MGD)		15.5 MGD

Date: 4/20/2018

Permit Writer: Teresa Rodriguez