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Job Messages

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Job Messages

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The online help contains information regarding the fields in this report.

Michael F. Easley, Governor
State of North Carolina

William G. Ross, Jr., Secretary
Department of Environment and Natural Resources

Alan W. Klimek, P.E., Director
Division of Water Quality

RECEIVED
FEB 14 2007
HARRIS NUCLEAR PLANT

February 9, 2007

Mr. Eric McCartney, General Manager
Harris Nuclear Plant
P.O. Box 165
New Hill, North Carolina 27562

Subject: Issuance of NPDES Permit
Permit No. NC0039586
Harris Nuclear Plant
Harris Energy and Environmental Center
Wake County

Dear Mr. McCartney:

Division personnel have reviewed and approved your application for renewal of the subject permit. Accordingly, we are forwarding the attached NPDES discharge permit. This permit is issued pursuant to the requirements of North Carolina General Statute 143-215.1 and the Memorandum of Agreement between North Carolina and the U.S. Environmental Protection Agency dated May 9, 1994 (or as subsequently amended).

The following modifications from the draft permit are included in the final permit:

- Data reported in the application for Outfall 006 showed levels of Nickel and Manganese above the water quality standards for WS-V waters. The water quality standards for these parameters are 25 $\mu g/L$ for Nickel and 200 $\mu g/L$ for Manganese. Additional data reviewed for nickel show that for the past 20 months all samples were less than detection. The Division will not implement a limit for nickel at this time. The Division will implement monitoring for manganese for this outfall. Only one effluent analysis was available for this parameter. Progress Energy submitted influent data showing high levels of manganese in the intake water. The data collected will be evaluated to determine the need for a limit.
- The name of the permittee was changed to Carolina Power and Light Company doing business as Progress Energy Carolinas, Inc.
- Monitoring requirements for ammonia at outfall 002 can not be eliminated. Ammonia is an indicator of treatment plant performance and is a standard parameter monitored in WWTP treating domestic wastes.
- Part IV, Standard Conditions, Section D.2 specifies that the DMR shall be postmarked no later than the 30th day following the completed reporting period.
- The cooling water intake structure information submitted with the permit application meets the requirements of Section 316(b).
- Part II.4.Stormwater Pollution Prevention Plan of the Special Conditions was modified to specify that the Plan does not have to be submitted to the Division. The facility should have a copy available for review during inspections or if requested by the public.

If any parts, measurement frequencies or sampling requirements contained in this permit are unacceptable to you, you have the right to an adjudicatory hearing upon written request within thirty (30) days following receipt of this letter. This request must be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings (6714 Mail Service Center, Raleigh, North Carolina 27699-6714). Unless such demand is made, this decision shall be final and binding.

Please note that this permit is not transferable except after notice to the Division. The Division may require modification or revocation and reissuance of the permit. This permit does not affect the legal requirements to obtain other permits which may be required by the Division of Water Quality or permits required by the Division of Land Resources, the Coastal Area Management Act or any other Federal or Local governmental permit that may be required.

If you have any questions concerning this permit, please contact Teresa Rodriguez at telephone number (919) 733-5083, extension 553.

Sincerely,

Phil Vinzani

for: Alan W. Klimek, P.E.

Cc: NPDES files
Central files
U.S. EPA Region 4
Raleigh Regional Office – Surface Water Protection
Aquatic Toxicology Unit

HARRIS NUCLEAR PLANT NPDES REISSUANCE APPLICATION 316(b) SUPPLEMENT

The Harris Nuclear Plant hereby demonstrates that they have reduced their flow commensurate with a closed-cycle recirculating cooling system. Therefore only the information required at 40 CFR Part 122 Section 122.121(r)(2),(3) and (5) is being provided with this application.

(r)(2) Source water physical data. These include:

(i) A narrative description and scaled drawings showing the physical configuration of all source water bodies used by your facility, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports your determination of the water body type where each cooling water intake structure is located;

The source water body is Harris Reservoir. Harris Reservoir is a freshwater reservoir located in Chatham and Wake Counties, North Carolina. It was created by impounding Buckhorn Creek, a tributary of the Cape Fear River. The main body of Harris Reservoir has a surface area of approximately 4,150 acres. The main reservoir has a maximum depth of 18 m, a mean depth of 5.3 m, a volume of approximately 8.9×10^7 m^3, a full-pool elevation of 67.1 m National Geodetic Vertical Datum (NGVD) [220 ft.], and an average residence time of 28 months. The reservoir began filling in December 1980 and full-pool elevation was reached in February 1983. The 40 mile shoreline is mostly wooded and the 71 square mile drainage area is mostly rolling hills with land used primarily for forestry and agriculture. A smaller 317 acre auxiliary reservoir was also built to serve as the primary source for the Emergency Cooling Water System, which is designed to remove heat from the reactor and critical components following a loss-of-coolant accident (LOCA) or a loss of off-site power.

Refer to attached maps.

Temperature[1] – for the past few years temperature regimes are described as follows:

- Reservoir waters were slightly stratified in the Buckhorn Creek arm and in the mid reservoir during May and July and were well mixed during January and November, 2002.
- Reservoir waters were stratified at all stations during May and July and were either well mixed or very weakly stratified during January and November, 2001.
- Reservoir waters at all reservoir stations (except White Oak Creek arm) were strongly stratified during July and were either well mixed or very weakly stratified during January, May, and November, 2000.

[1] *CP&L – Progress Energy Harris Nuclear Plant Environmental Monitoring Report, 2000, 2001, 2002*

- Reservoir waters at all reservoir stations (except White Oak Creek arm) were stratified during July and were freely circulating during January, May, and November 1999.

- In general mid-depth reservoir temperature ranges from 6.1 – 9.8 °C in the winter to 19.9 – 22.7 °C in the summer.

(ii) Identification and characterization of the source waterbody's hydrological and geomorphological features, as well as the methods you used to conduct any physical studies to determine your intake's area of influence within the waterbody and the results of such studies; and

The 40 mile shoreline is mostly wooded and the 71 square mile drainage area is mostly rolling hills with land used primarily for forestry and agriculture. Refer to attached topographic maps for geomorphological features. Since the facility has a closed-cycle cooling system, no Proposal for Information Collection (PIC) is required to be developed and consequently no area of influence is required to be determined.

(iii) Locational maps.

See attached maps.

(r)(3) Cooling water intake structure data. These include:

(i) A narrative description of the configuration of each of your cooling water intake structures and where it is located in the water body and in the water column;

The plant has two cooling water intake structures but only one is equipped with cooling water intake pumps.

<u>Cooling Tower Makeup and Emergency Service Water Intake Structure (CTMUESW)</u>

The first structure can be called the Cooling Tower Makeup and Emergency Service Water Intake Structure (CTMUESW). It is located at the end of a canal that stems from an arm of the main reservoir. This structure is equipped with two Cooling Tower Makeup (CTMU) pumps, each rated at 26,000 gallons per minute (gpm), and two Emergency Service Water (ESW) pumps, each rated at 21,000 gpm. The structure was constructed with 14 bays but only two bays are used for the CTMU pumps and two bays are used for the ESW pumps. The ESW pump bays have a concrete dividing wall with an eight by ten foot butterfly valve. The dividing wall butterfly valve arrangement along with pipe valving permits operation of the ESW pumps by accessing water from either the main or auxiliary reservoir. The CTMU pump bays are each equipped with traveling screens with 3/8 inch openings. The ESW pump bays are fitted with traveling screens with 3/8 inch openings. Normal water elevation is 220 feet. The invert to the suction for the pumps is located at approximately 191.5 feet.

Emergency Service Water Intake Screening Structure

The second intake structure is called the Emergency Service Water Intake Screening Structure which is located at the end of a canal coming from the auxiliary reservoir. This structure has no cooling water intake pumps and functions only as an alternate screened intake opening for water withdrawal by the two ESW pumps located at the CTMUESW. This structure has traveling screens with 3/8 inch openings. The normal water elevation in the auxiliary reservoir is 250 feet and the invert to the conveyance pipes is approximately 233.3 ft. in elevation. The structure does have two screen wash pumps (@ 500 gpm) which are operated about an hour per year each; two fire protection system pumps (@ 3000 gpm) which are operated about 12 hours per year each; and one fire jockey pump with negligible flow rate and run time.

(ii) Latitude and Longitude in degrees, minutes, and seconds for each of your cooling water intake structures;

The CTMUESW structure is located at approximately 35° 37' 49" N and 78° 57' 13" W. The Emergency Service Water Intake Screening Structure is located at approximately 35° 37' 48" N and 78° 57' 20" W.

(iii) A narrative description of the operation of each of your cooling water intake structures, including design intake flows, daily hours of operation, number of days of the year in operation and seasonable changes, if applicable;

The CTMUESW structure has a design flow of 135.38 MGD (Table 1). This includes the two cooling tower make-up pumps and the two emergency service water pumps. This intake is utilized mainly to withdraw cooling tower makeup water, however it has the capability to withdraw emergency cooling water from either the Harris Reservoir (main reservoir) or the auxiliary reservoir. Usually one cooling tower make-up (CTMU) pump is in operation to provide cooling tower make up water (37.44 MGD) with the other pump functioning as a back-up. One CTMU pump is generally in use when the plant is in operation. The plant is generally in operation 24 hours per day for an average of about 329 days per year. [2]

The two ESW pumps are intended for emergency use only but are tested periodically to ensure reliable operation. Typically, one or the other ESW pump draws water from the auxiliary reservoir through the Emergency Service Water Intake Screening Structure about 4 days per quarter and draws water through the CTMUESW structure from the main reservoir about 10 days per year.

[2] Based on Capacity Utilization Rate of 90%

(iv) A flow distribution and water balance diagram that includes all sources of water to the facility, recirculating flows, and discharges;

Refer to water balance schematic provided with the NPDES reissuance application.

(v) Engineering drawings of the cooling water intake structure

See attached drawings

(r)(5) Cooling water system data.

(i) A narrative description of the operation of the cooling water system, its relationship to cooling water intake structures, the proportion of the design intake flow that is used in the system, the number of days of the year the cooling water system is in operation and seasonal changes in the operation of the system, if applicable;

The facility maintains a closed-cycle recirculating cooling water system. The closed-cycle cooling system consists of a natural draft, hyperbolic cooling tower that provides a heat sink for the recirculating condenser cooling water and the normal service water systems. The normal service water is withdrawn from the closed-cycle cooling water system (cooling tower basin) and provides cooling water to various plant components and systems. During normal operation, one CTMU pump supplies all the necessary makeup water (37.44 MGD) for the closed-cycle cooling system in order to restore losses due to drift, evaporation, blowdown and internal consumption. Infrequently, in drought years, the CTMU pumps are also used to transfer water from the main reservoir to the auxiliary reservoir. Additionally, during periods of extreme cold weather, heated cooling water may be discharged to the auxiliary reservoir in order to ensure that ice does not build up at the emergency cooling water intake screening structure. The closed-cycle recirculating cooling system is generally in operation when the plant is in operation. The plant generally is in operation an average of about 329 days per year. The closed-cycle recirculating system has a blowdown that averages approximately Four[3] MGD per month.

The two ESW pumps are intended for emergency use only but are tested periodically to ensure reliable operation. Typically, one or the other ESW pump draws water from the auxiliary reservoir about 4 days per quarter and draws water from the main reservoir about 10 days per year. This amount totals approximately 786 Million Gallons/year[4]. This water is conveyed through critical plant components and discharged back to the auxiliary reservoir by the ESW discharge canal.

[3] Based on monthly average flows for previous 2.5 years.

[4] 30.24 MGD X 4 days/qtr. X 4 qtr./yr. = 483.84 MG/yr.; 30.24 MGD X 10days/year = 302.4 MG/yr. 483.84 + 302.4 = 786.24 MG/yr. Use 786 MG/yr.

Under normal operating conditions, the recirculating (internal) cooling water flow is 774.15 MGD. This total includes recirculating cooling water (702.15 MGD) and Normal Service Water (NSW, 72.0 MGD) flows apportioned as follows:

3 circulating water pumps @ 234.05 MGD each
1 NSW pump @ 72.0 MGD

The design flow is 846.15 MGD (Table 2).

(ii) Design and engineering calculations prepared by a qualified professional and supporting data to support the description required by paragraph (r)(5)(i) of this section.

Calculations and references for information are provided.

Table 1 – Intake Pump Design

Cooling Tower Make-up Pumps	GPM	MGD	Total MGD
• Two Pumps	26,000[5] /pump	37.44[6]/pump	74.9
Emergency Service Water Pumps			
• Two Pumps	21,000[7]/pump	30.24[8]/pump	60.48
			135.38

Table 2 – Cooling System Recirculating Water Design

Condenser Cooling Water Pumps	GPM	MGD	Total MGD
• Three Pumps	162,533[9]/pump	234.05[10]/pump	702.15
Normal Service Water			
• Two Pumps	50,000[11]/pump	72.0[12]/pump	144.0
			846.15

[5] *Progress Energy Harris Final Safety Analysis Report, Section 3.8*
[6] 26,000 gals./min. X 60 mins./ hr. X 24 hrs./ day X 1 MG/1,000,000 gals. = 37.44 MGD/pump
[7] *Progress Energy Harris Final Safety Analysis Report, Section 3.8*
[8] 21,000 gals./min. X 60 mins./ hr. X 24 hrs./ day X 1 MG/1,000,000 gals. = 30.24 MGD/pump
[9] *Progress Energy Harris Final Safety Analysis Report Table 10.4.5-3*
[10] 162,533 gals./min. X 60 mins./ hr. X 24 hrs./ day X 1 MG/1,000,000 gals. = 234.047 MGD/pump
[11] *Progress Energy Harris Final Safety Analysis Report, Table 9.2.1-2*
[12] 50,000 gals./min. X 60 mins./ hr. X 24 hrs./ day X 1 MG/1,000,000 gals. = 72.0 MGD/pump

Demonstration of Flow Reduction Commensurate With A Closed-Cycle Recirculating System

§ 125.94(a)(1)(i) of the Phase II 316(b) regulation allows a determination of best technology available for minimizing adverse impact for a facility that demonstrates they have reduced their flow commensurate with a closed-cycle recirculating system. In this case the facility also is deemed to have met the applicable performance standards. The Harris Nuclear Plant maintains a closed-cycle recirculating cooling system and therefore has reduced their flow commensurate with a closed-cycle recirculating system.

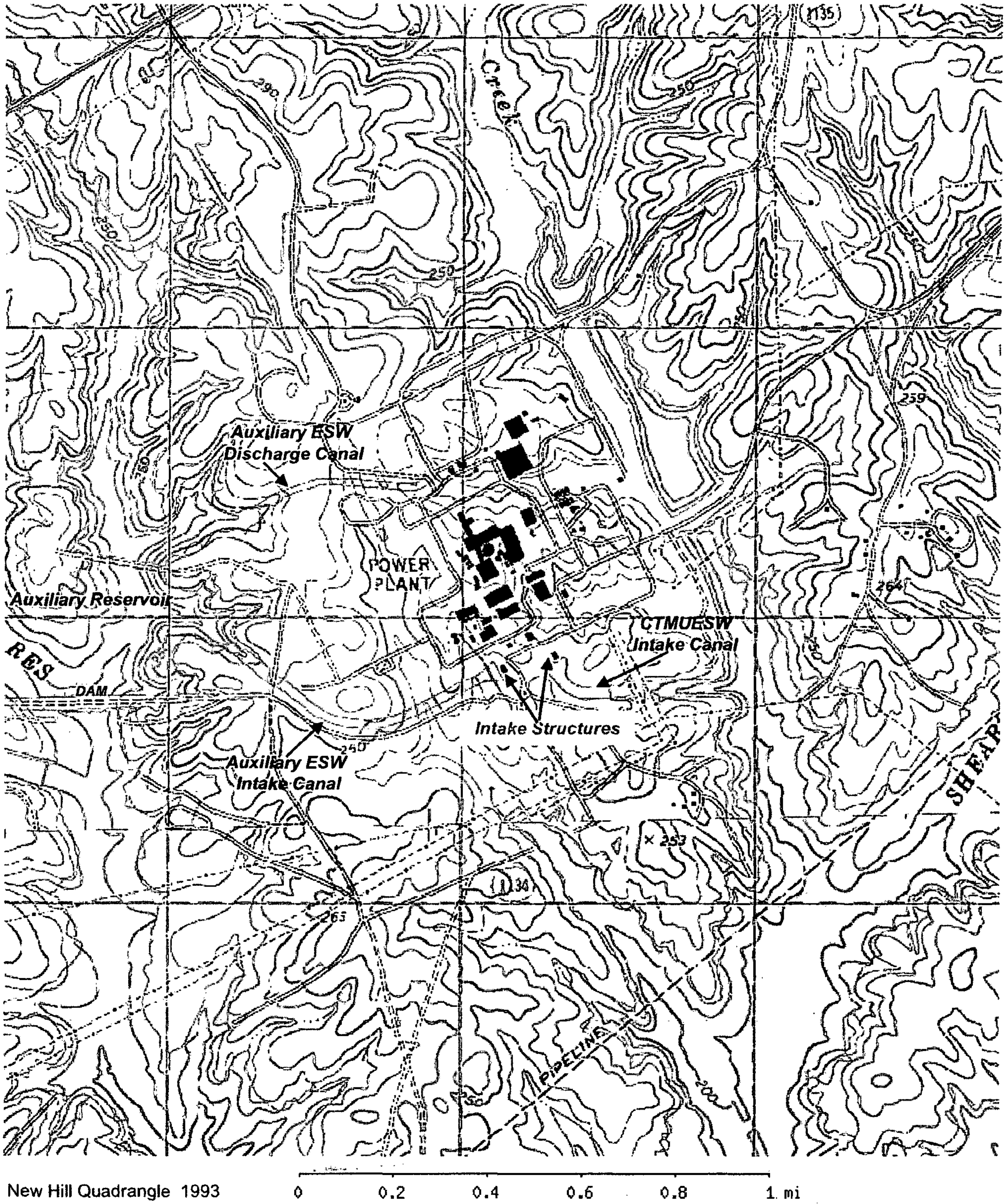
Flow reduction by the Harris Plant can be determined as follows:

The design flow of the recirculating cooling system is 846.15 MGD as previously explained. Assuming a 365 day/year operation this results in an annual flow of approximately 308,844.75 Million Gallons / year[13] or if the plant operated a once-through cooling system they would withdraw approximately this amount per year. The plant actually is designed to withdraw the following amount per year assuming no emergency withdrawal is needed:

		Annual volume
CTMU	74.9 MGD Design	27,338.5[14] MG
	37.44 MGD Actual Operation	13,665.6[15] MG
ESW		786 MG
Design Total		28,124.5[16] MG
Operation Total		14,451.6[17] MG

Proportioning the recirculating water (hypothetical once-through) to the amount actually withdrawn by the closed-cycle system, a flow reduction of approximately 91 %[18] is realized. Since generally only one CTMU pump is in operation a more realistic flow reduction is approximately 95 %[19]. Either way a flow reduction of 90% or better is certainly commensurate with those flows generally achieved by closed-cycle recirculating systems on a fresh water system.

[13] 846.15 MG/D X 365 days/year = 308,844.75 MG/year
[14] 74.9 MG/D X 365 days/year = 27,338.5 MG/year
[15] 37.44 MG/D X 365 days/year = 13,665.6 MG/year
[16] 27,338.5 MG/yr. + 786 MG/yr. = 28,124.5 MG/year
[17] 13,665.6 MG/yr. + 786 MG/yr. = 14,451.6 MG/year
[18] 308,844.75 MG - 28,087.5 MG = 280,757.25 MG; 280,757.25/308,844.75 = 0.909 or 91% reduction
[19] 308,844.75 MG – 14,414.6 MG = 294,430.15 MG; 294,430.15/308,844.75 = 0.953 or 95% reduction



New Hill Quadrangle 1993