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A Duke Energy Company

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M. S. Tuckman
Executive Vice President
Nuclear Generation

January 17, 2002

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Subject: Response to Requests for Additional Information in Support of the Staff Review of the Application to Renew the Facility Operating Licenses of McGuire Nuclear Station, Units 1 & 2 and Catawba Nuclear Station, Units 1 & 2

Docket Nos. 50-369, 50-370, 50-413 and 50-414

Dear Sir:
By letter dated June 13, 2001, Duke Energy Corporation (Duke) submitted an Application to Renew the Facility Operating Licenses of McGuire Nuclear Station and Catawba Nuclear Station (Application). The staff is reviewing the information provided in the Application and by letter dated November 19, 2001 identified areas where additional information is needed to complete its review of the McGuire Environmental Report contained within the Application. Duke responses to the requests for additional information (RAI) are provided in Attachment 1 to this letter. Note that the above NRC letter did not contain an RAI number 11. None of the responses in Attachment 1 contain any commitments.

If there are any questions, please contact Bob Gill at (704) 382-3339.

Very truly yours,

M. S. Tuckman

M. S. Tuckman

Attachment

A001

Affidavit

M. S. Tuckman, being duly sworn, states that he is Executive Vice President, Nuclear Generation Department, Duke Energy Corporation; that he is authorized on the part of said Corporation to sign and file with the U. S. Nuclear Regulatory Commission the attached responses to staff requests for additional information relative to its review of the Application to Renew the Facility Operating Licenses of McGuire Nuclear Station and Catawba Nuclear Station, Docket Nos. 50-369, 50-370, 50-413 and 50-414 dated June 13, 2001, and that all the statements and matters set forth herein are true and correct to the best of his knowledge and belief. To the extent that these statements are not based on his personal knowledge, they are based on information provided by Duke employees and/or consultants. Such information has been reviewed in accordance with Duke Energy Corporation practice and is believed to be reliable.

M. S. Tuckman

M. S. Tuckman, Executive Vice President
Duke Energy Corporation

Subscribed and sworn to before me this 17TH day of JANUARY 2002.

Mary P. Helms
Notary Public

My Commission Expires:

JAN 22, 2006

xc: (w/ Attachment)

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Attachment 1
Application to Renew the Operating Licenses of
McGuire Nuclear Station and Catawba Nuclear Station

Responses to NRC Requests for Additional Information
Concerning the McGuire Environmental Report
NRC Letter dated November 19, 2001

Environmental RAI 1
Does Duke have water withdrawal permits for water with drawn from Lake Norman and/or the six groundwater wells noted in Table 4-4 of the ER? If so, please provide information regarding the permit issuing agency, the statutory basis for the permits, the permit numbers and the permit issuance and expiration dates.

Response to Environmental RAI 1
No water withdrawal permits are required for water withdrawn from Lake Norman nor are water withdrawl permits required for the six groundwater wells noted in Table 4-4 of the ER.

North Carolina General Statute G.S. 143-215.22H requires that water withdrawals of greater than 100,000 gallons per day from surface or groundwaters of the state be registered with the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Resources.

The registration of the surface water used by McGuire was included in a 'Water Withdrawal and Transfer Registration for Duke Facilities' in March 2000. No permit is issued for this registration. The NCDENR water Resources Division issues a letter acknowledging receipt of the registration and a request to update the registration every five years.

The groundwater wells listed in Table 4-4 of the ER are not part of a single well system, nor do they withdraw groundwater from the same groundwater basin. The withdrawals do not total to 100,000 gallons per day. Therefore, these wells do not require a registration under G.S. 143-215.22H.

Environmental RAI 2
For an alternative coal-fired plant (see p. 8-2 of the ER), could all of the solid waste products (flyash, bottom ash, spent selective catalytic reduction [SCR] catalyst, and scrubber sludge/waste) be placed in the same landfill or would separate landfills be required? Approximately how many total acres of landfill per year of operation would be required to accommodate all waste products? What would be the approximate weight of 8500 cubic feet of spent SCR catalyst material?

Response to Environmental RAI 2
The degree of on-site landfilling would depend upon the economics of the design and the market for both the flyash and the scrubber by-products (gypsum). Both flyash and gypsum would be actively marketed. However, without such a market the flyash and gypsum would be disposed of on-site as waste. Ash and scrubber wastes could be co-mingled and landfilled together.

The annual landfill requirement for scrubber waste is estimated at 7 acres per year. Ash waste is generated at approximately 90% flyash to 10% bottom ash. The landfill requirement for total ash is approximately 12 acres per year. Therefore, for both ash and scrubber waste, a total of 19 acres of landfill for each year of operation is estimated.

Spent SCR catalyst would be regenerated or disposed of off-site by a vendor such that on-site disposal would not be required. The approximate weight of the 8500 cubic feet of spent SCR catalyst is 138 tons.

Environmental RAI 3
The ER (p. 8-22) states that the TRANSCo interstate natural gas pipeline is located within two miles of the McGuire Nuclear Station, but that a new pipeline would be required if a replacement gas-fired plant were to be located at the McGuire site. Approximately how long would such a new pipeline be?

Response to Environmental RAI 3
The natural gas to operate a replacement of McGuire's 2258 MW at a capacity factor in excess of 90% is estimated to require approximately 12% of the natural gas capacity of the existing TRANSCo Tier II pipeline. Such an increase in demand on a continuous basis would require a comprehensive evaluation by TRANSCo to determine the upgrade solution. The upgrade required would also be dictated by other demands for natural gas at the time of the replacement of McGuire.

The GEIS (p. 8-34) uses a total of 3600 acres of disturbed land to gather and distribute natural gas for a 1000 MW sized plant. The gas needs would be more than two times greater for a replacement for McGuire. The 3600 acres would equate to approximately 200 miles of land disturbance for the new pipeline. The 200 mile estimate could be used based on better estimates for McGuire not being available.

Environmental RAI 4
Provide the license number, issuance date, and expiration date of the license for the independent spent fuel storage installation referred to on Page 9-2 of the ER.

Response to Environmental RAI 4
The question is requesting specific information relative to a plant specific license for an Independent Spent Fuel Storage Installation (ISFSI). However, as stated in Section 9.4 of the McGuire Environmental Report, storage of spent fuel in an ISFSI is conducted under a general permit [license] issued in accordance with 10 CFR 72.210. Because a general license has been issued by the NRC in accordance with 10 CFR 72.210, a plant specific license for the ISFSI is not required at McGuire.

Section 72.214 provides a list of approved spent fuel storage casks. McGuire uses the TN-32 Dry Storage Cask which is licensed by the NRC in Certificate of Compliance number 1021. This Certificate of Compliance is applicable for all TN-32 casks at all nuclear power plants licensed under Part 50 and was issued April 19, 2000 and expires April 19, 2020 (see 10 CFR 72.214).

Environmental RAI 5
Provide information on the status of the stormwater permit that expired 11/30/99 (p. 9-3 of the ER).

Response to Environmental RAI 5
As of the date of this response, the permit has not been issued. This permit is issued by the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Water Quality, Stormwater and General Permits Unit. The NCDENR states that they are extremely behind in issuing permits. We are still operating under the guidelines of the expired permit.

Environmental RAI 6
Resolve the discrepancy between the number for the air operating permit given in the ER (#98-110-269 on p. 9-4) and the 2/23/00 letter from Mecklenburg County (which indicates that the permit number is 00-019-269). Also, is the ER citation (p. 9-4) to Section 112 of the Federal Clean Air Act correct as the authority for the permit?

Response to Environmental RAI 6
The current McGuire air permit number is 00-019-269. The reference to Section 112 of the Federal Clean Air Act is correct. This section is entitled Hazardous Air Pollutants.

Environmental RAI 7
Is the permit issued 7/30/92 the most recent permit for the landfill (ER, p. 9-4)?

Response to Environmental RAI 7
Yes. Permit #60-04 is the most recent permit issued for the landfill.

Environmental RAI 8
Provide a copy of the most recent impingement study.

Response to Environmental RAI 8
The most recent impingement study is provided below:

McGuire Impingement Study Preliminary Results
December 10, 2000 through December 14, 2001

Background
McGuire Nuclear Station is a 2,360-MW, 2-unit facility located on Lake Norman, NC. The original NPDES permit issued for the facility in March 1978 required an evaluation of the effectiveness of the design of the intake structure in reducing the impingement and entrainment of aquatic organisms. That permit requirement was addressed through a predictive study (October 1978) based primarily upon intake velocity, intake design, fish swim speed, fish distribution and abundance in the McGuire intake area and results of impingement sampling at nearby Marshall Steam Station during 1974-75. As a follow-up to the historical predictive study, Duke Power initiated a second impingement study during the winter 2000. In contrast to the earlier predictive study, the current study is a 2-year field study that will provide empirical data on fish impingement.

Condenser Cooling Water System and Intake Structure
The McGuire condenser cooling water (CCW) system consists of two intake structures, an upper intake and a low level intake. The upper intake, which contains the CCW pumps, is located in an embayment approximately 700 m east of Cowans Ford Dam. The low level intake is located near the base of the dam at the full pond depth of approximately 30 m and is operated during the warmest summer months as needed to maintain the average monthly discharge temperature within permit limits. During operation of the lower level intake, water is pumped to the forebay of the upper intake, where it mixes with upper intake water before being pumped into the CCW system. There are four CCW pumps for each of the two generating units. Each pump has two intake bays, and each bay has a set of trash racks (0.50-in bars, 4.50 in on center) backed by a set of traveling screens (0.38-in openings), for a total of eight bays, trash racks and traveling screens per unit (Figure 1). The traveling screens are rotated and cleaned once per week via an automatic backwash system.

Methods
The current impingement study incorporates a full count of all fishes impinged on McGuire CCW intake screens. Under a routine maintenance schedule, the traveling intake screens are rotated and backwashed once a week. Impingement sampling has been scheduled to coincide with this screen maintenance procedure. The sampling program began in December 2000 and will continue through November 2002. The weekly sampling procedure is as follows:

Figure 1. Diagram of McGuire upper level intake showing layout of RC pumps and associated traveling intake screens.

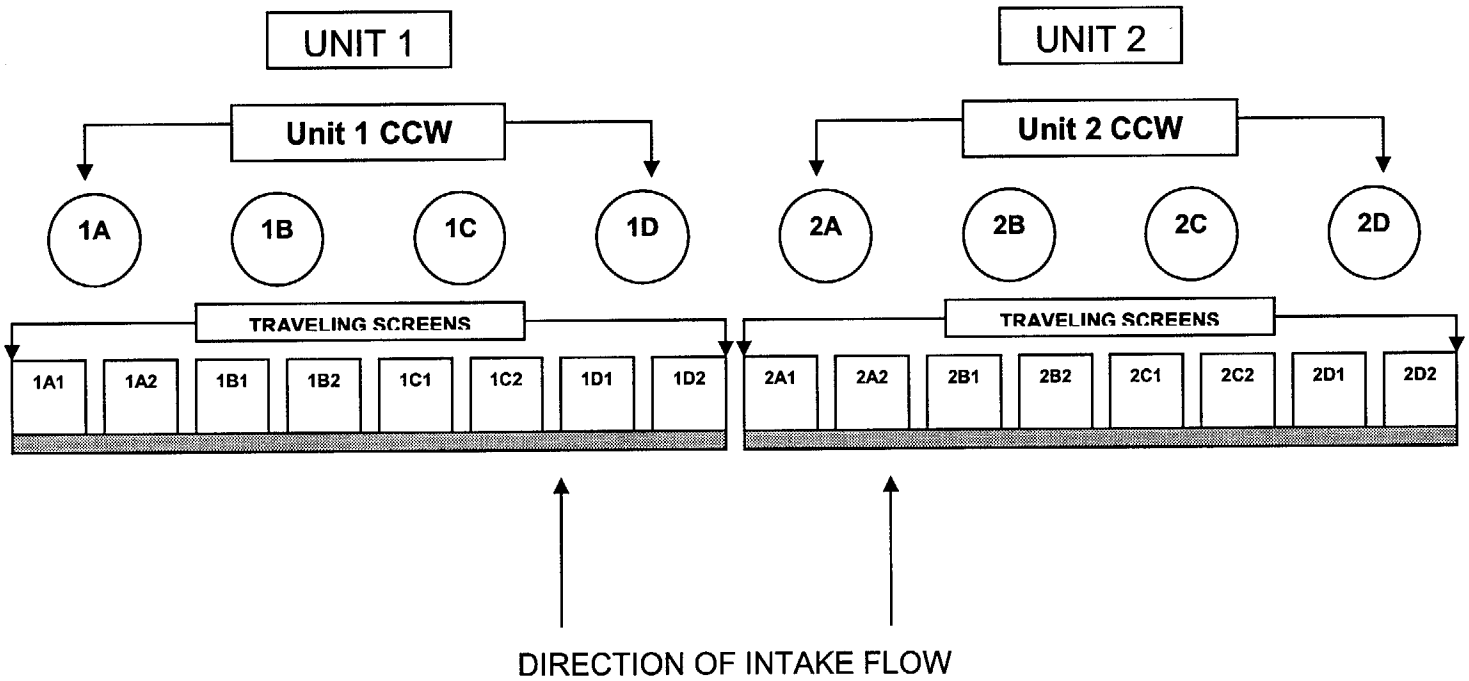


Figure 2. Total impingement (number of fish) at McGuire and associated intake water temperature from December 10, 2000 through December 14, 2001.

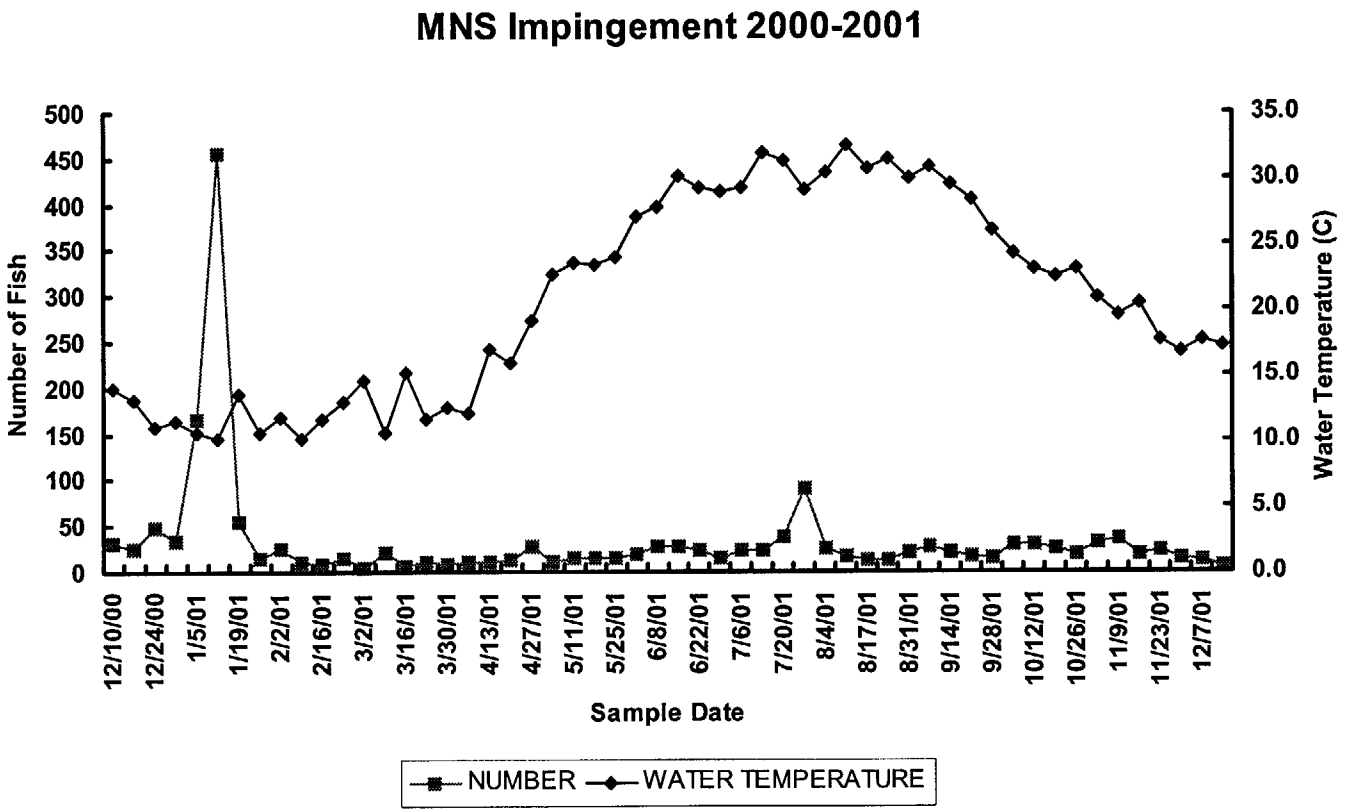


Figure 3. Percent composition by taxa for most frequently impinged fishes during the period December 10, 2000 through December 14, 2001 (the category Other includes all species that individually comprised less than 5% of the total impingement).

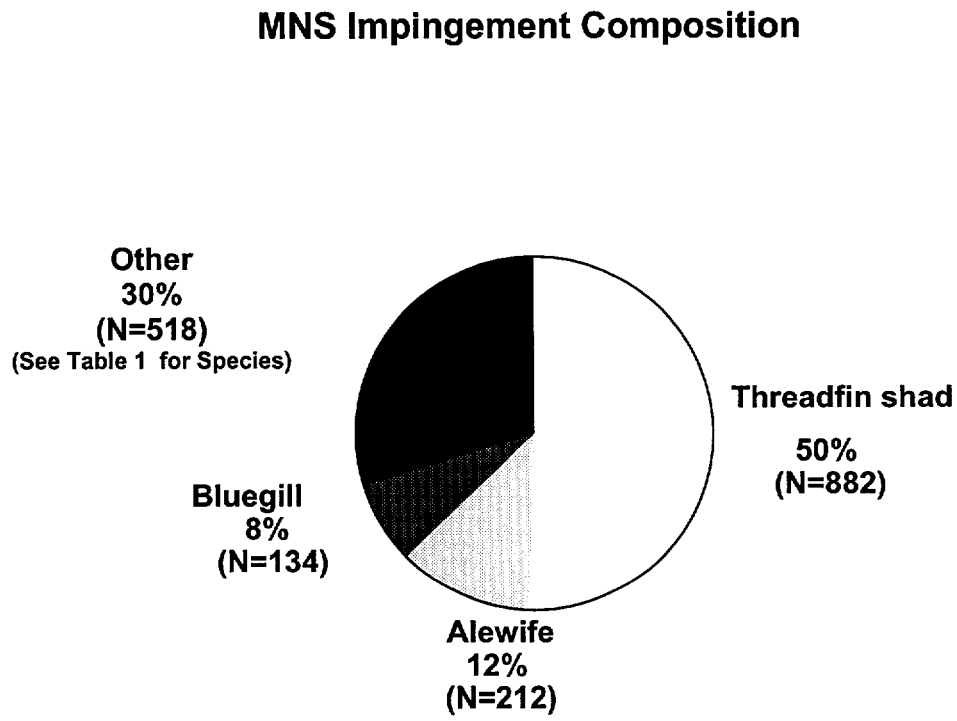


Table 1. Composition of taxa comprising the category Other in Figure 3.

TAXA	Number	% of Other
Black Crappie	8	0.5%
Blue Catfish	15	0.9%
Channel catfish	50	2.9%
Eastern silvery minnow	1	0.1%
Flathead catfish	33	1.9%
Gizzard Shad	33	1.9%
Golden Shiner	43	2.5%
Hybrid sunfish	3	0.2%
Largemouth bass	13	0.7%
Rainbow Trout	1	0.1%
Redbreast Sunfish	34	1.9%
Redear sunfish	9	0.5%
Spotted bass	2	0.1%
Striped Bass	48	2.7%
Unidentified	59	3.4%
Warmouth	18	1.0%
White Bass	47	2.7%
White crappie	13	0.7%
White perch	65	3.7%
Yellow perch	23	1.3%
Total Other	518	29.7%

Environmental RAI 9
Provide copies of the two most recent *Corbicula* monitoring reports.

Response to Environmental RAI 9
The *Corbicula* monitoring program, initiated by Duke Power in 1990, was designed to meet the requirements of the US Nuclear Regulatory Commission (NRC) Generic Letter 89-13[1]. Generic Letter 89-13 requested that for nuclear power plant facilities with open-cycle service water systems, licensees implement and maintain an ongoing program of surveillance and control techniques to significantly reduce the incidence of flow blockage problems as a result of biofouling (in particular *Corbicula*, a non-native fresh water bivalve mollusk). Duke Energy Corporation's surveillance program includes a visual inspection of the McGuire Nuclear Station intake structure. Additionally, the *Corbicula* field sampling program for the McGuire service water system, as described in the attached two most recent reports, was approved as being 'in compliance' with the NRC generic letter:

The two most recent *Corbicula* monitoring reports follow this page. These reports are:

> Hall, J.J. and T.J. Wilda. 2000. *Corbicula* Populations and Their Biofouling Potential in the McGuire Nuclear Station Intake Structures in 1999. Duke Power Company internal report.
>
> Hall, J.J. and T.J. Wilda. 2001. *Corbicula* Populations and Their Biofouling Potential in the McGuire Nuclear Station Intake Structures in 2000. Duke Power Company internal; report.

[1] US Nuclear Regulatory Commission, 18 July 1989. Service Water System Problems Affecting Safety-related Equipment (Generic Letter 89-13).

Duke Power Company
Group Environment, Health, and Safety

Corbicula Populations and Their Biofouling Potential in the McGuire Nuclear Station Intake Structures in 1999

Prepared by
James J. Hall* and Thomas J. Wilda
Duke Power Company
Aquatic Ecology Team
Huntersville, NC
April 4, 2000

*Author to whom questions should be addressed

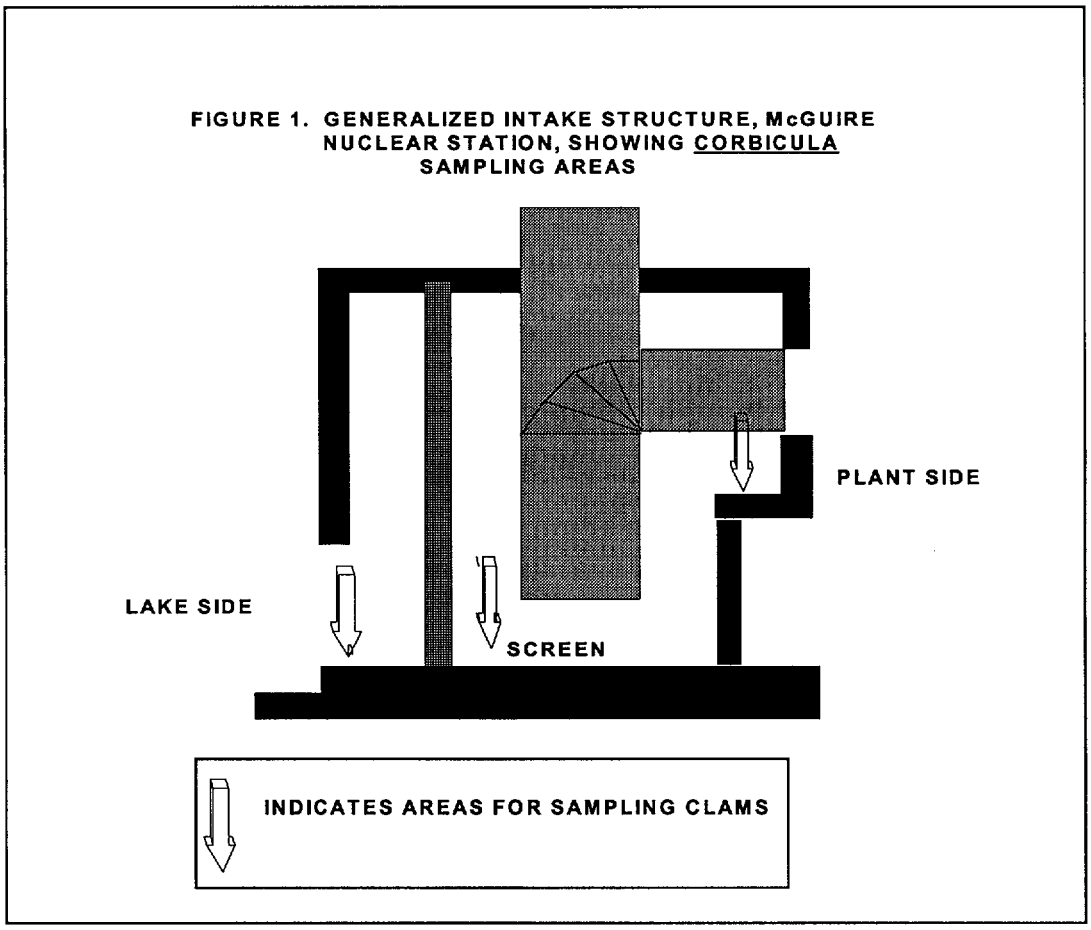
INTRODUCTION

This is an update on the population densities of the Asiatic clam, *Corbicula fluminea*, in and near Duke Power's McGuire Nuclear Station's (MNS) intake structures in 1999. The *Corbicula* population monitoring program for MNS has been ongoing since January 1990. At that time samples were collected from pump pits of the Condenser Cooling Water (CCW) intake structure and from natural substrate near the low-level intake in Lake Norman, located at the base of Cowans Ford Dam. In 1991 a location in the Standby Nuclear Service Water Pond near the low-level intake (MNS pond intake) was added to the monitoring program. Sampling *Corbicula* populations in and near the intakes of Duke's nuclear stations helps meet the requirements in the Nuclear Regulatory Commission's Generic Letter 89/13 which requires that *Corbicula* populations in each intake structure be sampled during each refueling outage, or annually. The population densities of these clams in each intake will give some indication of the biofouling potential at each station. Programs similar to McGuire's are being conducted at Catawba (CNS) and Oconee (ONS) Nuclear Stations.

METHODS

In March and October 1999, a Petersen grab was used to collect nine grab samples from the floor of each of the CCW intake structure pump pits of Units 1 and 2 (Pumps A, B, C, and D in each Unit). In each pump pit, three grab samples were taken in front of the traveling screens on the lake side, three just behind the traveling screens, and three along the back wall, or plant side (Figure 1). In November, six grab samples were collected from the natural substrate near the low-level intake in Lake Norman, and from the MNS standby nuclear service water pond near the low-level pond intake.

Grab samples were processed at the Environmental Center where the clams were separated from the sediment and then counted and measured to the nearest millimeter using an automated image analyzer. Clams 9 mm long or longer were classified as adults (sexually mature) and the smaller clams (<9mm) as juveniles. The density of *Corbicula* (number/m^2) for each grab sample taken in each CCW pump pit is shown in an oblique view of the bottom of the structure with the sampling locations indicated by the pyramid symbols. The height of the pyramid and the number over it indicate the density of *Corbicula* for each grab sample. Mean densities were also computed for the CCW pump pit and the low-level lake and pond intakes, and were plotted as an annual mean density. The vertical axis scales for density on all figures are specific to each graph to allow for the large range in densities.



The measure of biofouling potential used for 1999 data is the same as that used in 1998. The index relies upon the density of adults in a population and the proportion of juveniles that would reasonably be expected to survive to adulthood. It is determined by computing the logarithm_{10} of the density of adults and adding to that the logarithm_{10} of 5% of the juvenile density. The index can range from zero up to a practical limit around seven. For example, if there were 10,000 adults and 10,000 juveniles in a sample it would result in a biofouling potential of 6.7; the logarithm_{10} of 10,000 is 4.0, and the logarithm_{10} of (.05 x 10,000) is 2.7. Densities as high as these would rarely be encountered.

RESULTS AND DISCUSSION

Corbicula Density

Unit 1

Corbicula densities (clams/m^2) in individual samples from Unit 1 pump pits varied widely, ranging from none to 6163 (Figure 2). The mean density of all samples within each pump pit decreased since the previous year for all except pump D, where it had decreased each year from 1993 to 1998 before increasing in 1999 (Figure 3). The number and proportion of adult clams in samples from all the Unit 1 pump pits were within the range of those found in samples since 1990.

Unit 2

The densities of *Corbicula* were higher in the pump pits of Unit 2, where they ranged from 116 to 13,023 (Figure 4). Densities of clams in pumps A and B were within the range of those collected since 1990, but in pumps C and D the densities were the highest found in that time span (Figure 5). The number of adult clams was within the range of those collected since 1990 in all pump pits except D, where it was highest in 1999.

Nuclear Service Water Pond and Lake Norman Intake

Corbicula populations have historically been nonexistent or present in very low densities near the deep-water low level lake and pond intakes, and this was the case in 1998; no clams were collected at either location (Figures 6 and 7). Typically, the water becomes anoxic in the pond below five meters in summer, preventing a buildup of a clam population in this area. Also, at the low-level intake the water may become anoxic depending on the extent of lake stratification. Belanger (1991) found that *Corbicula* populations could be totally eliminated in areas where the dissolved oxygen level is depressed.

Biofouling Potential

The biofouling indices for the MNS pump pits of Unit 1 were in the Moderate or High range; those for the pump pits of Unit 2 were all High (Figure 8). (The biofouling potential categories were assigned arbitrarily, and will be used for historical comparisons.) Many power plants experience high densities of *Corbicula* in intake pump pits (Dreier and Tranquilli 1981; Harvey 1981; Smithson 1981), and those populations appear to be the main source of clams that cause biofouling problems. Veligers (immature, planktonic clams) carried via raw water intake systems are the ultimate source of *Corbicula* that cause biofouling problems after they settle and grow within a plant. Veligers are produced during spawning which is usually initiated at water temperatures around 16 to 20°C (61 to 68°F) and is inhibited by temperatures over 30 to 34°C (86 to 90°F) (Aldrige and McMahon 1978, Britton et al. 1979, Dreier and Tranquilli 1981). However, a study of *Corbicula* in Lake Wylie found that reproduction there began in late April at a temperature of 15°C (59°F), and continued until December (Duke Power Company unpublished data).

The decision to clean the CCW pump pits of the accumulated silt, detritus, and *Corbicula* should be based upon the extent of in-plant fouling problems, as well as the data presented here. Cleaning or other treatment, such as killing by deoxygenating the water, can reduce the numbers and size of the clams to the point where they do not plug tubing (Smithson 1981, Strauss 1982). However, removing these clams from the intake structures is not the complete solution because of the likelihood of *Corbicula* presence in the intake area. Williams and McMahon (1986) found that juvenile *Corbicula* up to 2 mm long can be suspended and then carried into an intake structure by the currents in the intake canal of a power plant. They also reported that water currents produced by the pumps could roll the *Corbicula* up to 7 mm in length along the substrate toward the intake where they remain a source for future biofouling problems.

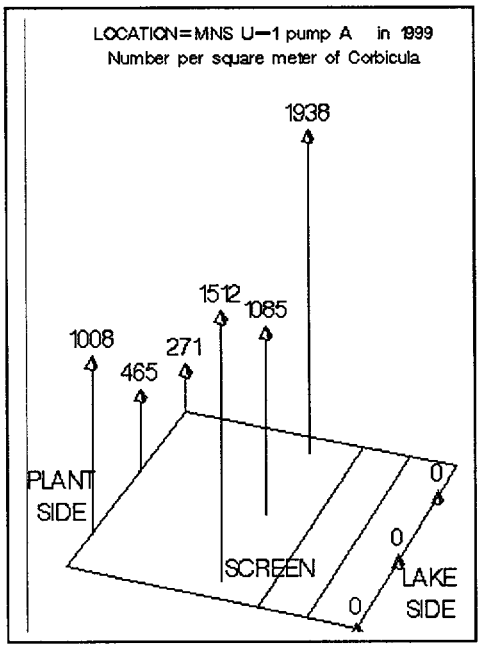


Figure 2A. Unit 1 Pump A

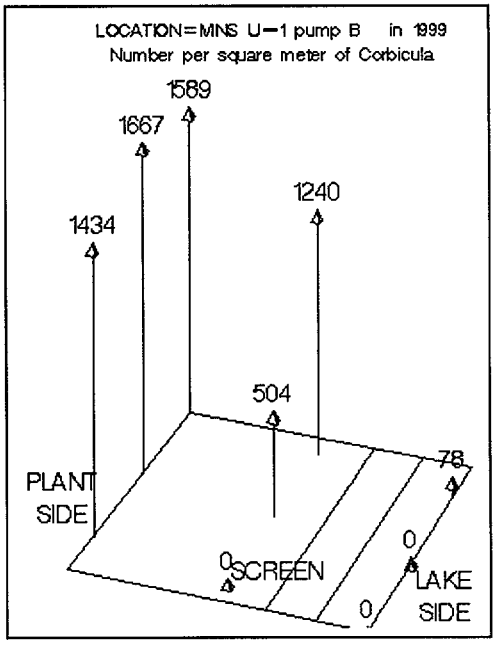


Figure 2B. Unit 1 Pump B

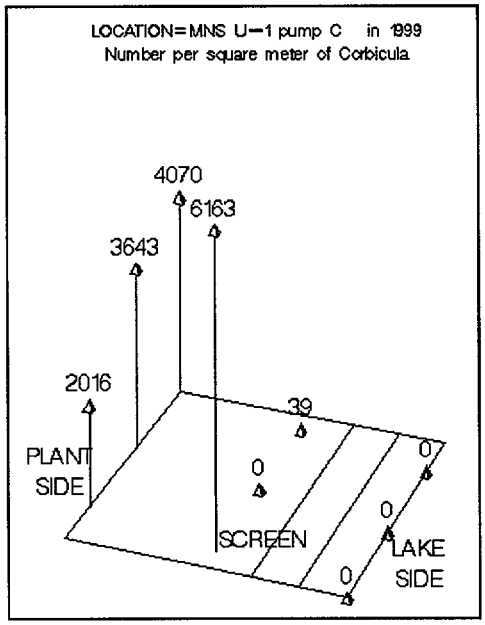


Figure 2C. Unit 1 Pump C

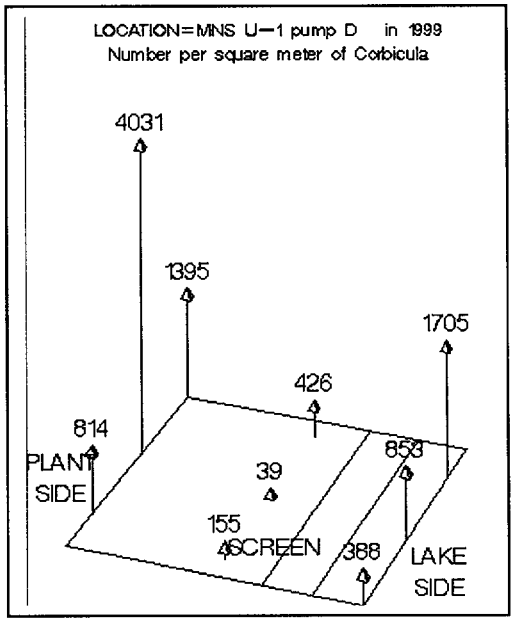


Figure 2D. Unit 1 Pump D

Figure 2. Densities (number/m^2) of *Corbicula* at sample sites in pump pits A through D of Unit 1 in June 1999.

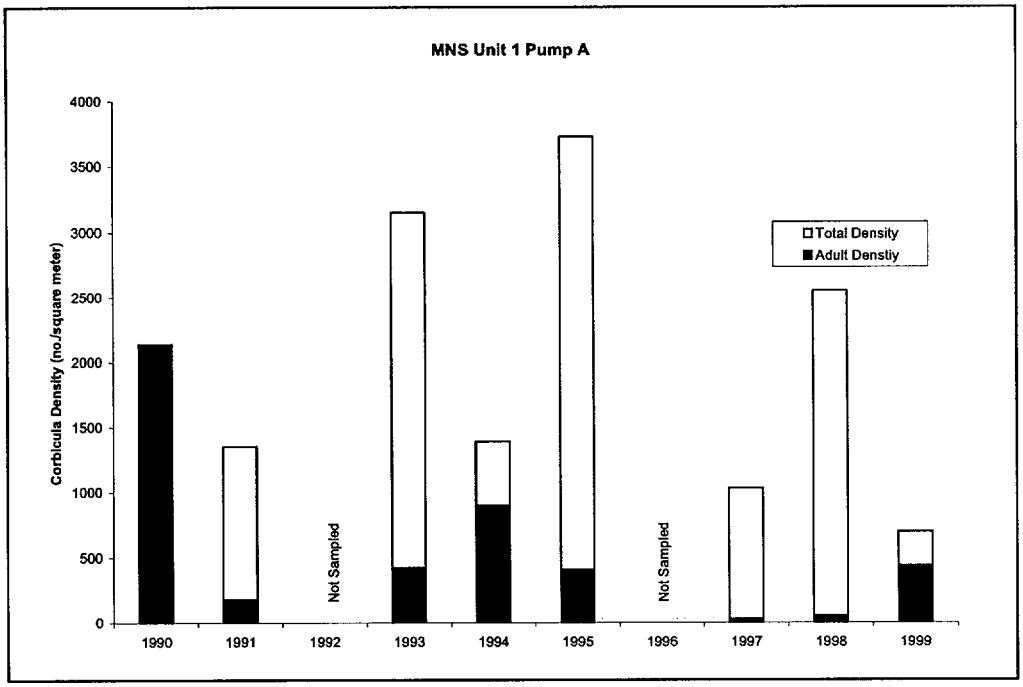


Figure 3A. (Note scale of vertical axis.)

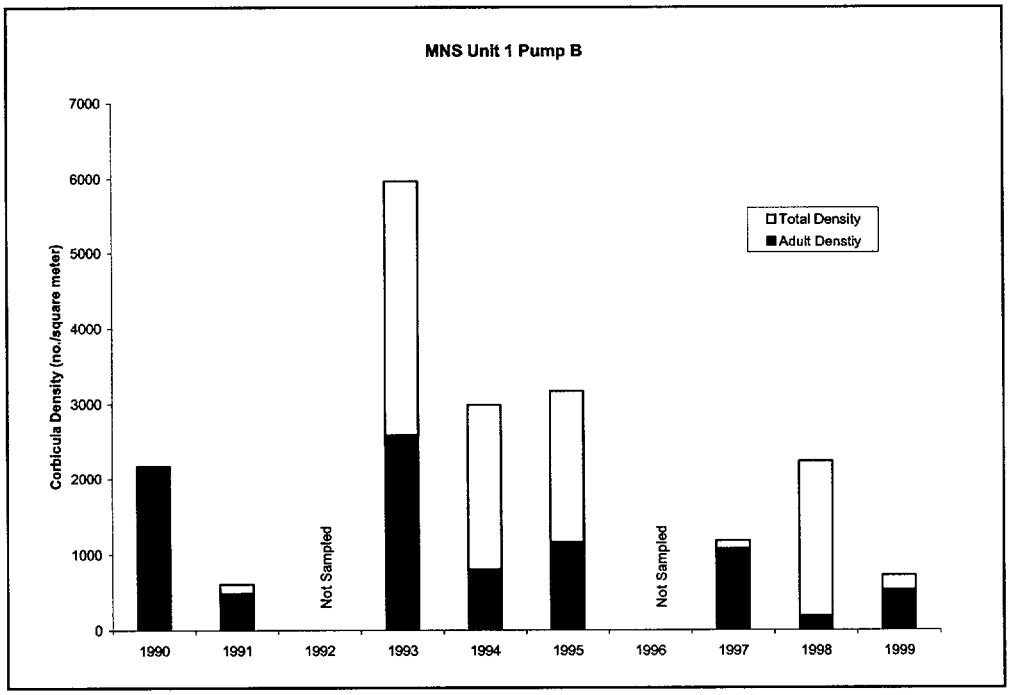


Figure 3B. (Note scale of vertical axis.)

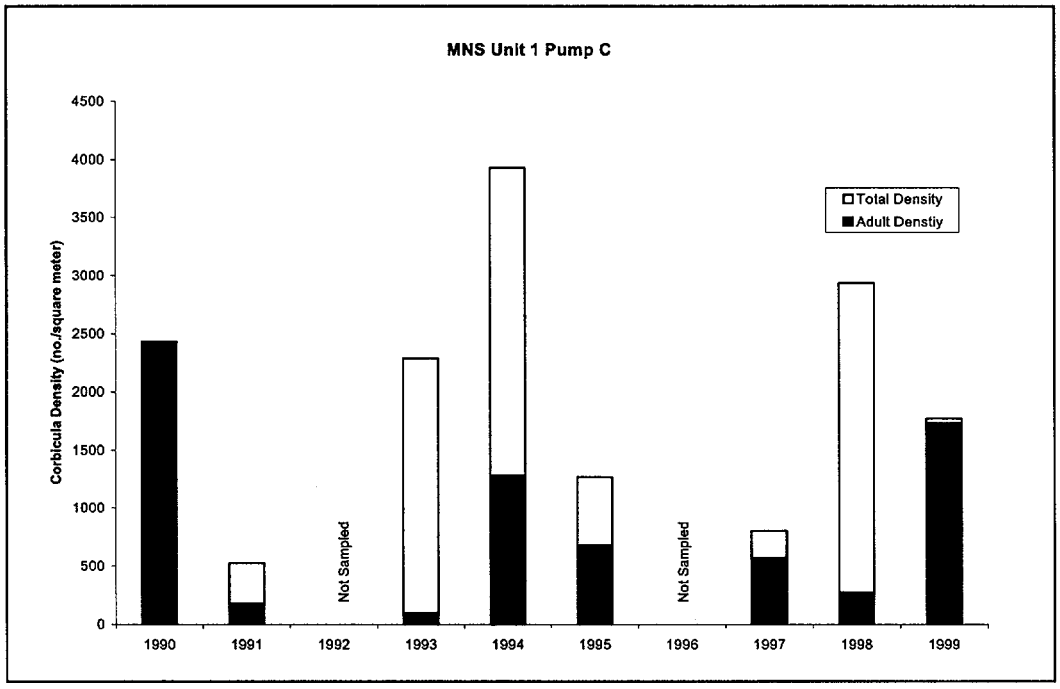


Figure 3C. (Note scale of vertical axis.)

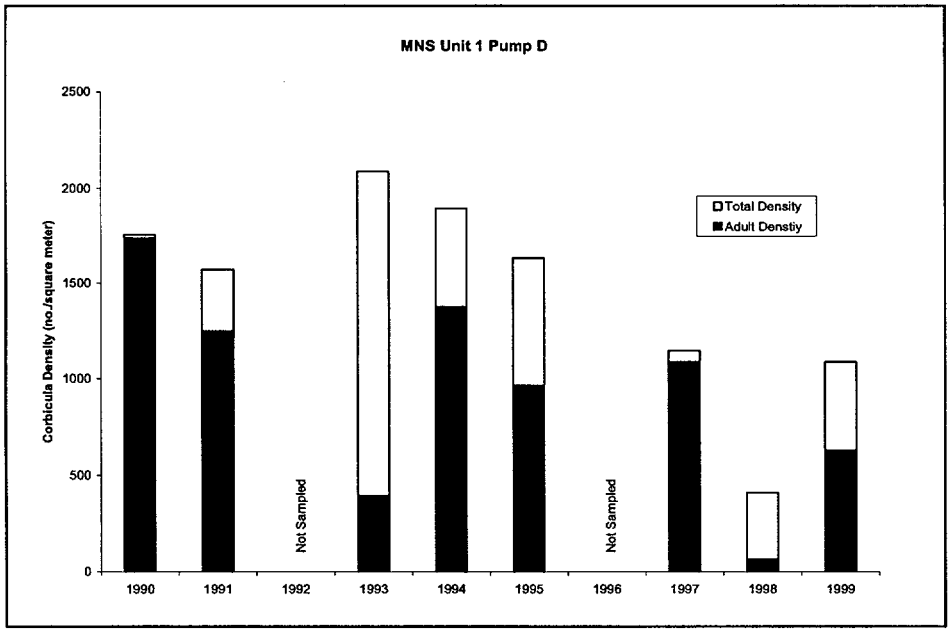


Figure 3D. (Note scale of vertical axis.)

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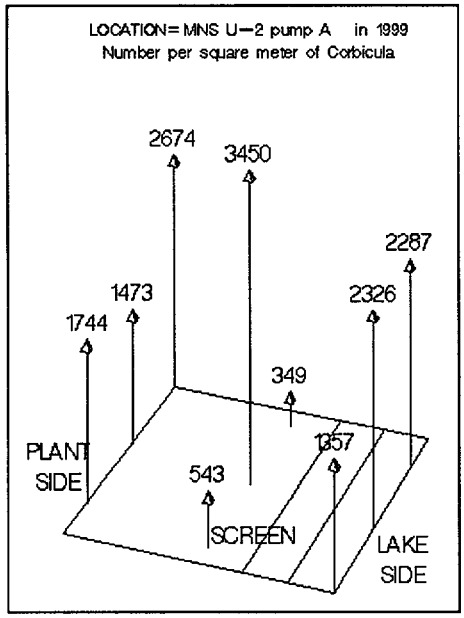

Figure 4A. Unit 2 Pump A

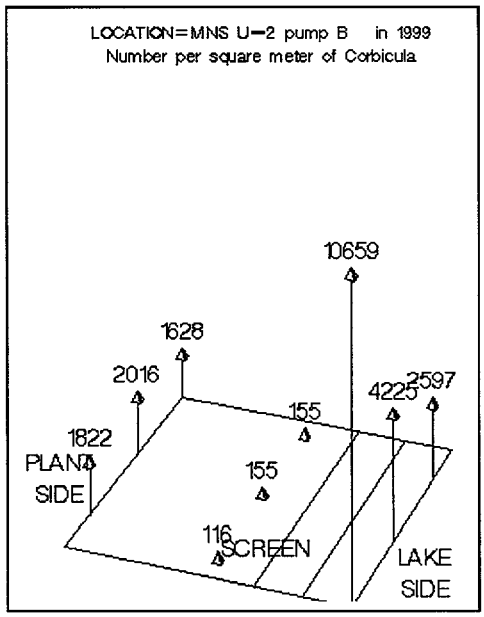

Figure 4B. Unit 2 Pump B

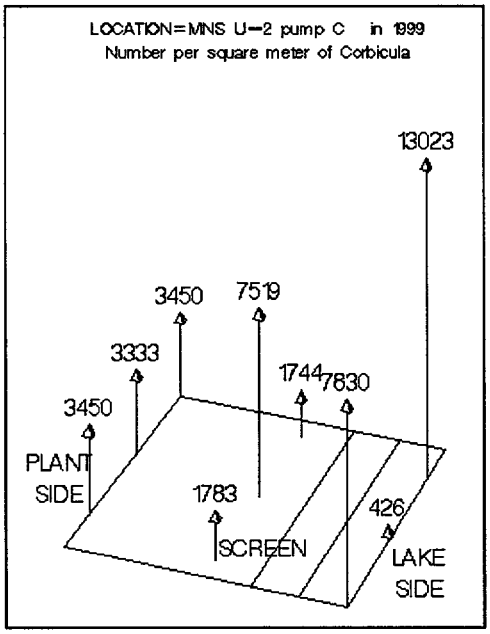

Figure 4C. Unit 2 Pump C

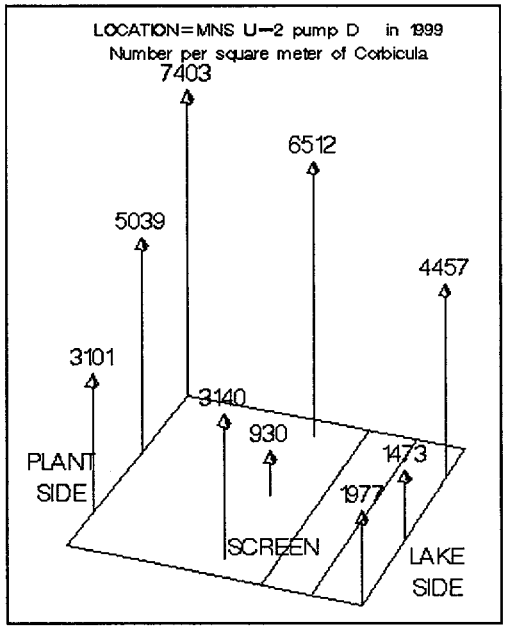

Figure 4D. Unit 2 Pump D

Figure 4. Densities (number/m^2) of *Corbicula* at sample sites in pump pits A through D of Unit 2 in June 1998.

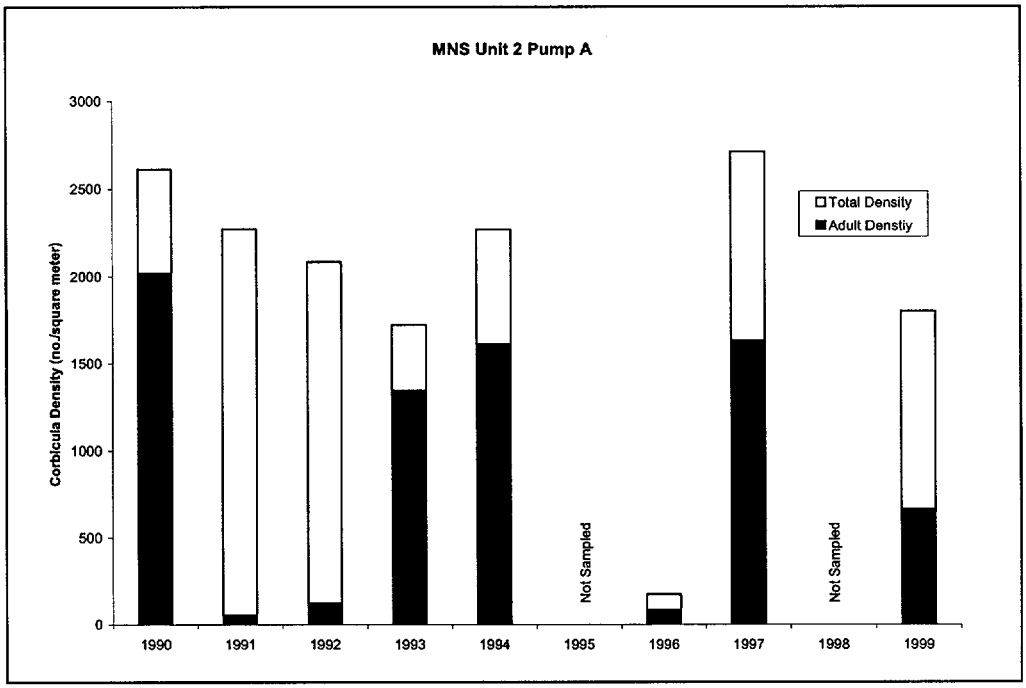

Figure 5A. (Note scale of vertical axis.)

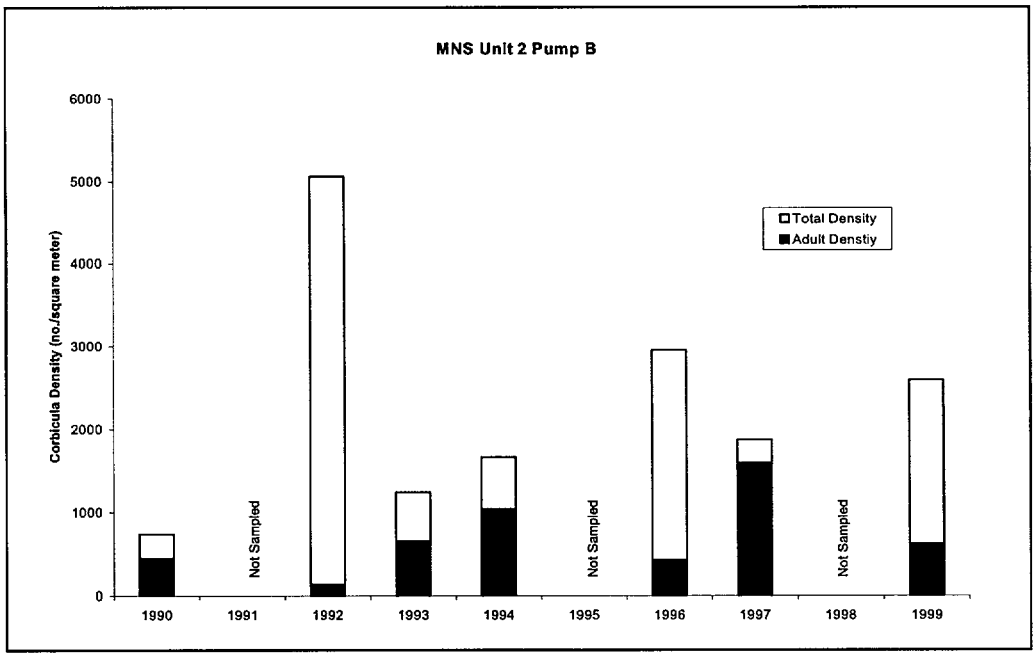

Figure 5B. (Note scale of vertical axis.)

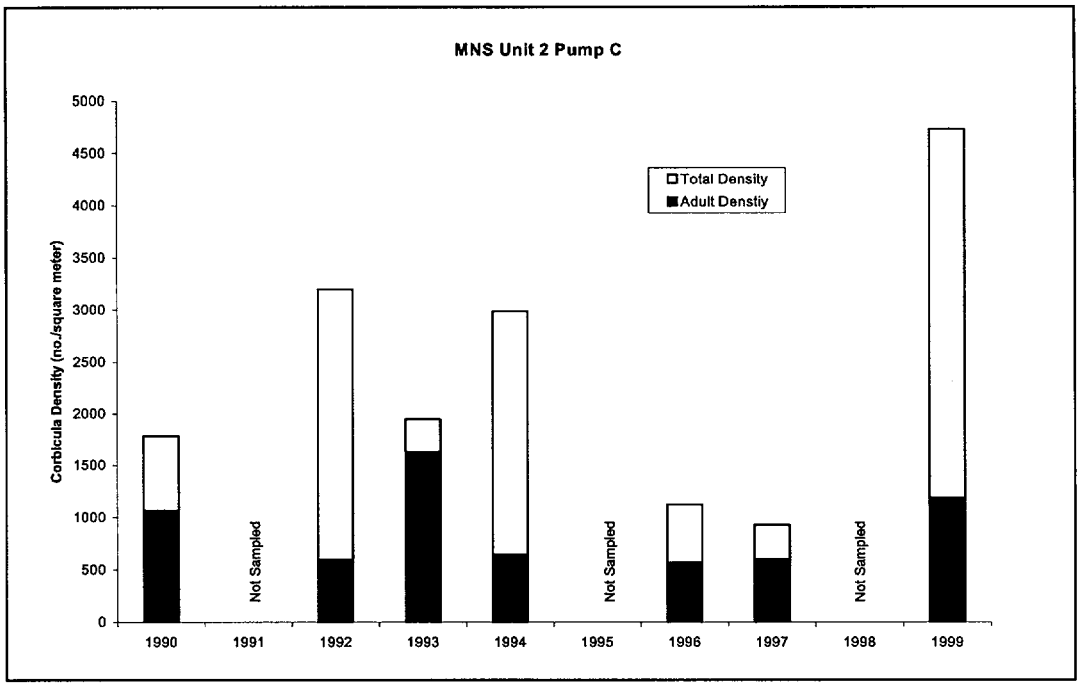

Figure 5C. (Note scale of vertical axis.)

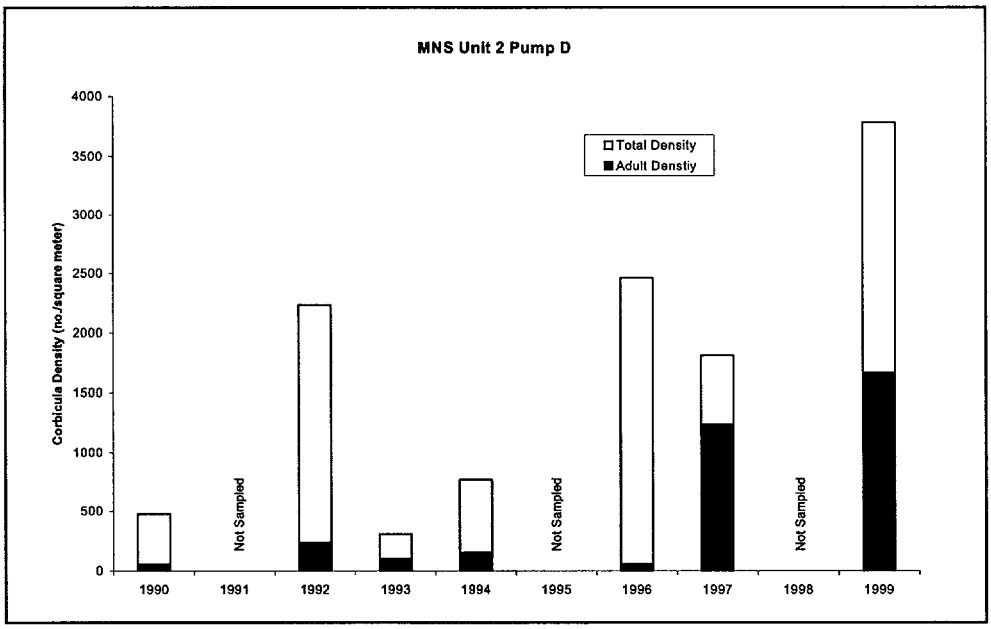

Figure 5D. (Note scale of vertical axis.)

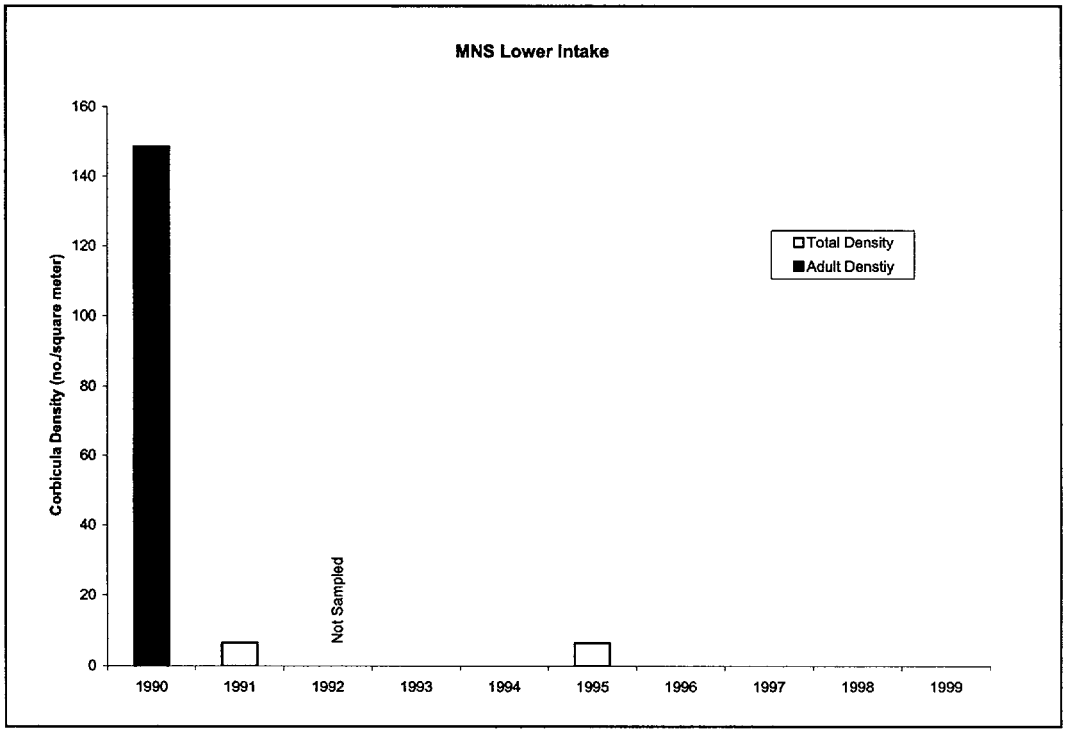

Figure 6. (Note scale of vertical axis.)

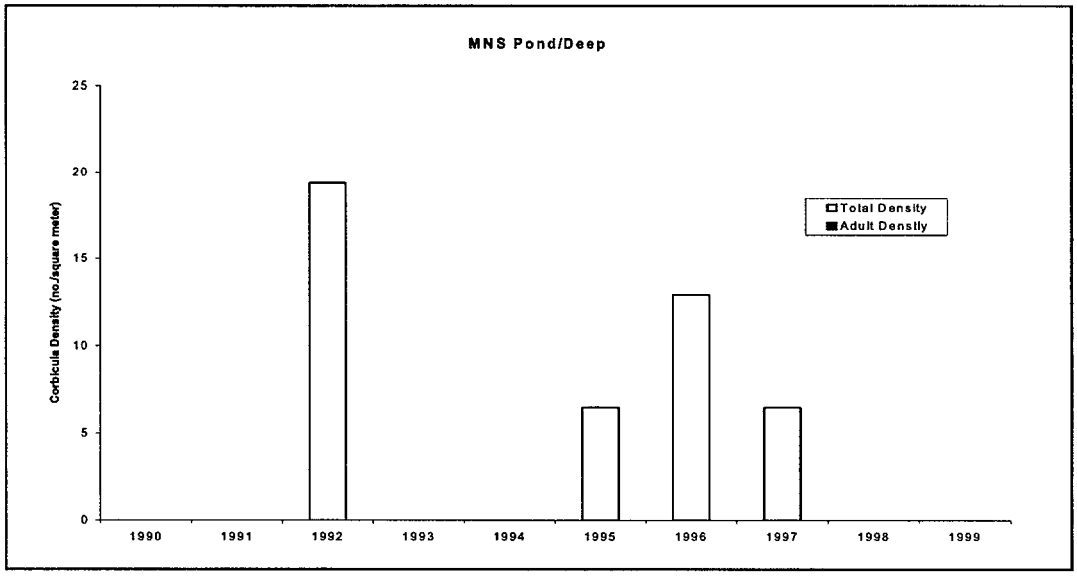

Figure 7. (Note scale of vertical axis.)

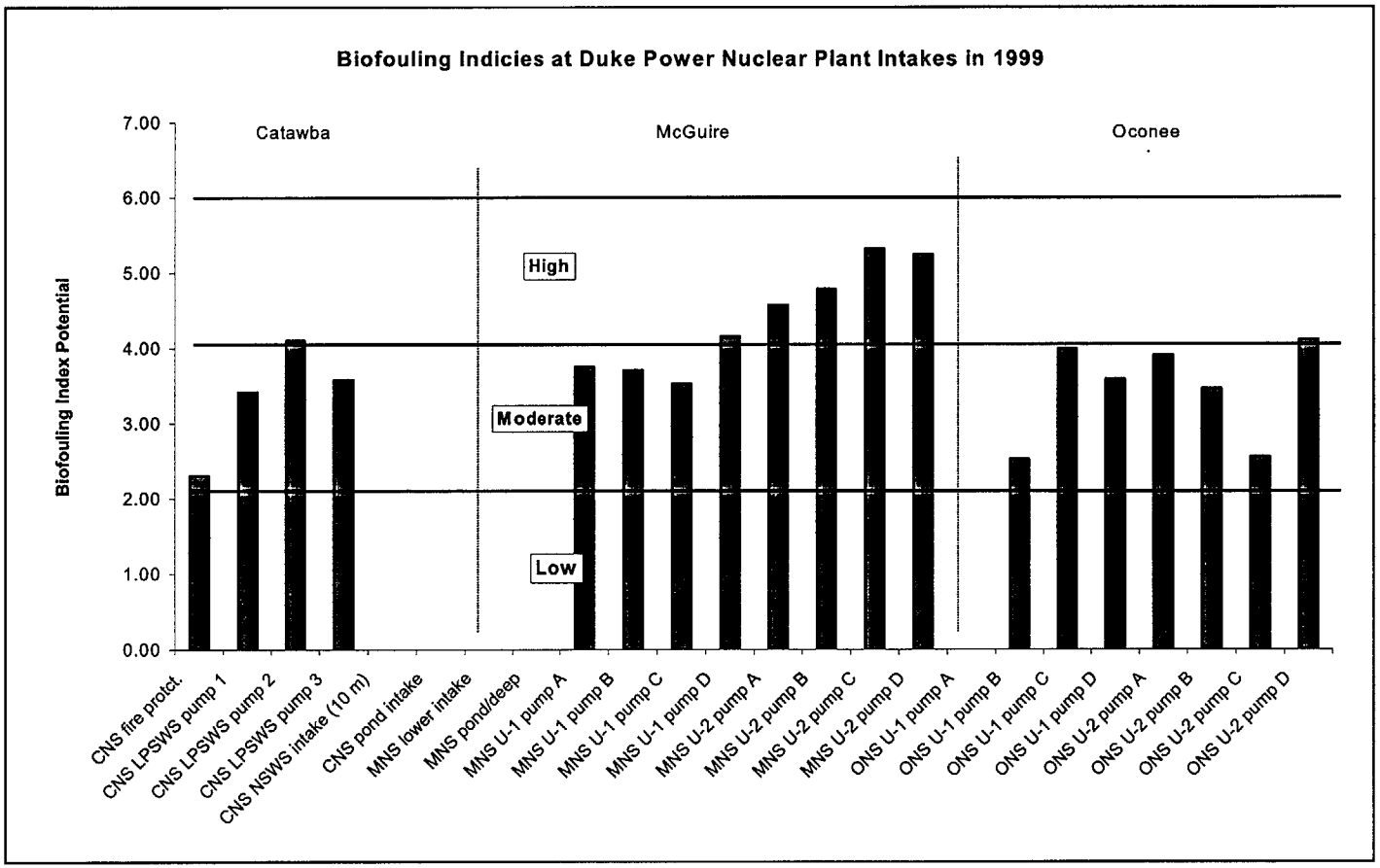

Figure 8. Biofouling potential at Duke Power nuclear plant locations sampled in 1999.

Literature Cited

Aldrige, D.W. and R.F. McMahon. 1978. Growth, fecundity, and bioenergetics in a natural population of the Asiatic fresh water clam, *Corbicula manilensis* Philippi, from north central Texas. J. Molluscan Stud. 44: 49-70.

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Dreier, H. and J. A. Tranquilli. 1981. Reproduction, growth, distribution and abundance of *Corbicula* in an Illinois cooling lake. Illinois Nat. Hist. Surv. Bull. 32: 378-393.

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Smithson, J. A. 1981. Control and treatment of Asiatic clams in power plant intakes. Proc. Amer. Power Conf. 43: 1146-1151.

Strauss, S. 1982. Good news: *Corbicula fluminea* is being brought under control. Power, July 1982. McGraw-Hill, Inc.

Williams, C .J. and R. F. McMahon. 1986. Power station entrainment of *Corbicula fluminea* (Muller) in relation to population dynamics, reproductive cycle and biotic and abiotic variables. Amer. Malac. Bull. Special Ed. 2: 99-111.

Duke Power Company
Group Environment, Health, and Safety

Corbicula Populations and Their Biofouling Potential in the McGuire Nuclear Station Intake Structures in 2000

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May 4, 2001

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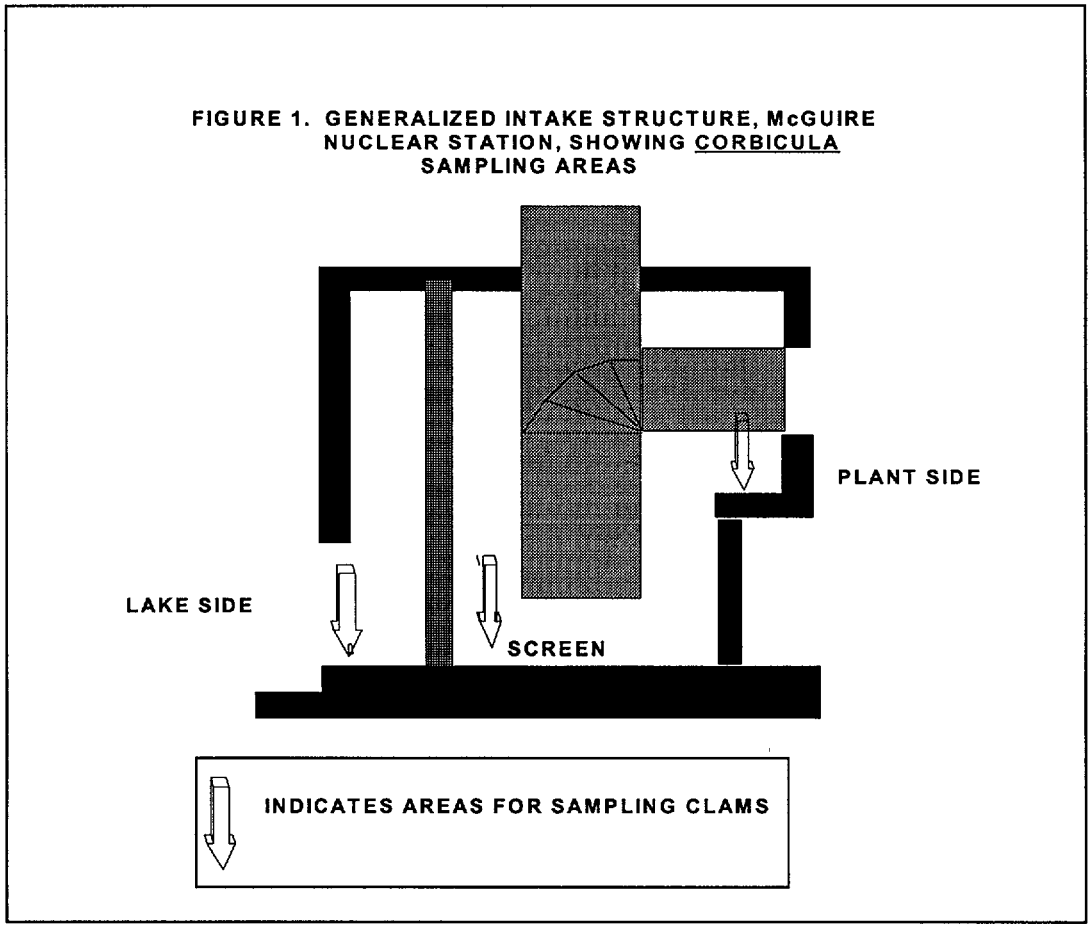
INTRODUCTION

This is an update on the population densities of the Asiatic clam, *Corbicula fluminea*, in and near Duke Power's McGuire Nuclear Station's (MNS) intake structures in 2000. The *Corbicula* population monitoring program for MNS has been ongoing since January 1990. At that time samples were collected from pump pits of the Condenser Cooling Water (CCW) intake structure and from natural substrate near the low-level intake in Lake Norman, located at the base of Cowans Ford Dam. In 1991 a location in the Standby Nuclear Service Water Pond near the low-level intake (MNS pond intake) was added to the monitoring program. Sampling *Corbicula* populations in and near the intakes of Duke's nuclear stations helps meet the requirements in the Nuclear Regulatory Commission's Generic Letter 89/13 which requires that *Corbicula* populations in each intake structure be sampled during each refueling outage, or annually. The population densities of these clams in each intake will give some indication of the biofouling potential at each station. Programs similar to McGuire's are being conducted at Catawba (CNS) and Oconee (ONS) Nuclear Stations.

METHODS

In September 2000, a Petersen grab was used to collect nine grab samples from the floor of the CCW intake structure pump pits of Unit 2 (Pumps A, B, C, and D). Three grab samples were taken in front of the traveling screens on the lake side, three just behind the traveling screens, and three along the back wall, or plant side (Figure 1). In November, six grab samples were collected from the natural substrate near the low-level intake in Lake Norman, and from the MNS standby nuclear service water pond near the low-level pond intake.

Grab samples were processed at the Environmental Center where the clams were separated from the sediment and then counted and measured to the nearest millimeter using an automated image analyzer. Clams 9 mm long or longer were classified as adults (sexually mature) and the smaller clams (<9mm) as juveniles. The density of *Corbicula* (number/m^2) for each grab sample taken in each CCW pump pit is shown in an oblique view of the bottom of the structure with the sampling locations indicated by the pyramid symbols. The height of the pyramid and the number over it indicate the density of *Corbicula* for each grab sample. Mean densities were also computed for the CCW pump pit and the low-level lake and pond intakes, and were plotted as an annual mean density. The vertical axis scales for density on all figures are specific to each graph to allow for the large range in densities.



The measure of biofouling potential used for 2000 data is the same as that used in 1998 and 1999. The index relies upon the density of adults in a population and the proportion of juveniles that would reasonably be expected to survive to adulthood. It is determined by computing the logarithm_{10} of the density of adults and adding to that the logarithm_{10} of 5% of the juvenile density. The index can range from zero up to a practical limit around seven. For example, if there were 10,000 adults and 10,000 juveniles in a sample it would result in a biofouling potential of 6.7; the logarithm_{10} of 10,000 is 4.0, and the logarithm_{10} of (.05 x 10,000) is 2.7. Densities as high as these would rarely be encountered.

RESULTS AND DISCUSSION

Corbicula Density

Unit 2

Corbicula densities (clams/m^2) in individual samples from Unit 2 pump pits varied widely, ranging from 155 to 6589 (Figure 2). Mean densities of clams in pump pits A were higher than those in any year since 1991; in pump pits B, C, and D the mean densities were within the range of those collected in recent years (Figure 3A-D). The number of adult clams was within the range of those collected since 1991 in all pump pits except A, where it was highest in 2000.

Nuclear Service Water Pond and Lake Norman Intake

Corbicula populations have historically been nonexistent or present in very low densities near the deep-water low level lake and pond intakes, and this was the case in 2000 when very few clams were found at either location (Figures 4 and 5). Typically, the water becomes anoxic in the pond below five meters in summer, preventing a buildup of a clam population in this area. Also, at the low-level intake the water may become anoxic depending on the extent of lake stratification. Belanger (1991) found that *Corbicula* populations could be totally eliminated in areas where the dissolved oxygen level is depressed.

Biofouling Potential

The biofouling indices for the MNS pump pits of Unit 2 were in the High range (Figure 6). (The biofouling potential categories were assigned arbitrarily, and will be used for historical comparisons.) Many power plants experience high densities of *Corbicula* in intake pump pits (Dreier and Tranquilli 1981; Harvey 1981; Smithson 1981), and those populations appear to be the main source of clams that cause biofouling problems. Veligers (immature, planktonic clams) carried via raw water intake systems are the ultimate source of *Corbicula* that cause biofouling problems after they settle and grow within a plant. Veligers are produced during spawning which is usually initiated at water temperatures around 16 to 20°C (61 to 68°F) and is inhibited by temperatures over 30 to 34°C (86 to 93.2°F) (Aldrige and McMahon 1978, Britton et al. 1979, Dreier and Tranquilli 1981). However, a study of *Corbicula* in Lake Wylie found that reproduction there began in late April at a temperature of 15°C (59°F), and continued until December (Duke Power Company unpublished data).

The decision to clean the CCW pump pits of the accumulated silt, detritus, and *Corbicula* should be based upon the extent of in-plant fouling problems, as well as the data presented here. Cleaning or other treatment, such as killing by deoxygenating the water, can reduce the numbers and size of the clams to the point where they do not plug tubing (Smithson 1981, Strauss 1982). However, removing these clams from the intake structures is not the complete solution because of the likelihood of *Corbicula* presence in the intake area.

Williams and McMahon (1986) found that juvenile *Corbicula* up to 2 mm long can be suspended and then carried into an intake structure by the currents in the intake canal of a power plant. They also reported that water currents produced by the pumps could roll the *Corbicula* up to 7 mm in length along the substrate toward the intake where they remain a source for future biofouling problems.

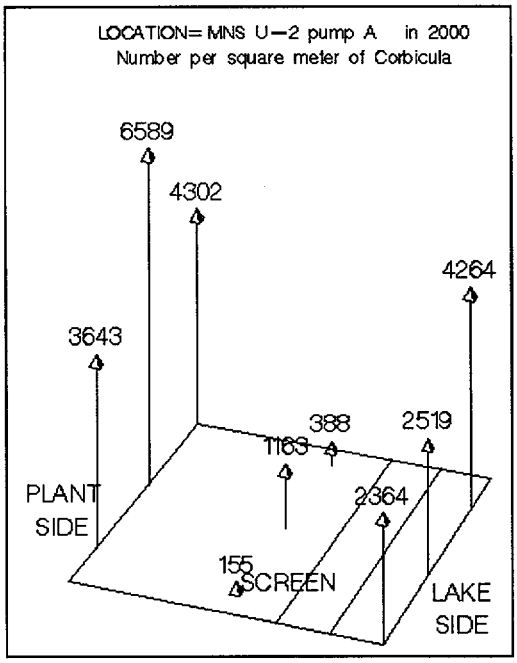


Figure 2A. Unit 1 Pump A

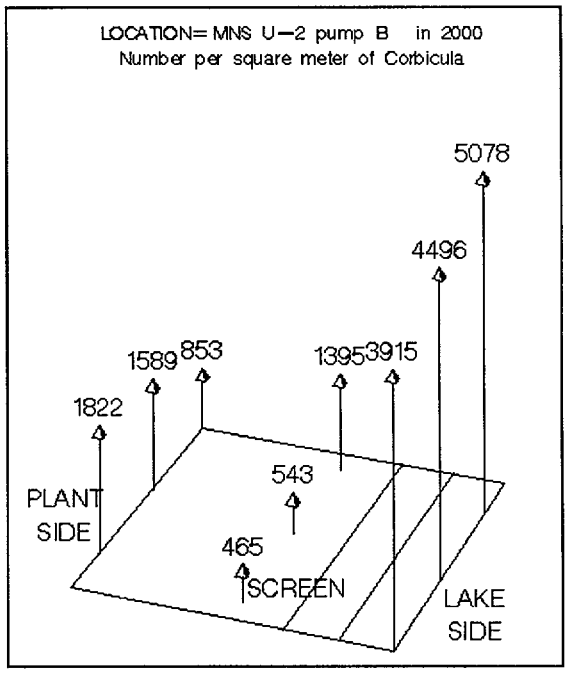


Figure 2B. Unit 1 Pump B

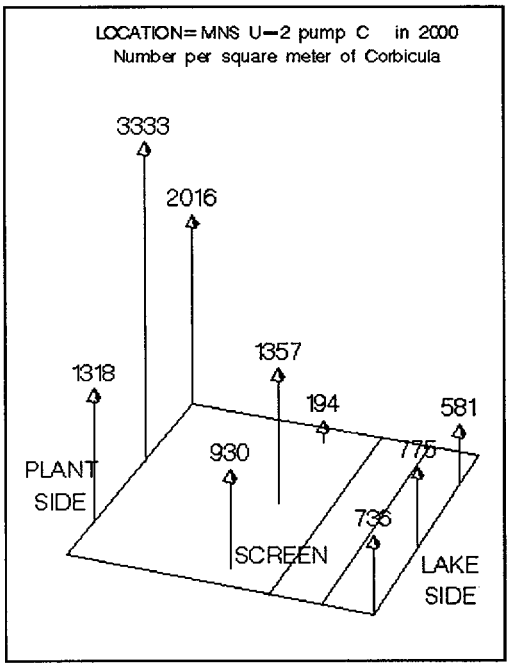


Figure 2C. Unit 1 Pump C

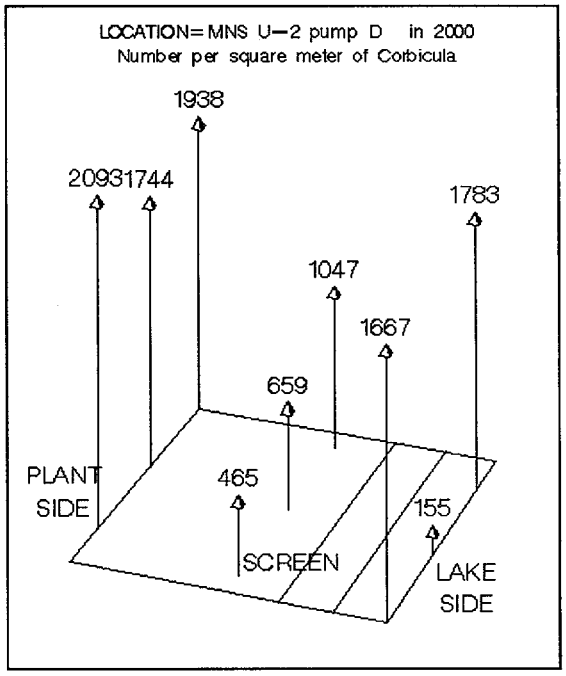


Figure 2D. Unit 1 Pump D

Figure 2. Densities (number/m^2) of *Corbicula* at sample sites in pump pits A through D of Unit 2 in September 2000.

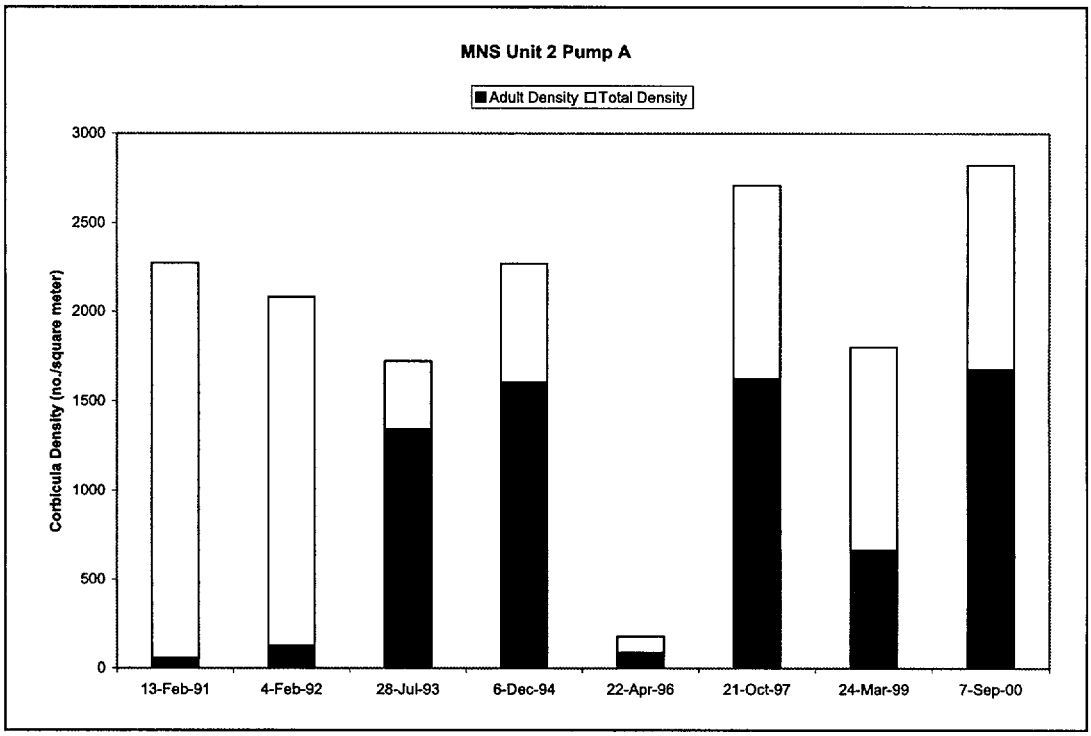


Figure 3A. Mean density of Corbicula in MNS Unit 2 Pump A on September 7, 2000. (Note scale of vertical axis.)

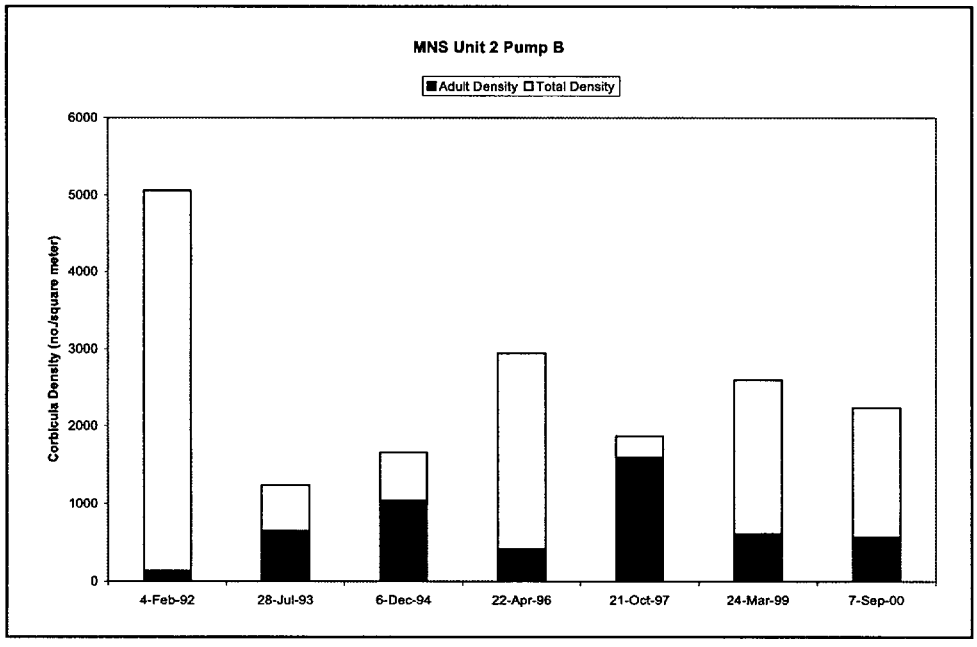


Figure 3B. Mean density of Corbicula in MNS Unit 2 Pump B on September 7, 2000. (Note scale of vertical axis.)

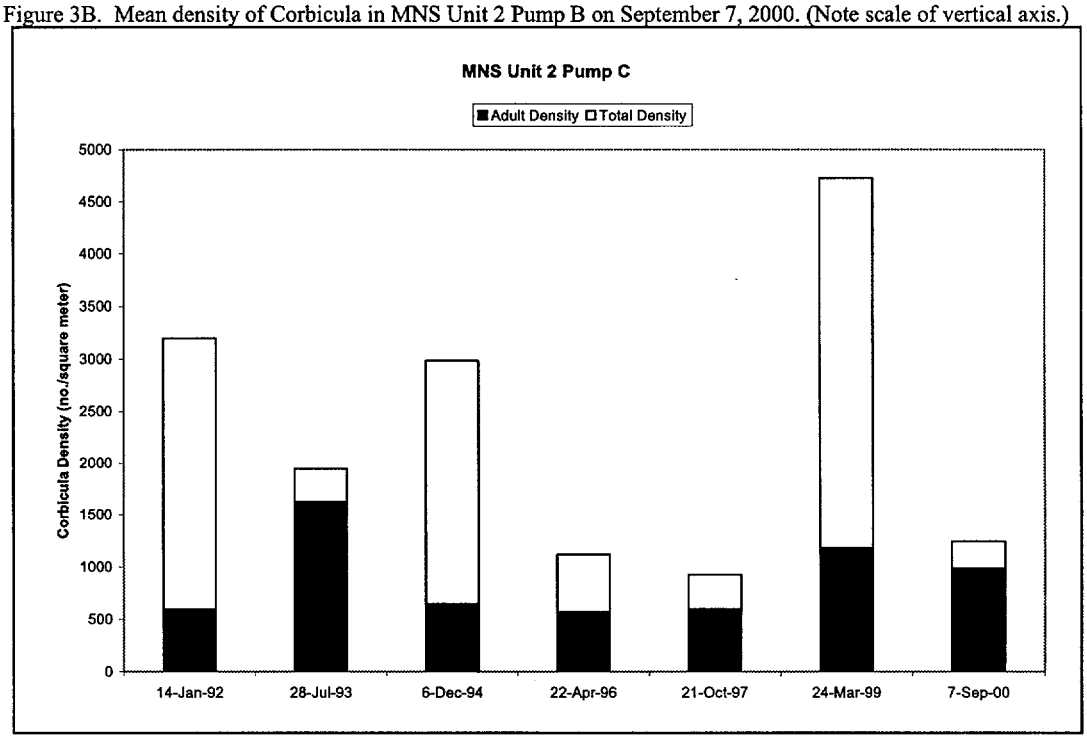


Figure 3C. Mean density of Corbicula in MNS Unit 2 Pump C on September 7, 2000. (Note scale of vertical axis.)

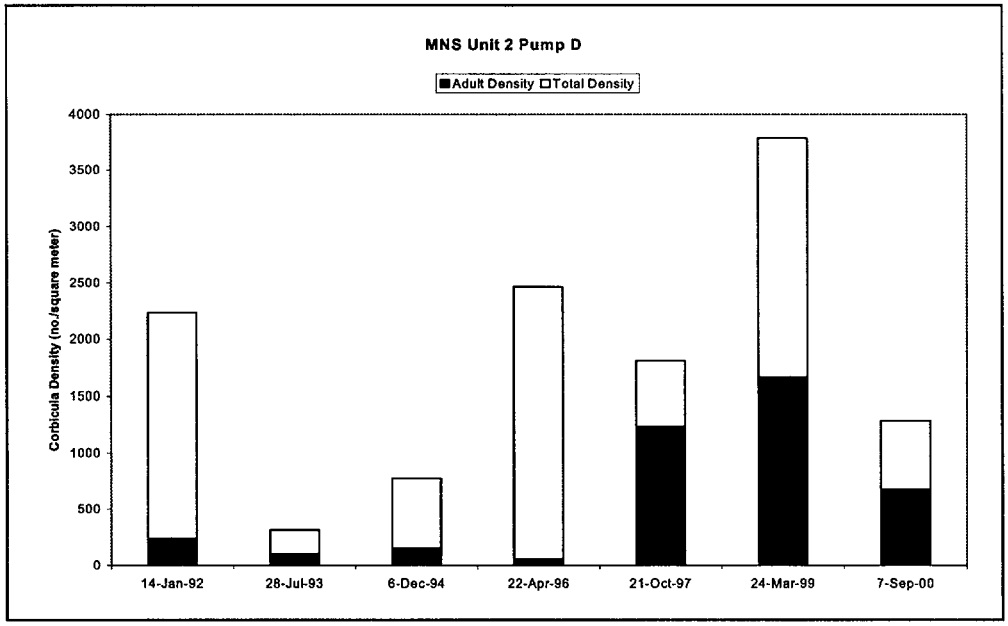


Figure 3D. Mean density of Corbicula in MNS Unit 2 Pump D on September 7, 2000. (Note scale of vertical axis.)

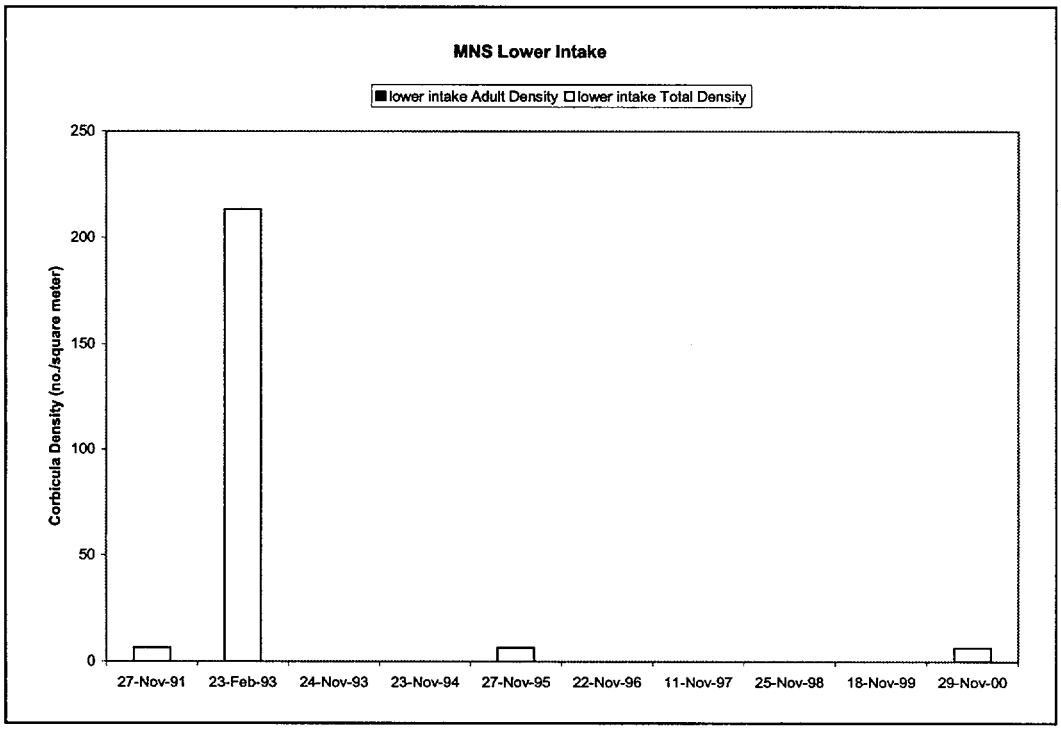


Figure 4. Mean density of Corbicula in the MNS Lower Intake on September 7, 2000. (Note scale of vertical axis.)

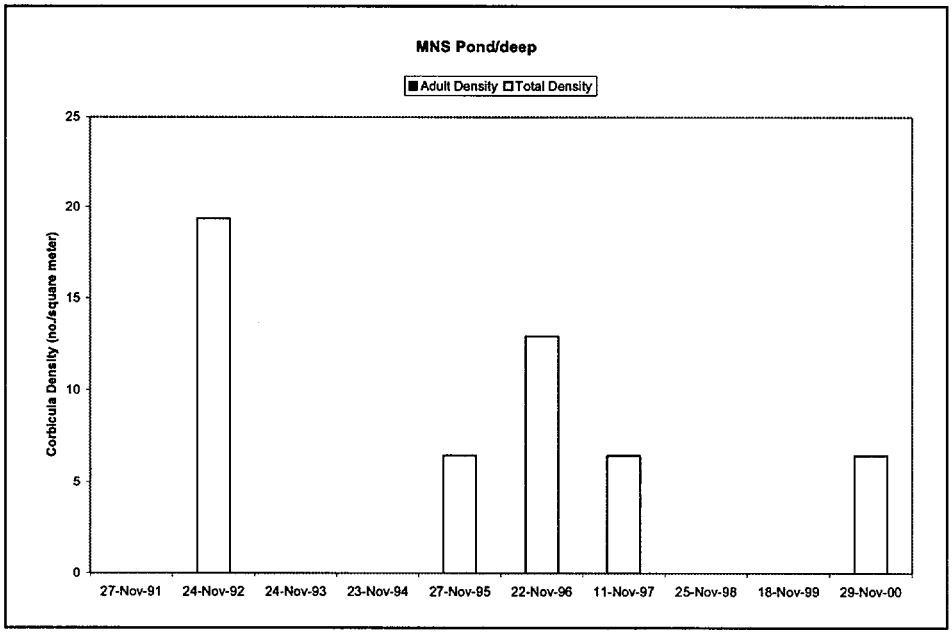


Figure 5. Mean density of Corbicula in MNS Pond/Deep on September 7, 2000. (Note scale of vertical axis.)

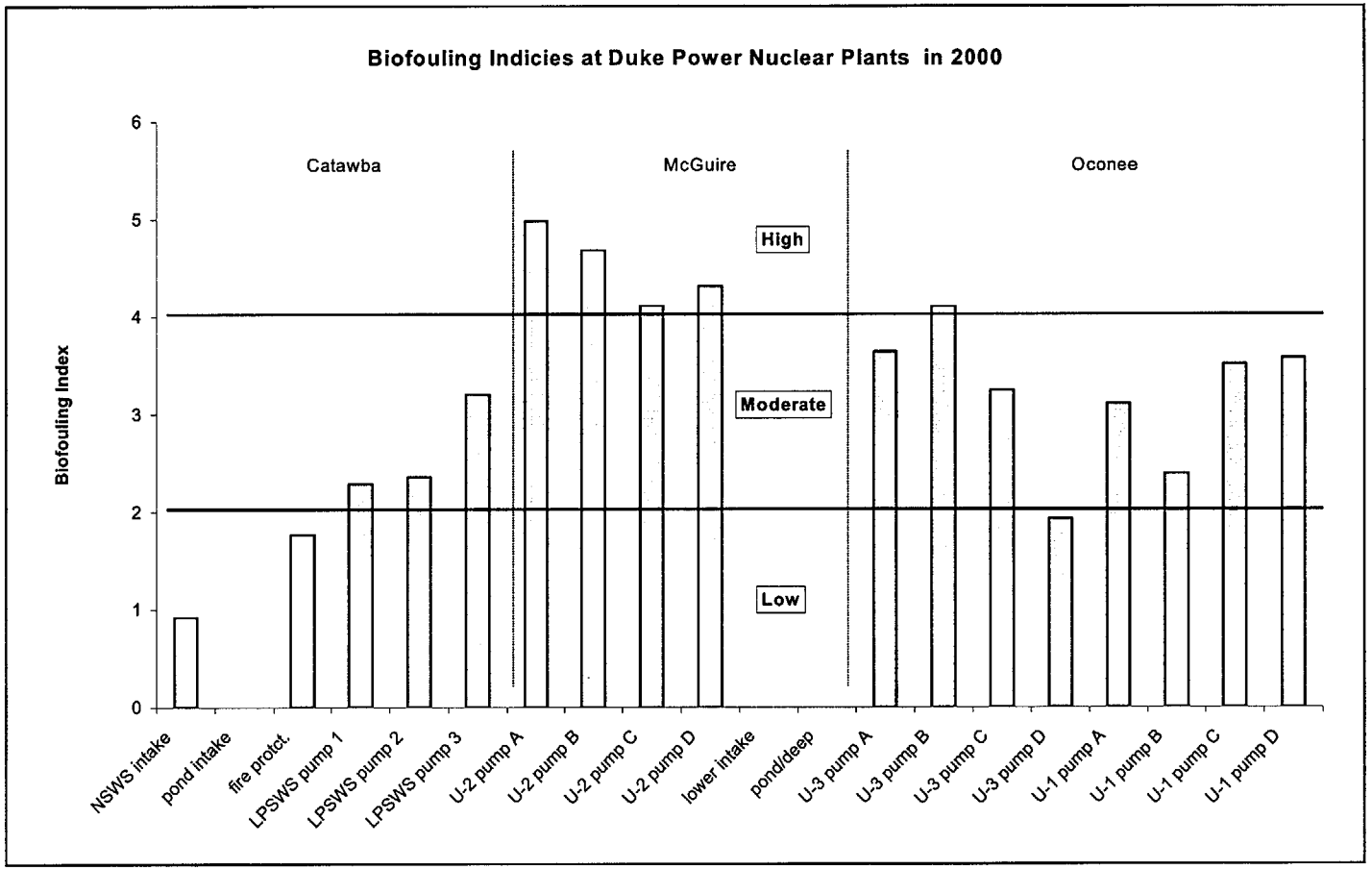


Figure 6. Biofouling potential at Duke Power nuclear plant locations sampled in 1999.

Literature Cited

Aldrige, D.W. and R.F. McMahon. 1978. Growth, fecundity, and bioenergetics in a natural population of the Asiatic fresh water clam, *Corbicula manilensis* Philippi, from north central Texas. J. Molluscan Stud. 44: 49-70.

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Environmental RAI 10
Describe Duke's program for remaining cognizant of listed species that occur or may occur in the future in the Exclusion Area and transmission line rights-of way (ROWs). This description should include the following:

- the cooperative agreements/programs with federal, state, local agencies, and/or Universities, etc., that result in site surveys and inspections during which the occurrence of such species could be documented;

- the Atlas database system that tracks such species on the transmission line ROWs;

- the process by which Duke's Atlas information is incorporated into the state Natural Heritage Database program;

- the process whereby Duke would communicate knowledge of federally threatened (e.g., Georgia aster [Aster georgianus]) or endangered species (e.g., Schweinitz's sunflower [Helianthus schweinitzii]) to the U.S. Fish and Wildlife Service, should such species become established in the Exclusion Area or transmission line ROWs.

The description should include cooperative agreements and programs with Federal, State, and local agencies and universities, etc., that facilitate the protection, monitoring, and/or management of listed species, in particular, Georgia aster and Schweinitz's sunflower.

Responses to Environmental RAI 10
Describe Duke's program for remaining cognizant of listed species that occur or may occur in the future in the Exclusion Area and transmission line rights-of-way (ROWs). This description should include the following:

-the cooperative agreements/programs with federal, state, local agencies, and/or Universities, etc., that result in site surveys and inspections during which the occurrence of such species could be documented;

Duke works cooperatively with Mecklenburg Parks and Recreation (MP&R), South Carolina Department of Natural Resources-Heritage Trust Program (SCDNR), and Winthrop University Endangered Species Program to enhance protected plant populations on ROWs. Duke has, in the past, worked with North Carolina Department of Environment and Natural Resources -Natural Heritage Program, University of North Carolina-Charlotte, University of South Carolina-Spartanburg, and Winthrop University to manage or protect selected sections of ROWs (none associated with the licensing of McGuire Nuclear Station) which contain rare and diverse plant communities. Duke performs certain vegetation maintenance activities on ROWs and other lands in collaboration with interested groups to enhance

protected species populations. Duke participates in county natural heritage surveys in its service area and maintains close working relations with State Agencies and local botanical experts thus ensuring that new records of listed species are noted. The cooperative efforts have been largely the result of partnering, but on rare occasions have resulted from required permitting activities.

-The Atlas database system that tracks such species on the transmission line ROWs;

The Atlas database system is a Geographic Information System that is used to manage Duke's transmission system. It includes information on transmission structures, property ownership, access, acreage, surface waters, ROW widths and protected species, among other parameters. This system is used to specify vegetation maintenance practices in ROWs . Special maintenance activities are noted in the span-by-span description of the ROW, whether is by special request of the property owner or for the location of a stream or protected species. Additionally, maintenance restrictions are identified in the field by signage. In-field signage and restrictions documented in the Atlas system (maps and restrictions provided to contractors prior to maintenance) are used to ensure that contractors do not impact protected plant populations during maintenance.

-The process whereby Duke would communicate knowledge of federally threatened (e.g. Georgia aster (Aster georgianus)) or endangered species (e.g., Schweinitz's sunflower (Helianthus schweinitzii)) to the U.S. Fish and Wildlife Service, should such species become established in the Exclusion area or transmission line ROWs.

Protected species of the Piedmont Carolinas are almost exclusively limited to specialized soils. Georgia aster and Schweinitz's sunflower are almost always found on Iredell soils which are not located in the Exclusion area or McGuire transmission ROWs. The Exclusion area and ROWs have been extensively inventoried for rare species and none have been found. It is unlikely that protected species would colonize these areas; therefore, Duke plans no periodic inventories of the site.

Special plant communities or protected species locations on other Duke sites have been recorded with the appropriate state natural heritage program. In the past, these locations have been identified by 1) a botanical expert (sometimes hired by Duke) that finds a new record and reports the location to Duke and the appropriate natural heritage program, 2) a Duke biologist finds new record and notifies state natural heritage biologist for verification and recording, or 3) state and Duke biologist find a new record during cooperative inventories and the state biologist records the site. State biologists typically take the lead in managing and recording state and federally listed species in North and South Carolina. The state natural heritage databases are available on the Internet for the U.S. Fish and Wildlife Service. Should a protected species be discovered in the McGuire Exclusion Area or associated ROWs, Duke

will notify the North Carolina Natural Heritage Program and the U.S. Fish and Wildlife Service and seek their advice on developing a protection plan for the area.

-the description should include cooperative agreements and programs with Federal, State, and local agencies and universities, etc., that facilitate the protection, monitoring, and/or management of listed species, in particular, Georgia aster and Schweinitz's sunflower.

Duke has working agreements (but no formal agreements) with Mecklenburg Parks and Recreation to manage several ROWs that contain smooth coneflower, Schweinitz's sunflower, and Georgia aster in North Carolina. Duke works cooperatively with SCDNR and and Winthrop University Endangered Species Program to manage three ROW areas near Rock Hill, South Carolina that contain rare prairie species including Schweinitz's sunflower and one population of Georgia aster. These partnering efforts serve to enhance existing populations and habitats.

There was no question number 11 included in the Requests for Additional Information letter dated November 19, 2001.

Environmental RAI 12
Describe the history of bird electrocutions and collisions involving the transmission lines from McGuire Units 1 and 2 to the switchyard. Describe the distances between the separation of phases and separation of phase-to-ground components for the 230 kV and 525 kV lines. Describe the stream and pond crossed by the transmission lines (see Figure 2 in Attachment D of the ER) in terms of their potential to support waterfowl and to provide food resources for raptors. Qualitatively describe the numbers of waterfowl and raptors known to use these areas. Finally, describe any modifications made to the transmission lines (e.g., aviation balls) to make them more visible and hence minimize collisions.

Responses to Environmental RAI 12
Describe the history of bird electrocutions and collisions involving the transmission lines from McGuire Units 1 and 2 to the switchyard.

There is no indication that the transmission lines from McGuire to the switchyard, or for that matter any transmission or distribution lines in the vicinity of McGuire are, or have had, a deleterious impact on birds. Compelling data and anecdotal evidence supporting this ' no impact' conclusion is based on the following:

a). The have been no reports of dead or injured birds found along these transmission lines.

b). Duke Power has a Migratory Bird Depredation Permit (MB000257-0) issued by the federal government as well as separate permits issued by the NC and SC wildlife departments. One of the federal permit requirements is that Duke Energy report any migratory bird (the only birds excepted are 3 exotics - English sparrow, European starling, pigeon) that has been found dead around Duke facilities or any active nest that must be relocated. Duke Energy crews who perform regularly scheduled preventative maintenance on the McGuire transmission lines and switchyard instrumentation fill our these reports detailing their work and that report has a specific section to document any bird related outages or 'line trips'. These reports are queried quarterly, printed, and copies sent to the US Fish and Wildlife Service (USFWS) in Atlanta. Annual reports are also sent to the USFWS as well as the North Carolina Wildlife Resources Commission in Raleigh, NC and the South Carolina Department of Natural Resources in Columbia, SC as part of the annual permit application process. There has been no data whatsoever to suggest there is any McGuire bird electrocution or collision problem.

c). In 1998 Duke Energy Corporation established a 24-hr Migratory Bird Hot Line (1-800-573-3853) to help company employees address bird encounters during the course of their day-to-day work. This Hotline is monitored by two wildlife biologists and in the event there is a bird-related incident, the biologist provides the field crew with scientifically-based information intended to assist the bird and if the situation dictates, the biologist also notifies state and federal agencies. There have been no calls or notifications indicating avian-related problems with the McGuire transmission lines or at any crossings of streams or ponds or in any of the habitats the line traverses.

d). Another safeguard in monitoring the impact of transmission lines on birds is the helicopter patrol Duke Energy performs on the entire transmission system twice each year. If there was any increased incidence of bird fatalities being caused by collisions with the McGuire wires, this would likely be discovered during these normal helicopter inspections.

Describe the distances between the separation of phases and separation of phase-to-ground components for the 230 kV and 525 kV lines.

The following table shows the minimum phase-to-ground and phase-to-phase clearances for the 230-kV and 525-kV structures at McGuire. These clearances are the closest distances between any ground point and any energized point and includes the attachment hardware. Therefore, the minimum distance between any wire and ground would be about 1 foot more than the distances shown.

Type of Structure	Minimum Phase-to-Ground Clearance	Minimum Phase-to-Ground Clearance
Typical 525-kv Tower	14 feet	35 feet
Typical 230-kV Tower	8 feet	23 feet
McGuire 230-kV Busline Structure	8 feet	33.5 feet

It is readily apparent that the phase-to-ground and the phase-to-phase spans are greater than the wing span of all raptors in the area. Ospreys do frequent the Lake Norman area, but prefer nesting in site of the lake and their wingspans are generally 6 ft. or less. The only other raptor with a wingspan that could even conceivably span the line clearances is the Bald Eagle. These birds however seldom ever have a wingspan greater than 90 inches. Additionally, Bald Eagles are infrequently observed in the Lake Norman area and there are no known nest sites within 60 miles of McGuire.

Describe the stream and pond crossed by the transmission lines (see Figure 2 in Attachment D of the ER) in terms of their potential to support waterfowl and to provide food resources for raptors. Qualitatively describe the numbers of waterfowl and raptors known to use these areas.

The stream shown in Figure 2 of ER Attachment 2 is very small and thus it is difficult to imagine it attracts any significant numbers of waterfowl. The pond, with its open water environment, does attract some ducks and geese. The riparian buffer around the pond is wooded only on one side and the overall pond boundary is surrounded by McGuire buildings, lay down yards, heavy used highways, and parking lots. No assessment of the potential of the stream and pond crossed by the transmission lines to support waterfowl or provide food for raptors has been performed. No study has been performed that would identify the numbers of waterfowl or raptors known to use these areas.

Finally, describe any modifications made to the transmission lines (e.g., aviation balls) to make them more visible and hence minimize collisions.

There is minimal aquatic habitat in the line crossing areas. Additionally, the probability of bird electrocution and strikes is minimized by the fact that the McGuire to the switchyard transmission lines are relatively short (3300 ft. for the 525-kV and 4000 ft. for the 230-kV lines). These lines do not span what would be considered as high quality waterfowl or aquatic raptor habitat. Waterfowl are not routinely crossing the McGuire transmission lines to access feeding and nesting areas, nor are there topographic features, distractive lighting, or agricultural crops that would obscure the lines or attract birds to the area. Because of these facts, there is no reason to add aviation balls, flight diverters, etc. to make the lines more visible.

Environmental RAI 13
Describe the programs (Duke's own program or those in cooperation with Federal, State, and local agencies and universities, etc.) in place to enhance and/or set aside habitat to benefit wildlife, particularly migratory birds, on and in the vicinity of the McGuire site.

Response to Environmental RAI 13
The following programs have been established to benefit avian and other wildlife populations in the vicinity of McGuire:

a). Over 30 bluebird houses have been installed in the vicinity of McGuire and are monitored annually by McGuire employee volunteers. Each year approximately 10 new bluebird boxes are added continually increasing the size of the nesting box program.

b). Acres of food plots, including strip plots in power line rights-of-way, have been planted, and are maintained to attract wildlife including songbirds, doves, goldfinches, fox, deer, and turkeys. Food plots include sorghum, sunflowers, rye, wheat, and clover. A selective mowing program has been implemented to further enhance wildlife habitat.

c). In 1996 Duke Power in conjunction with the Wild Turkey Federation released ~15 birds that are commonly observed frequenting the food plots, rights-of-way, and the bottomland hardwood areas around McGuire. Young turkeys are also being observed each year; evidence that the flock size is increasing. As mentioned earlier, food plots are maintained to help increase the flock and in excess of 100 sawtooth oaks have been planted near the McGuire switchyard to provide mast.

d). Beginning in the mid-1980's, in cooperation with the Carolina Raptor Center, an osprey hacking site was established on McGuire property near Cowans Ford Dam. For 3-4 consecutive years, coastal NC ospreys were hacked and nesting platforms were also installed around the southern end of the lake to attract returning adults each spring. Because of these hacking and nesting platform initiatives, there is an abundant osprey population on Lake Norman. Nesting sites are inventoried by Duke scientists on a yearly basis.

e). A great blue heron rookery exists on a Davidson Creek island in Lake Norman approximately 3 miles north of McGuire. This heronry contains approximately 35 nests each year. The island was was deeded by Duke Energy Corporation to the NC Wildlife Resources Commission (NCWRC). The island is managed under the NCWRC Colonial Waterbird Nesting Area program. In cooperation with NCWRC wildlife biologists and law enforcement agents, Duke Power scientists periodically monitor the heronry as well as help post the island with signage that prohibits entry during the nesting season of

April 1-August 31.

f). McGuire received WAIT™ certification this year from the NC Wildlife Federation for the station's progressive wildlife enhancement programs. Wildlife And Industry Together (WAIT™) is a program of the South Carolina Wildlife Federation in partnership with Duke Energy, the South Carolina Department of Natural Resources and the National Wild Turkey Federation. WAIT™ is designed to encourage corporate landowners to integrate wildlife habitat needs into corporate land management decisions.

g). The 668-acre Cowans Ford Wildlife Refuge (sold by Duke Power to the Mecklenburg County Parks and Recreation Department) and the Cowans Ford Waterfowl Refuge (jointly owned by Duke Power and the counties of Gaston, Lincoln, and Mecklenburg) are located directly south of McGuire along the eastern and western shores of Mountain Island Lake from Cowans Ford Dam to Riverbend Steam Station. These areas, as well as adjacent lands, are lined with bottomland hardwood forests and other habitats that support nearly 200 species of birds, 54 which are geotropically migrants. Because of this rich avian diversity, the lands from Cowans Ford to Mt. Island Lake have been officially designated as Important Bird Areas (IBA) by the National Audubon Society. Duke Energy Corporation scientists routinely work with county and state biologists in conducting avian inventories of these areas as well as leading public bird-watching tours.