Question 1:

"Please provide any new information acquired from pre-construction biological studies that has not been reported previously."

CP&L Response:

Two copies of the first annual report on the Harris Site baseline biological study have been sent to the AEC Staff. The report, "Baseline Biota of the Shearon Harris Nuclear Power Plant Study Area." was prepared by Aquatic Control Incorporated.

## Aquatic Ecology

Question 3:

Please supply a copy of the North Carolina Water Quality Standards and all other criteria that relate numerically to the ions listed in No. 2. You will also need to furnish us evidence of compliance with Section 401 of FWPCA related to Water Quality Certification.

CP&L Response:

A copy of the "Rules, Regulations, Classifications and Water Quality Standards Applicable to the Surface Waters of North Carolina" is enclosed.

State standards do not provide numerical limits on all ions that will be present in lake water.

The North Carolina Board of Water and Air Resources passed a resolution on December 20, 1973, instructing staff to issue Water Quality Certification for the 4,000 acre make-up pond and cooling towers. As soon as the Certification is received, copies will be provided to AEC.

# RULES, REGULATIONS, CLASSIFICATIONS

# AND

# WATER QUALITY STANDARDS APPLICABLE

# TO THE

# SURFACE WATERS OF NORTH CAROLINA

Adopted By

BOARD OF WATER AND AIR RESOURCES

DEPARTMENT OF WATER AND AIR RESOURCES

Raleigh, North Carolina

NORTH CAROLINA

BOARD OF WATER AND AIR RESOURCES

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# RULES, REGULATIONS, CLASSIFICATIONS AND WATER QUALITY STANDARDS APPLICABLE TO THE SURFACE WATERS OF NORTH CAROLINA.

The Declaration of Policy, as set forth in Section 211, Article 21, Chapter 143 of the General Statutes of North Carolina (Chapter 606, Session Laws of 1951) as amended, reads as follows: "It is hereby declared to be the public policy of this State to provide for the conservation of its water and air resources. Furthermore, it is the intent of the General Assembly, within the context of this Article to achieve and to maintain for the citizens of the State a total environment of superior quality. Recognizing that the water and air resources of the State belong to the people, the General Assembly affirms the State's ultimate responsibility for the preservation and development of these resources in the best interest of all its citizens and declares the prudent utilization of these resources to be essential to the general welfare. It is the purpose of this Article to create an agency which shall administer a program of water and air pollution control and water resource management. It is the intent of the General Assembly, through the duties and powers defined herein, to confer such authority upon the Board of Water and Air Resources as shall be necessary to administer a complete program of water and air conservation, pollution abatement and control and to achieve a coordinated effort of pollution abatement and control with other jurisdictions. Standards of water and air purity shall be designed to protect human health, to prevent injury to plant and animal life, to prevent damage to public and private property, to insure the continued enjoyment of the natural attractions of the State, to encourage the expansion of employment opportunities, to provide a permanent foundation for healthy industrial development and to secure for the people of North Carolina, now and in the future, the beneficial uses of these great natural resources."

In accordance with the declaration of policy and under authority of Article 21, Chapter 143, General Statutes of North Carolina (Chapter 606, Session Laws of 1951), and pursuant to public hearings duly called and held at the places and on the dates designated in notices published as required by Statute, Rules, Regulations, Classifications and Water Quality Standards Applicable to the Surface Waters of North Carolina were adopted by the State Stream Sanitation Committee of North Carolina, on November 19, 1953.

In accordance with the above declaration of policy and under authority of Article 21, Chapter 143, General Statutes of North Carolina, as amended, and pursuant to public hearing duly called and held at the place and on the date designated in notice published as required by Statute, the Rules, Regulations, Classifications and Water Quality Standards Applicable to the Surface Waters of North Carolina amended and adopted by the Board of Water and Air Resources, on January 30, 1968, are hereby amended and adopted by the Board of Water and Air Resources as set forth in the accompanying rules and regulations, this the 13th day of October, 1970.

BOARD OF WATER AND AIR RESOURCES

Raleigh, North Carolina

## RULES APPLICABLE TO

## CLASSIFICATIONS AND WATER QUALITY STANDARDS

RULE NO. I. - The Board of Water and Air Resources, prior to classifying and assigning standards of water quality to any specifically designated waters of the State, will proceed as follows:

1. The Board will designate and define the specific limits of each separate major watershed within the State to be studied for the purpose of classifying and assigning water quality standards to the waters or segments of waters therein.

2. The Board will direct its staff to have studies made of the designated waters to obtain the essential data and facts required for consideration in determining the proper classification of such waters or segments of waters under consideration.

3. The Board will direct its staff to have a report of the findings of such studies prepared and distributed or otherwise made available so far as practicable to all parties having specific interests in the classification of the designated waters. Such report shall contain recommendations as to classification of such waters or segments thereof, together with the standards of water quality which apply to the various classifications recommended.

4. The Chairman of the Board, or the Board, will designate one or more of its members as Hearing Examiner or Examiners to conduct a public hearing on the matter of classifying and assigning standards of water quality to the waters under consideration and will specify the date, time and place for holding each public hearing.

5. The Board will give due notice of such hearing or hearings in accordance with the requirements of General Statute 143-214.1.

6. The Hearing Examiner or Examiners will, as soon as practicable after the completion of the hearing, submit a complete report of the proceedings of the hearing, together with recommendations to the Board for disposition of the matter under consideration. The report shall be accompanied by a transcript of testimony presented at such public hearing, together with exhibits, a summary of relevant information from the results of stream studies conducted by the technical staff of the Board, and final recommendations as to classification of the designated waters or segments thereof and the standards of water quality which should be applied to each classification recommended.

7. The Board, after due consideration of the hearing records and the final recommendations of the Hearing Examiner or Examiners, will adopt its final action with respect to the assignment of classifications applicable to the identified waters under consideration and will publish such action, together with the effective date for the application of the provisions of General Statute 143-215.1 and General Statute 143-215.2, as amended, as a part of the Board's official regulations.

8. The final action of the Board with respect to the assignment of classification with its accompanying standards shall contain the Board's conclusions relative to the various factors given in General Statute 143-214.1(d), and shall specifically state:

a. The best usage in the interest of the public for such specifically identified waters or segments thereof, in accordance with the provisions of the Statute.

b. The class or classes to which such specifically designated waters in the watershed or watersheds shall be assigned.

c. The standards of water quality which shall be assigned to each classification to which the specifically identified water or segments thereof are assigned.

<u>RULE NO. II.</u> - The series of classifications and water quality standards applicable to each such classification, as adopted by the Board of Water and Air Resources, will be used by the Board for the purpose of assigning an appropriate classification to each separately identified water or segment thereof which the Board believes to be of sufficient importance to justify classification or control.

<u>RULE NO. III.</u> - Tests or analytical procedures to determine conformity or nonconformity with standards will, insofar as practicable and applicable, be made in accordance with the methods given in the latest edition of "Standard Methods for the Examination of Water and Wastewater", published by the American Public Health Association, American Water Works Association, and Water Pollution Control Federation or the latest edition of "Methods for Chemical Analysis of Water and Wastes", published by the Federal Water Quality Administration, or where other tests or analytical procedures have been found by the Department to be more applicable and satisfactory, same may be used upon adoption by the Board as a rule pursuant to General Statute 143-215.4(b). Latest edition as used in this rule means that edition of the applicable publication which has been most recently published with reference to the date at which a test or analytical procedure is carried out, and applies prospectively to editions issued subsequent to the adoption of this rule.

<u>RULE NO. IV.</u> - In determining the safety or suitability of Class A-I Waters for use as a source of water supply for drinking, culinary or food-processing purposes after approved disinfection, the Board will be guided by the physical, chemical and bacteriological standards specified in the 1962 edition of the "Public Health Service Drinking Water Standards" and the requirements of the State Board of Health as set forth in Section 5, "Protection of Unfiltered Public Water Supplies", of the Rules and Regulations Providing for the Protection of Public Water Supplies, as adopted October 6, 1960, and amended May 9, 1962, August 26, 1965, and October 12, 1967.

<u>RULE NO. V.</u> - In determining the safety or suitability of Class A-II Waters for use as a source of water supply for drinking, culinary or food-processing purposes after approved treatment, the Board will be guided by the physical, chemical and bacteriological standards specified in the 1962 edition of the "Public Health Service Drinking Water Standards."

RULE NO. VI. - In assigning the B or SB classification to waters intended for bathing, the Board will take into consideration the relative proximity of sources of pollution and will recognize the potential hazards involved in locating swimming areas close to sources of pollution and will not assign this classification to waters, the bacterial quality of which is dependent solely upon adequate disinfection, and where the interruption of such treatment would render the water unsafe for bathing.

RULE NO. VII. - The series of classifications and water quality standards and the rules and regulations pertaining thereto shall be known as the "Classifications and Water Quality Standards Applicable To The Surface Waters of North Carolina".

## REGULATIONS APPLICABLE TO

## CLASSIFICATIONS AND WATER QUALITY STANDARDS

REGULATION NO. I. - Waters whose existing quality is better than the established standards as of the date on which such standards become effective will be maintained at high quality; provided that the State of North Carolina has the authority to approve any project or development, which would constitute a new or an increased discharge of effluent to high quality water, when it has been affirmatively demonstrated that a change is justifiable to provide necessary economic or social development, and provided further, that the necessary degree of waste treatment to maintain high water quality will be required where physically and economically feasible. Present and anticipated use of such waters will not be precluded under the conditions of the aforesaid. In implementing this policy, the Federal Water Quality Administration will be kept informed and will be provided with such information as it will need in discharging its responsibilities under the Federal Water Pollution Control Act.

REGULATION NO. II. - DEFINITIONS. The definition of any word or phrase used in these regulations shall be the same as given in Article 21, Chapter 143 of the General Statutes of North Carolina, as amended. The following words and phrases, which are not defined in said Article, shall be construed to have the following meanings:

1. Source of water supply for drinking, culinary or food-processing purposes shall mean any source, either public or private, the waters from which are used for human consumption, or used in connection with the processing of milk, beverages, food or other purposes which require water meeting the "Public Health Service Drinking Water Standards".

2. Approved treatment, as applied to water supplies, means treatment accepted as satisfactory by the health authorities responsible for exercising supervision over the sanitary quality of water supplies.

3. Bathing shall include swimming, diving, skiing and similar uses but shall be regarded as a best usage only for waters in which such uses are or may be expected to be subjected to effective sanitary supervision and control.

4. Fishing shall include the propagation of fish and such other aquatic life as is necessary to provide a suitable environment for fish.

5. Shellfish culture shall include the use of waters for the propagation, storage and gathering of oysters, clams and other shellfish for market purposes.

6. Agricultural shall include the use of waters for stock watering, irrigation, and other farm purposes but not as sources of water supply for drinking, culinary or food-processing purposes.

7. Waste disposal shall include the use of waters for the disposal of sewage, industrial waste or other waste after approved treatment.

8. Tidal Salt Waters shall mean all tidal waters which are so designated by the Board of Water and Air Resources and which generally have a natural chloride ion content in excess of 500 parts per million.

9. Swamp Waters shall mean those waters which are so designated by the Board of Water and Air Resources and which are topographically located so as to generally have very low velocities and certain other characteristics which are different from adjacent stream draining steeper topography.

10. Offensive condition shall be construed to mean and include any condition or conditions resulting from the presence of sewage, industrial wastes or other wastes within the waters of the State or along the shorelines thereof which shall either directly or indirectly cause foul or noxious odors, unsightly conditions, or breeding of abnormally large quantities of mosquitoes or other insect pests, or shall damage private or public water supplies or other structures, result in the development of gases which destroy or damage surrounding property, herbage or grasses, or which shall affect the health of any person residing or working in the area.

11. Mountain and Upper Piedmont Waters shall mean all of the waters of the Hiwassee; Little Tennessee, including the Savannah River drainage area; French Broad; Broad; New; and Watauga River Basins and those portions of the Catawba River Basin above Lookout Shoals Dam and the Yadkin River Basin above the Junction of the Forsyth, Yadkin and Davie County Lines.

12. Lower Piedmont and Coastal Plain Waters shall mean those waters of the Catawba River Basin below Lookout Shoals Dam; the Yadkin River Basin below the Junction of the Forsyth, Yadkin and Davie County Lines and all of the waters of Cape Fear; Lumber; Roanoke; Neuse; Tar-Pamlico; Chowan; Pasquotank; and White Oak River Basins, except tidal salt waters which are assigned "S" Classifications.

13. Estuarine Waters shall mean those tidal salt waters assigned "S" Classifications.

14. Best usage of waters as specified for each class shall be those uses as determined by the Board of Water and Air Resources in accordance with the provisions of Article 21, Chapter 143, General Statutes of North Carolina, as amended.

15. Parts per million and parts per billion as used herein shall be construed to mean milligrams per liter and micrograms per liter, respectively, as defined in the latest edition of "Standard Methods for the Examination of Water and Wastewater", published by the American Public Health Association, American Water Works Association, and Water Pollution Control Federation.

REGULATION NO. III. - In cases where treated sewage, industrial wastes or other wastes are discharged directly into waters which are assigned a different classification than the waters into which such receiving waters flow, the standards applicable to the waters which receive such sewage, industrial wastes or other wastes shall be supplemented by the following:

> "The quality of any waters receiving sewage, industrial waste or other waste discharges shall be such that no impairment of the best usage of waters in any other class shall occur by reason of such sewage, industrial waste or other waste discharges."

REGULATION NO. IV. - In making tests or analytical determinations of classified waters to determine conformity or nonconformity with the established standards, samples shall be collected outside the limits of prescribed mixing zones in such manner and at such times and locations as to be representative of the receiving waters after reasonable opportunity for dilution and mixture with the wastes discharged thereto. The limits of mixing zones will be defined by the Department on a case-by-case basis after consideration of the magnitude and character of the waste discharge and the size and character of the receiving waters. Such zones shall be restricted to as small an area and length as possible, and shall not prevent free passage of fish or cause fish mortality.

REGULATION NO. V. - Natural waters may on occasion have characteristics outside of the limits established by the standards. The standards adopted herein relate to the condition of waters as affected by the discharge of sewage, industrial wastes or other wastes. The specified standards will not be considered violated when values outside the established limits are caused by natural conditions. Where wastes are discharged to such waters, the discharger shall not be considered a contributor to substandard conditions provided maximum treatment in compliance with permit requirements is maintained and, therefore, meeting the established limits is beyond his control.

REGULATION NO. VI. - The governing flow, which shall be the criterion for the standards and for the design of waste treatment facilities, shall be the minimum average flow for a period of seven consecutive days that have an average recurrence of once in ten years. In cases where the stream is regulated, the governing flow shall be the instantaneous minimum flow.

REGULATION NO. VII. - In the interest of maintaining and enhancing water quality, secondary treatment or equally effective treatment and control shall be considered the minimum acceptable abatement action for all significant sources of sewage, industrial waste or other waste regardless of the assigned classification and applicable water quality standards, unless it can be demonstrated that the quality of the receiving waters will be maintained and enhanced by a lesser degree of treatment or control. Advanced waste treatment processes shall be required insofar as practicable in instances where a higher degree of treatment is required to maintain the assigned water quality standards.

REGULATION NO. VIII. - The maximum limits for toxic and other deleterious substances in receiving waters shall not exceed the values recommended in the most recent edition of the "Report of the National Technical Advisory Committee on Water Quality Criteria" where stated and in cases where such values are not included in the report, bioassays will be conducted according

to the standard techniques recommended therein to determine safe levels for such substances on the basis of the discharge and characteristics of the waters under consideration.

REGULATION NO. IX. - It is recognized that unusual conditions may exist making it impossible or impractical to bring the quality of the receiving waters into compliance with the general or specific requirements of the applicable water quality standards. For example, such a situation shall be deemed to exist where no adequate or practical method of disposal or treatment for a particular waste is presently known or where the public interest will be better served by granting a variance. Under such conditions and with justifiable proof, variances from such standards may be authorized for such period as the public interest may require or permit, with due consideration being given to, among other things, the time required to develop a more effective method of disposal or treatment. Variances will be granted only after hearing and written approval of the Board.

REGULATION NO. X. - In determining the best usage of waters and in assigning classifications thereto, the Board shall consider the criteria specified in General Statute 143-214.1(d).

REGULATION NO. XI. - CLASSIFICATIONS FOR FRESH SURFACE WATERS AND WATER QUALITY STANDARDS APPLICABLE THERETO. The standards of water quality for each separately identified water to which a classification is assigned shall be those specified for such classification in the following series of Classifications and Water Quality Standards.

1. Class A-I Waters:

a. Best Usage of Waters: Source of water supply for drinking, culinary, or food-processing purposes or any other usage requiring water of lower quality.

b. Conditions Related to Best Usage: This class is intended primarily for waters having watersheds which are uninhabited and otherwise protected as required by the State Board of Health and which require only approved disinfection, with additional treatment when necessary to remove naturally present impurities, in order to meet the "Public Health Service Drinking Water Standards" and will be considered safe for drinking, culinary, and food-processing purposes.

2. Quality Standards Applicable to Class A-I Waters

| Items | Specifications |
|---|---|
| a. Floating solids; settleable solids; sludge deposits; taste or odor-producing substances. | None attributable to sewage, industrial wastes or other wastes. |
| b. Sewage, industrial wastes, or other wastes. | None. |
| c. Toxic wastes; oils; deleterious substances; colored or other wastes. | None. |

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| d. Organisms of coliform group. | Not to exceed 50/100 ml (either MPN or MF count) as a monthly average value. |
| e. Radioactive substances. | Gross beta activity (in the known absence of Strontium-90 and alpha emitters) not to exceed 1,000 pc/l (picocuries per liter) at any time. |

3. Class A-II Waters

a. Best Usage of Waters: Source of water supply for drinking, culinary or food-processing purposes and any other best usage requiring waters of lower quality.

b. Conditions Related to Best Usage: The waters, if subjected to approved treatment equal to coagulation, sedimentation, filtration and disinfection with additional treatment if necessary to remove naturally present impurities, will meet the "Public Health Service Drinking Water Standards" and will be considered safe for drinking, culinary or food-processing purposes.

4. Quality Standards Applicable to Class A-II Waters

| Items | Specifications |
|---|---|
| a. Floating solids; settleable solids; sludge deposits. | Only such amounts attributable to sewage, industrial wastes or other wastes as will not, after reasonable opportunity for dilution and mixture of same with the receiving waters, make the waters unsafe or unsuitable as a source of water supply for drinking, culinary, or food-processing purposes, injurious to fish and wildlife, or impair the waters for any other best usage established for this class. |
| b. Sewage, industrial wastes, or other wastes. | None which are not effectively treated to the satisfaction of the Board and in accordance with the requirements of the State Board of Health. |
| c. Odor-producing substances contained in sewage, industrial wastes, or other wastes. | Only such amounts, whether alone or in combination with other substances or wastes, as will not, after reasonable opportunity for dilution and mixture of same with receiving waters, cause taste and odor difficulties in water supplies which cannot be corrected by treatment as specified under "Conditions Related to Best Usage", impair |

the palatability of fish, or have a deleterious effect upon any best usage established for waters of this class.

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| d. Phenolic compounds. | Not greater than 0.001 mg/l (phenols). |
| e. pH. | Shall be normal for the waters in the area, which generally shall range between 6.0 and 8.5 except that swamp waters may have a low of 4.3. |
| f. Total hardness. | Not greater than 100 parts per million as $CaCO_3$. |
| g. Dissolved oxygen. | Not less than 6.0 mg/l for natural trout waters; 5.0 mg/l for put-and-take trout waters; not less than a daily average of 5.0 mg/l with a minimum of not less than 4.0 mg/l for non-trout waters, except that swamp waters may have lower values if caused by natural conditions. |
| h. Toxic wastes; oils; deleterious substances; colored or other wastes. | Only such amounts, whether alone or in combination with other substances or wastes as will not render the waters unsafe or unsuitable as a source of water supply for drinking, culinary, or food-processing purposes, injurious to fish and wildlife or adversely affect the palatability of same, or impair the waters for any other best usage established for this class. |
| i. Organisms of coliform group. | Not to exceed 5,000/100 ml as a monthly average value (either MPN or MF count); nor exceed this number in more than 20% of the samples examined during any one month; nor exceed 20,000/100 ml in more than 5% of such samples. Fecal Coliforms (MPN or MF count) not to exceed a log mean of 1,000/100 ml based on at least five consecutive samples examined during any 30-day period; nor exceed 2,000/100 ml in more than 20% of the samples examined during such period. (Not applicable during or immediately following periods of rainfall.) |

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| j. Temperature. | Not to exceed 5°F. above the natural water temperature, and in no case to exceed 84°F. for mountain and upper piedmont waters and 90°F. for lower piedmont and coastal plain waters. The temperature of natural trout waters shall not be significantly increased due to the discharge of heated liquids and shall not exceed 68°F.; however, the temperature of put-and-take trout waters may be increased by as much as 3°F. but the maximum may not exceed 70°F. |
| k. Radioactive substances. | Gross beta activity (in the known absence of Strontium-90 and alpha emitters) not to exceed 1,000 picocuries per liter. |

5. Class B Waters

a. Best Usage of Waters: Bathing and any other best usage except as source of water supply for drinking, culinary or food-processing purposes.

b. Conditions Related to Best Usage: The waters, under proper sanitary supervision by the controlling health authorities, will meet accepted standards of water quality for outdoor bathing places and will be considered safe and satisfactory for bathing purposes. Also, suitable for other uses requiring waters of lower quality.

6. Quality Standards Applicable to Class B Waters

| Items | Specifications |
|---|---|
| a. Floating solids; settleable solids, sludge deposits. | Only such amounts attributable to sewage, industrial wastes or other wastes as will not, after reasonable opportunity for dilution and mixture of same with the receiving waters, make the waters unsafe or unsuitable for bathing, injurious to fish and wildlife, or impair the waters for any other best usage established for this class. |
| b. Sewage, industrial wastes, or other wastes. | None which are not effectively treated to the satisfaction of the Board. In determining the degree of treatment required for such waste when discharged into waters to be used for bathing, the Board will take into consideration the quantity and quality of the sewage and wastes |

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| | involved and the proximity of such discharges to the waters in this class. |
| c. Phenolic compounds. | Not to exceed 0.001 mg/l (phenols). |
| d. pH. | Shall be normal for the waters in the area, which generally shall range between 6.0 and 8.5, except that swamp waters may have a low of 4.3. |
| e. Dissolved oxygen. | Not less than 6.0 mg/l for natural trout waters; 5.0 mg/l for put-and-take trout waters; not less than a daily average of 5.0 mg/l with a minimum of not less than 4.0 mg/l for non-trout waters, except that swamp waters may have lower values if caused by natural conditions. |
| f. Toxic wastes; oils; deleterious substances; colored or other wastes. | Only such amounts, whether alone or in combination with other substances or wastes as will not render the waters unsafe or unsuitable for bathing, injurious to fish and wildlife or adversely affect the palatability of same, or impair the waters for any other best usage established for this class, |
| g. Organisms of coliform group. (Applicable only during the months of May through September. During other months the coliform organism standard for Class "C" Waters shall apply.) | Fecal coliforms not to exceed a log mean of 200/100 ml (either MPN or MF count) based on at least five consecutive samples examined during any 30-day period and not to exceed 400/100 ml in more than 20% of the samples examined during such period. (Not applicable during or immediately following periods of rainfall.) |
| h. Temperature. | Not to exceed 5°F. above the natural water temperature, and in no case to exceed 84°F. for mountain and upper piedmont waters and 90°F. for lower piedmont and coastal plain waters. The temperature of natural trout waters shall not be significantly increased due to the discharge of heated liquids and shall not exceed 68°F.; however, the temperature of put-and-take trout waters |

may be increased by as much as 3°F. but the maximum may not exceed 70°F.

7. Class C Waters

a. Best Usage of Waters: Fishing, boating, wading and any other usage except for bathing or as a source of water supply for drinking, culinary or food-processing purposes.

b. Conditions Related to Best Usage: The waters will be suitable for fish and wildlife propagation. Also, suitable for boating, wading, and other uses requiring waters of lower quality.

8. Quality Standards Applicable to Class C Waters

| Items | Specifications |
|---|---|
| a. Floating solids; settleable solids; sludge deposits. | Only such amounts attributable to sewage, industrial wastes or other wastes as will not, after reasonable opportunity for dilution and mixture of same with the receiving waters, make the waters unsafe or unsuitable for fish and wildlife, or impair the waters for any other best usage established for this class. |
| b. pH. | Shall be normal for the waters in the area, which generally shall range between 6.0 and 8.5, except that swamp waters may have a low of 4.3. |
| c. Dissolved oxygen. | Not less than 6.0 mg/l for natural trout waters; 5.0 mg/l for put-and-take trout waters; not less than a daily average of 5.0 mg/l with a minimum of not less than 4.0 mg/l for non-trout waters, except that swamp waters may have lower values if caused by natural conditions. |
| d. Toxic wastes; oils; deleterious substances; colored or other wastes. | Only such amounts, whether alone or in combination with other substances or wastes as will not render the waters injurious to fish and wildlife or adversely affect the palatability of same, or impair the waters for any other best usage established for this class. |

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| e. Organisms of coliform group. | Fecal coliforms not to exceed a log mean of 1,000/100 ml (MPN or MF count) based upon at least five consecutive samples examined during any 30-day period; nor exceed 2,000/100 ml in more than 20% of the samples examined during such period. (Not applicable during or immediately following periods of rainfall.) |
| f. Temperature. | Not to exceed 5°F. above the natural water temperature, and in no case to exceed 84°F. for mountain and upper piedmont waters and 90°F. for lower piedmont and coastal plain waters. The temperature of natural trout waters shall not be significantly increased due to the discharge of heated liquids and shall not exceed 68°F.; however, the temperature of put-and-take trout waters may be increased by as much as 3°F. but the maximum may not exceed 70°F. |

9. Class D Waters

a. Best Usage of Waters: Agriculture, industrial cooling and process water supply, fish survival, navigation, and any other usage, except fishing, bathing, or as a source of water supply for drinking, culinary or food-processing purposes.

b. Conditions Related to Best Usage: The waters without treatment and except for natural impurities which may be present therein will be suitable for agricultural uses and will permit fish survival. The waters will also be usable after special treatment by the user as may be needed under each particular circumstance for industrial purposes, including cooling and process waters.

10. Quality Standards Applicable to Class D Waters

| Items | Specifications |
|---|---|
| a. Floating solids; settleable solids; sludge deposits. | Only such amounts attributable to sewage, industrial wastes or other wastes as will not, after reasonable opportunity for dilution and mixture of same with the receiving waters, render the waters unsuitable for agriculture, industrial cooling purposes and fish survival, or cause an offensive condition. |

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|---|---|
| b. pH. | Shall be normal for the waters in the area, which generally shall range between 6.0 and 8.5, except that swamp waters may have a low of 4.3. |
| c. Dissolved oxygen. | Not less than 3.0 mg/l. |
| d. Toxic wastes; oils; deleterious substances; colored or other wastes. | Only such amounts attributable to sewage, industrial wastes or other wastes as will not render the waters unsuitable for agriculture, industrial cooling purposes, navigation, fish survival, or cause offensive conditions. |
| e. Organisms of coliform group. (Applicable only to waters designated by the Board for irrigation of fruits and vegetables.) | Fecal coliforms not to exceed a log mean of 1,000/100 ml (MPN or MF count) based upon at least five consecutive samples examined during any 30-day period; nor exceed 2,000/100 ml in more than 20% of the samples examined during such period. (Not applicable during or immediately following periods of rainfall.) |
| f. Temperature. | Not to exceed 5°F. above the natural water temperature and in no case to exceed 84°F. for mountain and upper piedmont waters and 90°F. for lower piedmont and coastal plain waters. |

REGULATION NO. XII. - CLASSIFICATIONS FOR TIDAL SALT WATERS AND WATER QUALITY STANDARDS APPLICABLE THERETO. The standards of water quality for each separately identified water to which a classification is assigned shall be those specified for such classification in the following series of Classifications and Water Quality Standards.

1. Class SA Waters:

a. Best Usage of Waters: Shellfishing for market purposes and any other usage requiring waters of lower quality.

b. Conditions Related to Best Usage: Waters will meet the sanitary and bacteriological standards given in the 1965 revision of the "National Shellfish Sanitation Program Manual Of Operations: Part 1, Sanitation of Shellfish Growing Areas", recommended by the Public Health Service and will be considered safe and suitable for shellfish culture.

2. Quality Standards Applicable to Class SA Waters

| Items | Specifications |
|---|---|
| a. Floating solids; settleable solids; sludge deposits. | None attributable to sewage, industrial wastes or other wastes. |
| b. Sewage, industrial wastes, of other wastes. | None which are not effectively treated to the satisfaction of the Board and in accordance with the requirements of the State Board of Health. |
| c. pH. | Range between 6.8 and 8.5. |
| d. Dissolved oxygen. | Not less than 5.0 mg/l, except that swamp waters may have a minimum of 4.0 mg/l. |
| e. Toxic wastes; oils; deleterious substances; colored or other wastes. | Only such amounts, whether alone or in combination with other substances or wastes as will not make the waters unsafe or unsuitable for fish and shellfish or their propagation, impair the palatability of same, or impair the waters for any other best usage established for this class. |
| f. Organisms of coliform group. | Total coliform group not to exceed a median MPN of 70/100 ml, and not more than 10% of the samples shall exceed an MPN of 230/100 ml for a 5-tube decimal dilution test (or 330/100 ml where a 3-tube decimal dilution is used) in those areas most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions. |
| g. Temperature. | Shall not be increased above the natural water temperature by more than 1.5°F. during the months of June, July, and August nor more than 4.0°F. during other months and in no case to exceed 90°F., due to the discharge of heated liquids. |

3. Class SB Waters

a. Best Usage of Waters: Bathing and any other usage except shellfishing for market purposes.

b. Conditions Related to Best Usage: The waters, under proper sanitary supervision by the controlling health authorities, will meet accepted sanitary standards of water quality for outdoor bathing places and will be considered

4. Quality Standards Applicable to Class SB Waters

| Items | Specifications |
|---|---|
| a. Floating solids; settleable solids; sludge deposits. | None attributable to sewage, industrial wastes or other wastes. |
| b. Sewage, industrial wastes, or other wastes. | None which are not effectively treated to the satisfaction of the Board. In determining the degree of treatment required for such waters when discharged into waters to be used for bathing, the Board will take into consideration the quantity and quality of the sewage and wastes involved and the proximity of such discharges to the waters in this class. |
| c. pH. | Shall be normal for the waters in the area, which generally shall range between 6.0 and 8.5, except that swamp waters may have a low of 4.3. |
| d. Dissolved oxygen. | Not less than 5.0 mg/l, except that swamp waters may have a minimum of 4.0 mg/l. |
| e. Toxic wastes; oils; deleterious substances; colored or other wastes. | Only such amounts, whether alone or in combination with other substances or wastes as will not make the waters unsafe or unsuitable for bathing, injurious to fish or shellfish, or adversely affect the palatability of same, or impair the waters for any other best usage established for this class. |
| f. Organisms of coliform group. (Applicable only during months of May through September. During other months the coliform organism standard for Class "SC" Waters shall apply.) | Fecal coliforms not to exceed a log mean of 200/100 ml (either MPN or MF count) based on at least five consecutive samples examined during any 30-day period and not to exceed 400/100 ml in more than 20% of the samples examined during such period. (Not applicable during or immediately following periods of rainfall.) |
| g. Temperature. | Shall not be increased above the natural water temperature by more than 1.5°F. during the months of June, July, and August nor more than 4.0°F. during other months and in no case to exceed 90°F., due to the discharge of heated liquids. |

5. Class SC Waters

a. Best Usage of Waters: Fishing, and any other usage except bathing or shellfishing for market purposes.

b. Conditions Related to Best Usage: The waters will be suitable for fishing and fish propagation. Also, suitable for other uses requiring waters of lower quality.

6. Quality Standards Applicable to Class SC Waters

| Items | Specifications |
|---|---|
| a. Floating solids; settleable solids; sludge deposits. | Only such amounts attributable to sewage, industrial waste or other wastes as will not, after reasonable opportunity for dilution and mixture of same with the receiving waters, make the waters unsafe or unsuitable for fish, shellfish and wildlife, or impair the waters for any other best usage established for this class. |
| b. pH. | Shall be normal for the waters in the area, which generally shall range between 6.0 and 8.5, except that swamp waters may have a minimum of 4.3. |
| c. Dissolved oxygen. | Not less than 5.0 mg/l, except that swamp waters may have a minimum of 4.0 mg/l. |
| d. Toxic wastes; oils; deleterious substances; colored or other wastes. | Only such amounts, whether alone or in combination with other substances or wastes as will not render the waters injurious to fish and shellfish, adversely affect the palatability of same, or impair the waters for any other best usage established for this class. |
| e. Organisms of coliform group. | Fecal coliforms not to exceed a log mean of 1,000/100 ml (MPN or MF count) based upon at least five consecutive samples examined during any 30-day period; nor exceed 2,000/100 ml in more than 20% of the samples examined during such period. (Not applicable during or immediately following period of rainfall.) |
| f. Temperature. | Shall not be increased above the natural water temperature by more than 1.5°F. during the months of June, July, and August nor more than 4.0°F. during other months, and in no case to exceed 90°F., due to the discharge of heated liquids. |

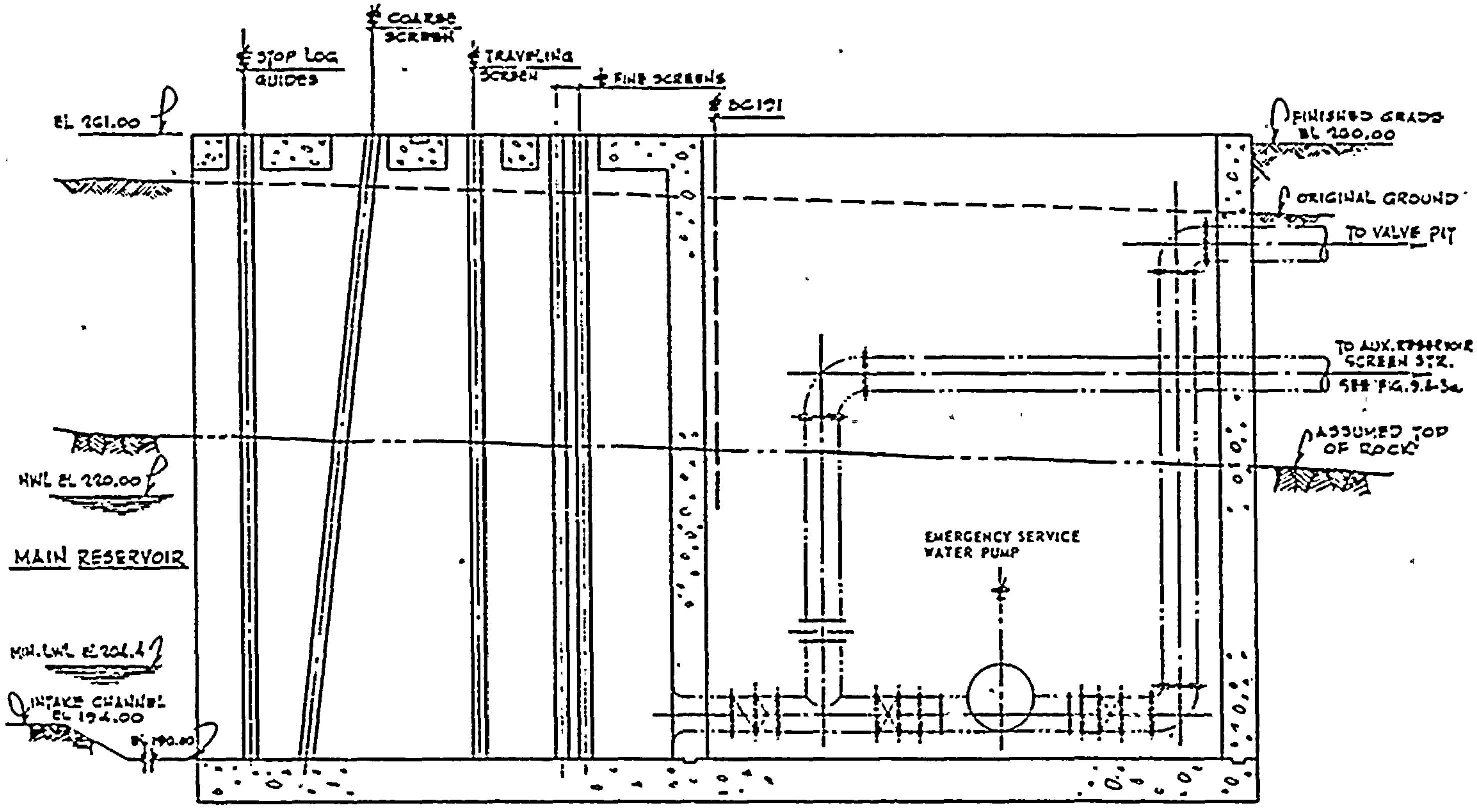
## Aquatic Ecology

Question 4:

"Please provide sketches of the new intake and discharge structures with sufficient detail to permit assessment of impacts on the aquatic ecosystem."

CP&L Response:

Figures 9.8-3 and 9.8-3a of the PSAR (Amendment 27) provide the required information for the service water and makeup water system. No other intake structures have been changed. These are provided on the following page.

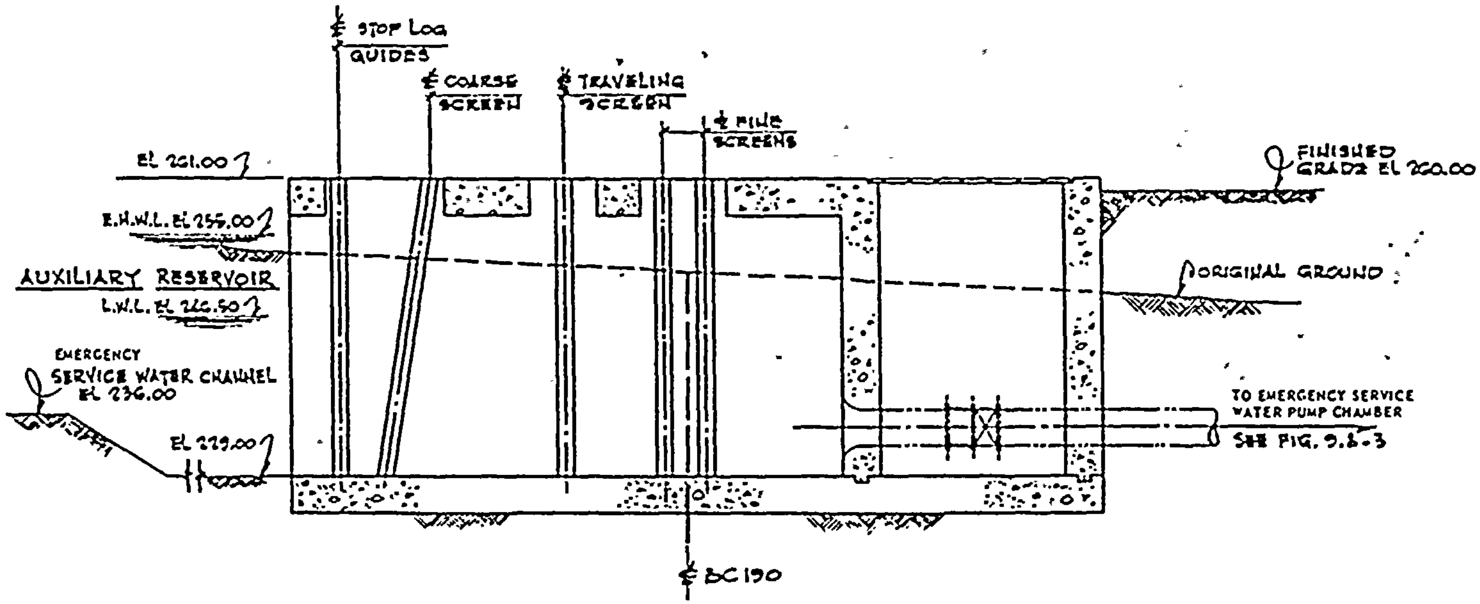



AMENDMENT NO. 27

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
UNITS 1, 2, 3 & 4

EMERGENCY SERVICE WATER AND COOLING TOWER MAKEUP WATER INTAKE STRUCTURE

9.8-3




AMENDMENT NO. 27

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
UNITS 1, 2, 3 & 4

EMERGENCY SERVICE WATER INTAKE
SCREEN STRUCTURE

9.8-3a

## Aquatic Ecology

Question 7:

Please elaborate on the utilization of chlorine and the possibility of buildup of high concentrations of toxic chloramines in the closed cycle system and blowdown.

CP&L Response:

Chlorination or other inhibitory practice will likely be used for algal or slime control. Assuming chlorination is used, it will be done on an intermittent basis. During periods of chlorination there will be no blowdown from the towers to the make-up pond. Controls will be provided to permit blowdown only when the residual chlorine is less than 0.1 ppm in the blowdown water.

The formation of chloramines in the cooling towers will depend on the amount of chlorine used for slime and algal control and the ammonia-nitrogen content of the water. Additionally, the amount of chloramines formed will be dependent on the pH of the cooling tower water (the reaction most favorable at pH of 8.3). The pH of the circulating water will be below 8.3 due to the addition of Sulfuric Acid. In any event combined chlorine residual (free chlorine plus chloramines) in the cooling tower blowdown will average less than 0.1 mg/l well below toxic level and similar to residuals in tap water.

# Hydrology

Question 1:

"Discuss intent to pump from Cape Fear River when the flow at Lillington is less than 600 cfs (P 2.2-13)."

CP&L Response:

The presently proposed restriction is that no pumping will be performed which would reduce flows in the Cape Fear below 600 cfs nor which would withdraw more than 25% of the river flow as measured at the Lillington gage.

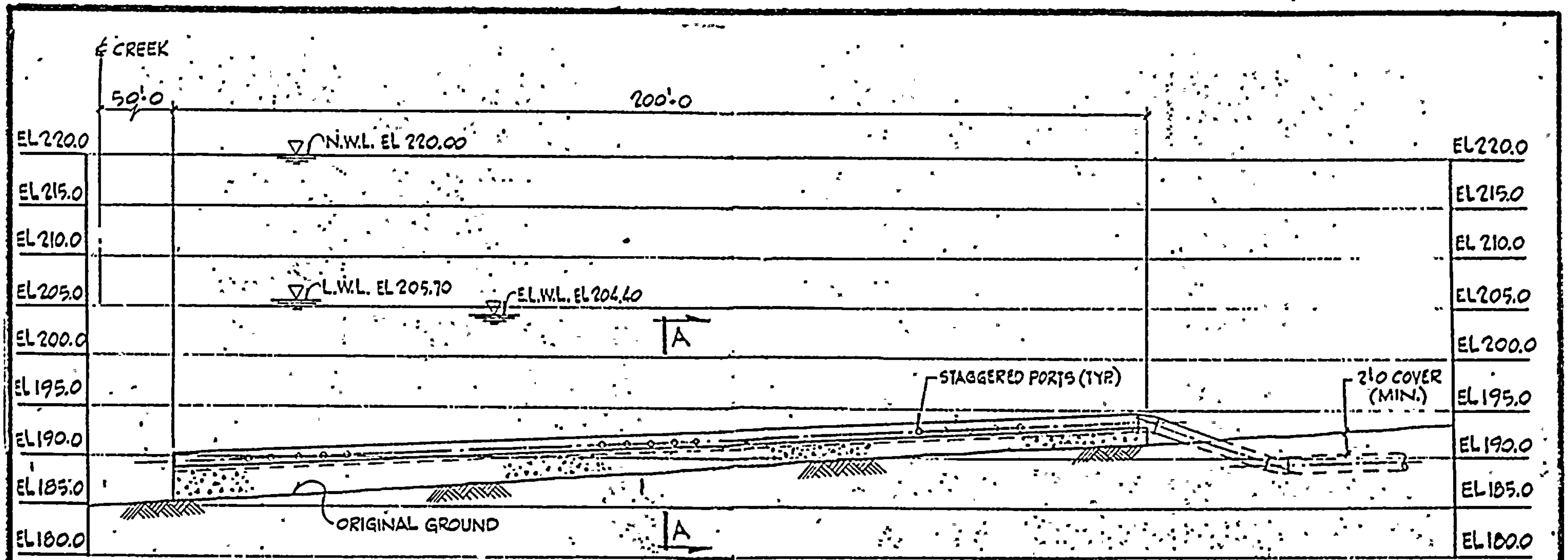
Question 2:

"Describe the intake more thoroughly-giving low and normal water elevation. Provide sketch of diffuser showing relationship to bottom profile. Include exit velocities and cost of system."

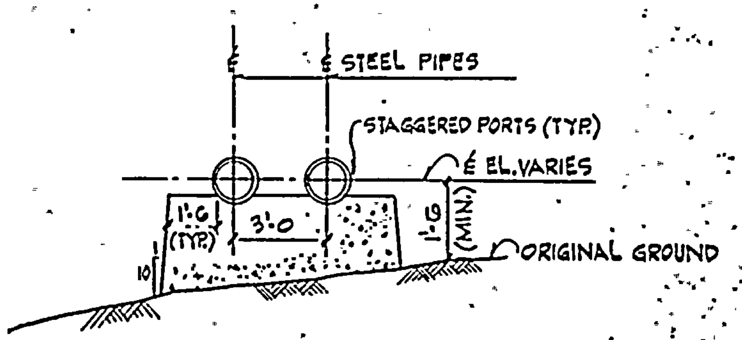
CP&L Response:

Sketches of the intake structures are included in the response to Question 4, "Aquatic Ecology."

A sketch of the diffuser is attached. The detailed design of the diffuser has not been completed, however, the diffuser will be located at N672000, E2010000 at the 195' contour. This is the proposed location within ± 1000 feet. Exit velocity and cost are not available yet, and are pending detail design completion.




PROFILE
HORIZ. 1"=20'-0
VERT. 1"=10'-0




SECT. A-A

DIFFUSER DETAIL

| | | | |
|---|---|---|---|
| EBASCO SERVICES INCORPORATED NEW YORK | | CAROLINA POWER & LIGHT COMPANY SHEARON HARRIS NUCLEAR POWER PLANT 1977-78-79-80 900,000 KW-UNITS 1,2,3,4 | SK-1364-CH-371 |
| DIV. C-H DR. R.M. | APPROVED | | |
| SCALE NOTED CH. | | | |
| DATE 10-26-73 | | | |

REV. NO. DATE

## Hydrology

Question 8:

"Is blowdown rate of 10 cfs for all 4 units combined or is it per unit?"

CP&L Response:

The combined average blowdown rate for all four towers is about 10.1 million gallons per day or 15.5 cfs.

## Hydrology

Question 9:

"What is blowdown concentration factor?"

CP&L Response:

Approximately 8.

## Hydrology

Question 10:

"Is the blowdown diffuser a surface of submerged diffuser?"

CP&L Response:

The diffuser is submerged. Refer to the figure attached to the response to "Hydrology, Question 2".

## Hydrology

Question 17:

"For the isotherms presented in Figure 3.3-4 and 3.3-5, what ambient temperature and/or density stratifications were assumed in the mixing zone?"

CP&L Response:

The elevation of the submerged diffuser is 195 feet. It has been conservatively estimated that the depth of the water above the diffuser will be such that no significant vertical temperature stratification will be observed in the mixing zone. The ambient temperatures in the lake are noted on the figures.

## Hydrology

Question 18:

"Was a stagnant mixing zone assumed in deriving the isotherms (Figures 3.3-4 and 3.3-5) or was an ambient current assumed? If the latter, what value was assumed?"

CP&L Response:

Current velocities in the mixing zone were based on the natural flow due to runoff and the diffuser discharge flow. The velocities in the mixing zone ranged from a minimum of 0.00077 feet/second to a maximum of 0.00116 feet/second. The diffuser discharge flow was assumed constant at 15 cfs.

## Hydrology

Question 19:

"Provide bases for lake levels assumed in Figures 3.3-4 and 3.3-5."

CP&L Response:

The lake levels of Figures 3.3-4 and 3.3-5 approximate the elevations during critical drought periods corresponding to the winter of 1925-26 and the summer of 1925 respectively. The 1925-26 period was one of the three most critical drought periods synthesized for Buckhorn Creek from records on Middle Creek.

## Hydrology

Question 20:

"For these lake levels, provide the average, minimum and maximum water depths in the mixing zone."

CP&L Response:

For lake elevations 215 and 217 feet, the average and maximum water depths are 14 and 16 feet respectively. In both cases the minimum water depth is zero.

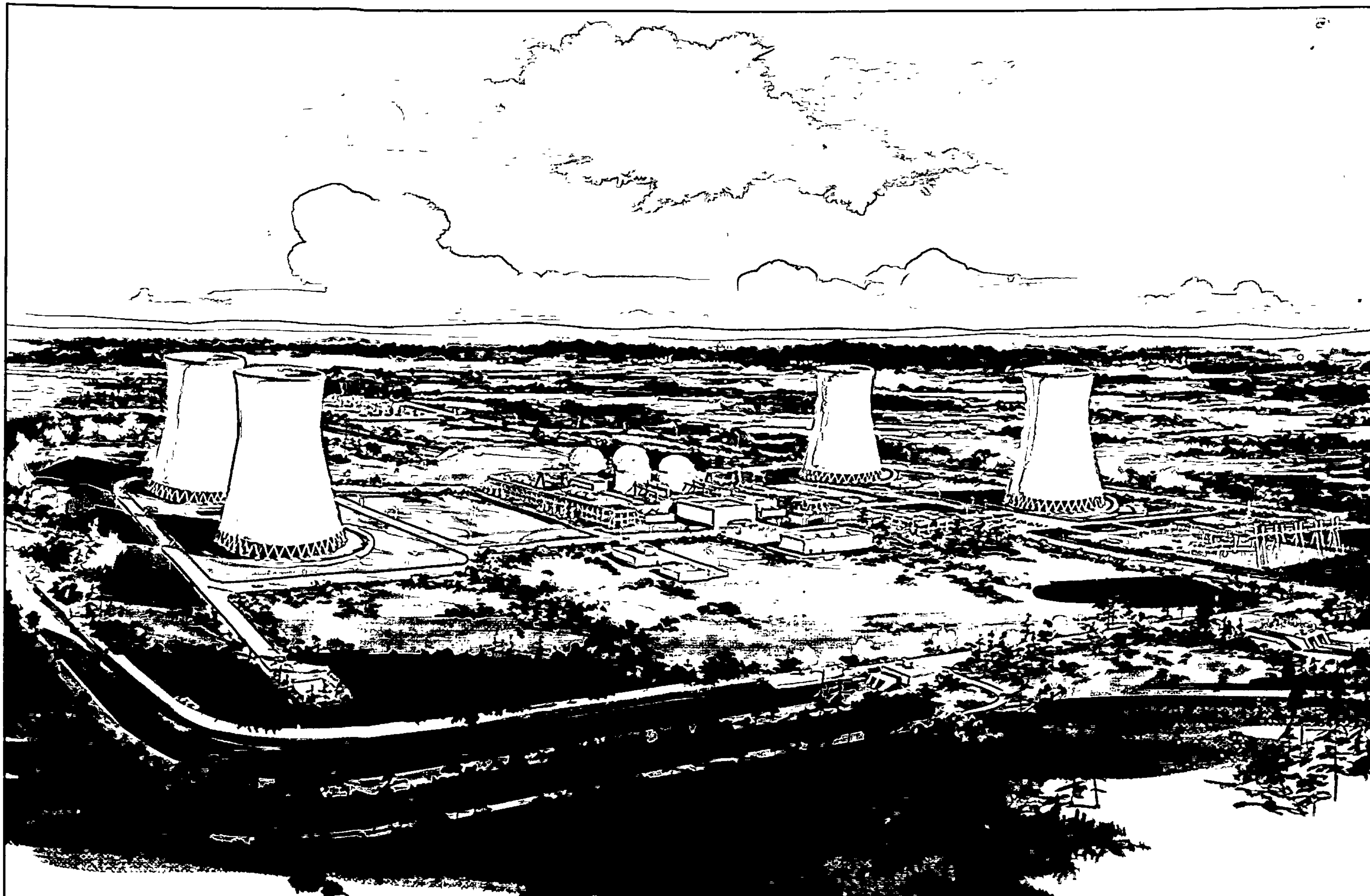
## Meteorology

Question 2:

"Please supply an artist's sketch of the station that will permit assessment of the visual and aesthetic impacts of the cooling towers."

CP&L Response:

Two copies of the artist's sketch are enclosed.



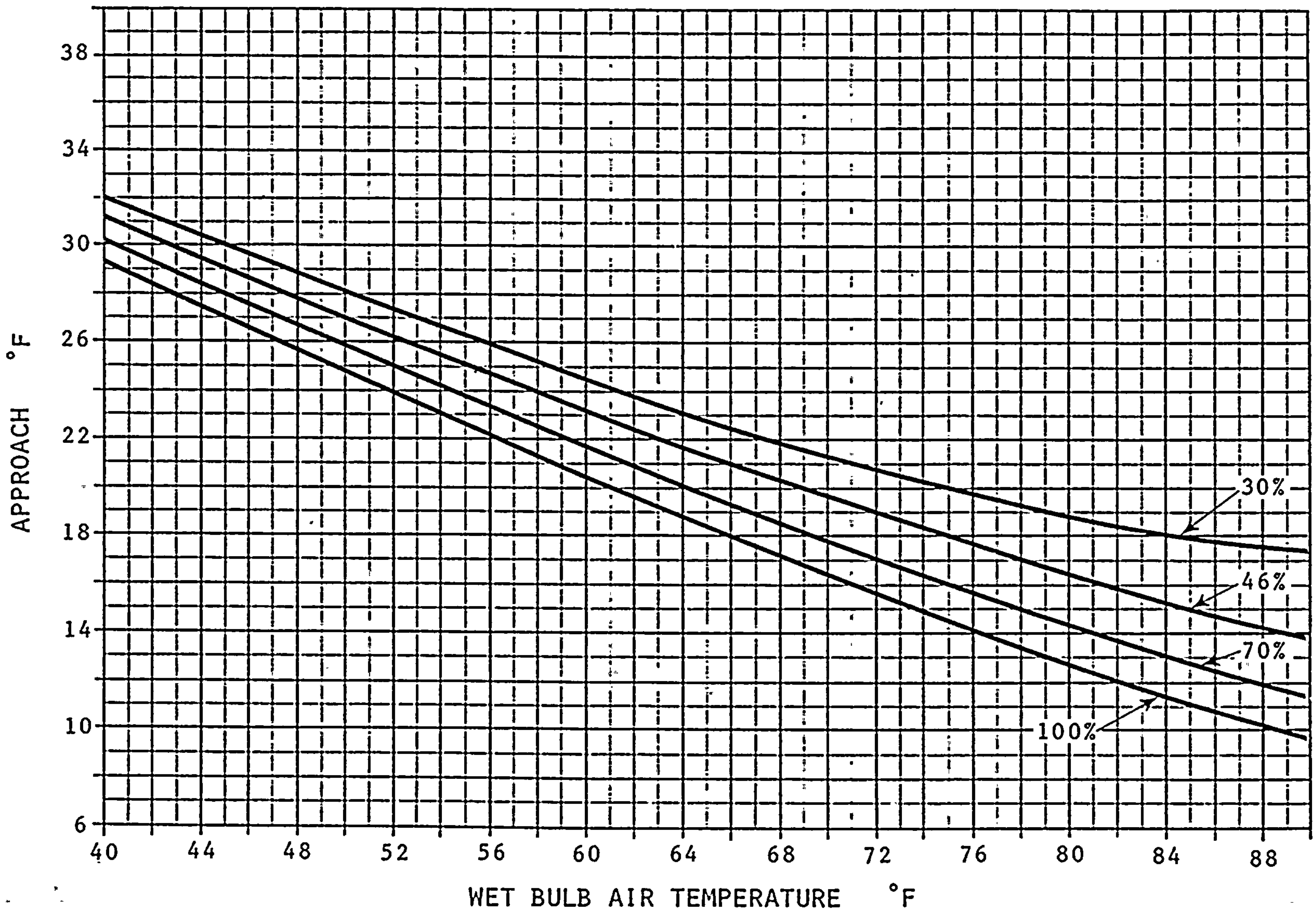
## Meteorology

### Question 3:

"Please supply a set of performance curves for the cooling towers - plots of wet-bulb intake temperatures vs. wet-bulb exhaust temperatures as a function of relative humidity."

### CP&L Response:

The curves shown on the following page are for typical similar cooling towers and are representative of those anticipated for the Harris Plant. A cooling tower manufacturer has not yet been selected for the Harris units and curves for the towers will not be available until late January, 1974.




Attachment 5

NATURAL DRAFT COOLING TOWER

PERFORMANCE CURVES APPROACH IN FUNCTION
OF WET BULB AIR TEMPERATURE AND RELATIVE HUMIDITY

## Meteorology

Question 4:

"Elaborate on the geographical location at which the meteorological data (especially relative humidity) was acquired."

CP&L Response:

This data was taken at Raleigh-Durham Airport about 20 miles north-northeast of the plant site.

# Meteorology

## Question 5:

"Supply data on humidity as a function of wind speed."

## CP&L Response:

The requested data is attached on the following page.

WIND SPEED - RELATIVE HUMIDITY OCCURRENCES

| Wind Speed (mph) | 0 - 4 | | | | | | 5 - 14 | | | | | | 15 - 24 | | | | | | 25 and over | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Relative Humidity % | <30 | 30 to 49 | 50 to 69 | 70 to 79 | 80 to 89 | 90 to 100 | <30 | 30 to 49 | 50 to 69 | 70 to 79 | 80 to 89 | 90 to 100 | <30 | 30 to 49 | 50 to 69 | 70 to 79 | 80 to 89 | 90 to 100 | <30 | 30 to 49 | 50 to 69 | 70 to 79 | 80 to 89 | 90 to 100 | |
| *MONTH | | | | | | | | | | | | | | | | | | | | | | | | | Total Obser-vations |
| JANUARY | 27 | 196 | 542 | 320 | 301 | 487 | 145 | 937 | 1596 | 575 | 464 | 893 | 34 | 328 | 229 | 83 | 80 | 184 | | 4 | 2 | 4 | 1 | 8 | 7440 |
| FEBRUARY | 42 | 222 | 384 | 213 | 213 | 356 | 205 | 1056 | 1279 | 498 | 459 | 915 | 87 | 293 | 227 | 87 | 66 | 167 | 4 | 2 | 5 | 3 | 7 | 2 | 6792 |
| MARCH | 54 | 223 | 389 | 214 | 168 | 319 | 368 | 1139 | 1456 | 488 | 526 | 961 | 119 | 366 | 283 | 89 | 75 | 157 | 6 | 18 | 8 | 6 | 2 | 6 | 7440 |
| APRIL | 62 | 198 | 262 | 188 | 223 | 314 | 321 | 1141 | 1345 | 634 | 633 | 781 | 109 | 410 | 230 | 99 | 94 | 125 | 4 | 17 | 8 | 1 | | 7 | 7200 |
| MAY | 25 | 211 | 341 | 303 | 403 | 619 | 141 | 984 | 1389 | 747 | 842 | 960 | 20 | 180 | 135 | 42 | 45 | 50 | | | 3 | | | | 7440 |
| JUNE | 15 | 212 | 413 | 312 | 520 | 755 | 57 | 908 | 1322 | 652 | 770 | 916 | 16 | 107 | 104 | 52 | 18 | 50 | | | | | | 1 | 7200 |
| JULY | 5 | 184 | 385 | 282 | 457 | 1011 | 30 | 777 | 1322 | 753 | 842 | 1122 | 1 | 70 | 102 | 34 | 15 | 46 | | | 2 | | | | 7440 |
| AUGUST | 3 | 114 | 428 | 267 | 473 | 1161 | 9 | 486 | 1297 | 729 | 832 | 1292 | | 35 | 105 | 52 | 42 | 98 | | | 1 | 1 | 3 | 12 | 7440 |
| SEPTEMBER | 19 | 128 | 296 | 223 | 365 | 1064 | 36 | 629 | 1179 | 710 | 844 | 1316 | 3 | 80 | 102 | 45 | 45 | 93 | | 1 | | 1 | | 21 | 7200 |
| OCTOBER | 18 | 191 | 296 | 249 | 433 | 889 | 70 | 742 | 1146 | 751 | 746 | 1309 | 21 | 102 | 160 | 75 | 82 | 152 | | 1 | | | 1 | 6 | 7440 |
| NOVEMBER | 50 | 246 | 488 | 344 | 404 | 613 | 173 | 846 | 1156 | 589 | 608 | 1064 | 52 | 178 | 151 | 53 | 63 | 120 | | | 1 | | 1 | | 7200 |
| DECEMBER | 37 | 235 | 477 | 331 | 432 | 803 | 171 | 1072 | 1599 | 779 | 811 | 1239 | 48 | 235 | 199 | 74 | 69 | 138 | 1 | 5 | 4 | 2 | 2 | 7 | 8767 |

*Values are the ten year monthly average for the period 1951 - 1960 as measured at Raleigh-Durham Airport.

# General

## Question 1:

"Please furnish information (including a sketch) that describes the boundaries and acreage of the site. Comment on the statement on p. 3.1.1 relating to acquisition of land around the auxiliary reservoir to an elevation of +260 if the berm of the auxiliary dam is also +260 feet (p. 2.2-12)."

## CP&L Response:

As stated in Section 2 of the Environmental Report, the approximate acreage of the site will be 14,000 acres. Figure 2.1-1b of the PSAR (Amendment 27) shows the boundary of property required for power generation at the Harris Site.

Around the auxiliary reservoir, based on maximum flood levels, land will be purchased to approximately elevation +260 feet. In the vicinity of the auxiliary dam, land will be acquired to the necessary elevation to allow for construction, maintenance access, etc., and will not necessarily be restricted to elevation +260 feet.

Question 2:

"Elaborate on the amount and source of rock and earth that will be used in the construction of the two dams."

CP&L Response:

| Main Dam | |
|---|---|
| Impervious Core | 148,000 cy |
| Rock Fill | 230,850 |
| Fine Filter | 45,500 |
| Course Filter | 41,000 |
| Riprap | 18,500 |
| Crushed Rock | 2,625 |

| Auxiliary Dam | |
|---|---|
| Imprevious Core | 245,000 cy |
| Random Rock Fill | 154,900 |
| Transition Filter | 82,000 |
| Riprap | 65,600 |
| Crushed Rock | 4,500 |
| Bedding for Riprap | 7,500 |

The main dam will be about 1,215 ft. long at the berm elevation of 260 ft. The main reservoir dam will include a concrete spillway section about 75 ft. long. The main dam will have a maximum height above the stream bed of about 90 ft., and will contain approximately 550,000 cu. yd. of compacted earth materials.

The foundation materials of the auxiliary reservoir structures and the intake structure from the main reservoir are the Triassic claystones, sandstones, shales, and siltstone. The foundation materials for the main dam and spillway and the Cape Fear River to main reservoir makeup water system are granite. The main dam core and shell and the auxiliary dam core will be founded on rock. A portion of the auxiliary dam shell will be founded on rock.

The main dam will be an earth-rockfill structure and the auxiliary dam and auxiliary separating dike will be earth-random rockfill structures all designed to use locally available materials. Each dam will have a cross section consisting of a central impervious core flanked by transition ilter zones and compacted rock or random rockfill shells. The auxiliary separating dike will have a cross section consisting of a central impervious core flanked by a random rockfill shell. The slopes of the structures will be protected with riprap placed on crushed rock bedding where necessary.

The auxiliary dam, which is a part of the emergency core cooling water system will be an earth-fill structure about 3,700 ft. long including the spillway section. The dam will have a maximum height of about 50 ft. above the stream bed and will contain approximately 600,000 cu. yd. of compacted earth materials.

Attachment 3 is provided to illustrate dam construction material.

Main Dam Borrow Areas:

The borrow area is included within the area bounded by:

from point N664750, E2005500
N664750, E2007800 to
N664000, E2007800 to
N662900, E2006600 to
N663900, E2006200 to
N663900, E2005500 to
N664750, E2005500.

All points connected by straight lines.

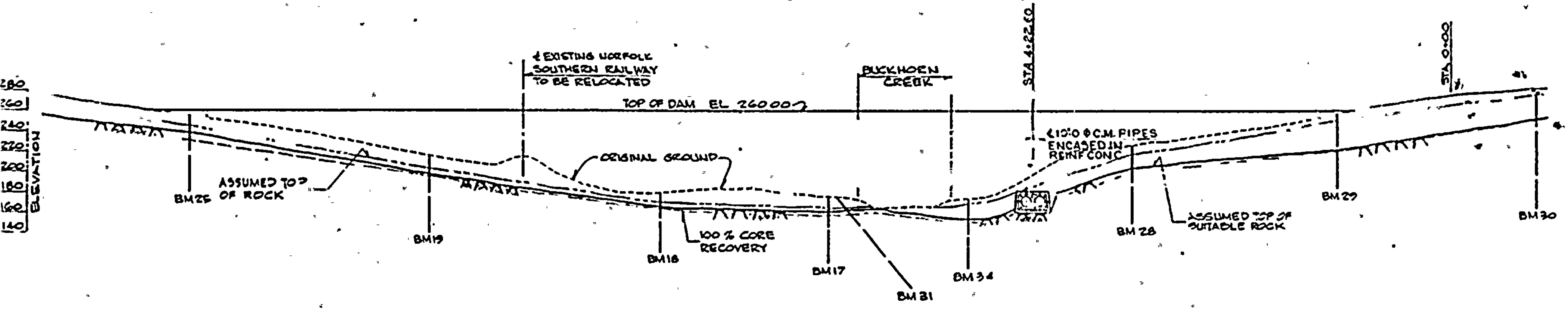
This area includes 75,000 cu. yd. (net) stripping and 1,400,000 cu. yd. core material. The area is composed of sand, silt, clay, topsoil, sandy-clayey silt, and clayey-silty sand.

West Auxiliary Dam Borrow Area

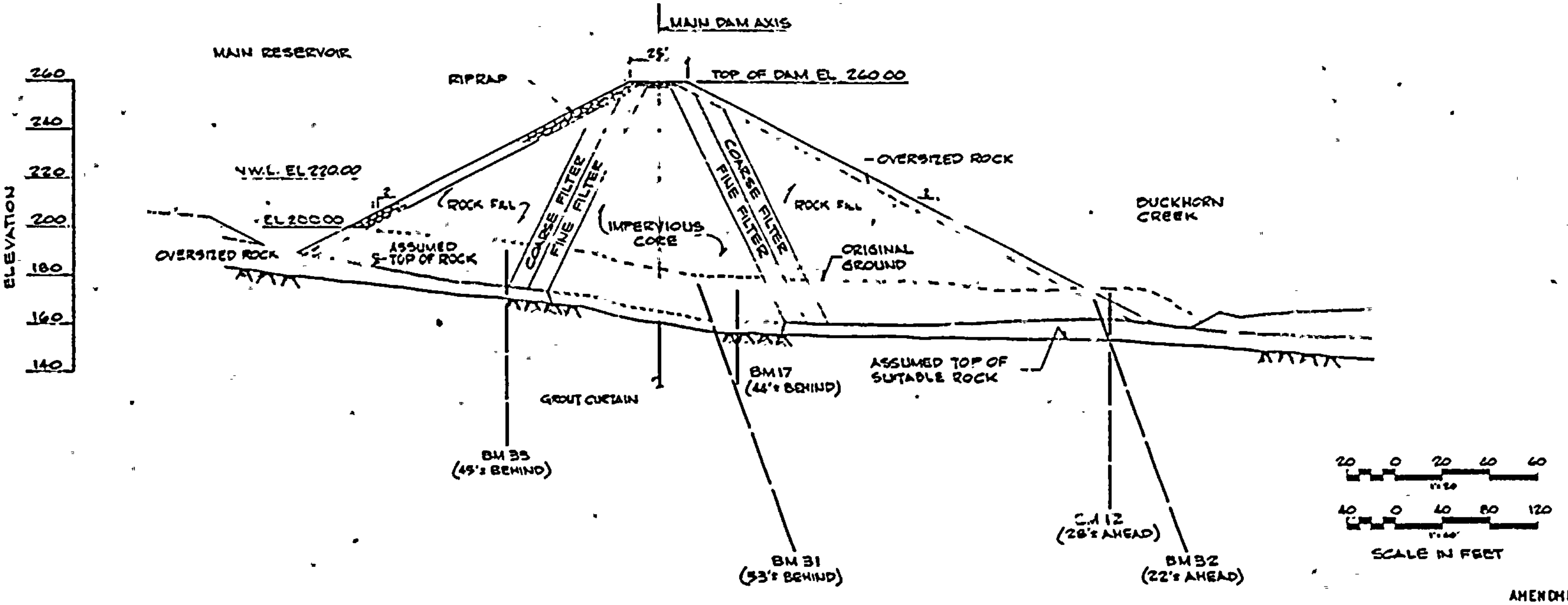
The borrow area is included within the area bounded by straight lines connecting the following points:

N683050, E2006550 to
N683050, E2007650 to
N681950, E2007650 to
N681950, E2006550.

This area contains 31,000 cu. yd. stripping and 502,500 cu. yd. core material. The area includes sand, silt, clayey silt, clay, topsoil, sandy-clayey silt, and clayey-silty sand.




PROFILE ALONG MAIN DAM AXIS
(LOOKING DOWNSTREAM)
1"-40"



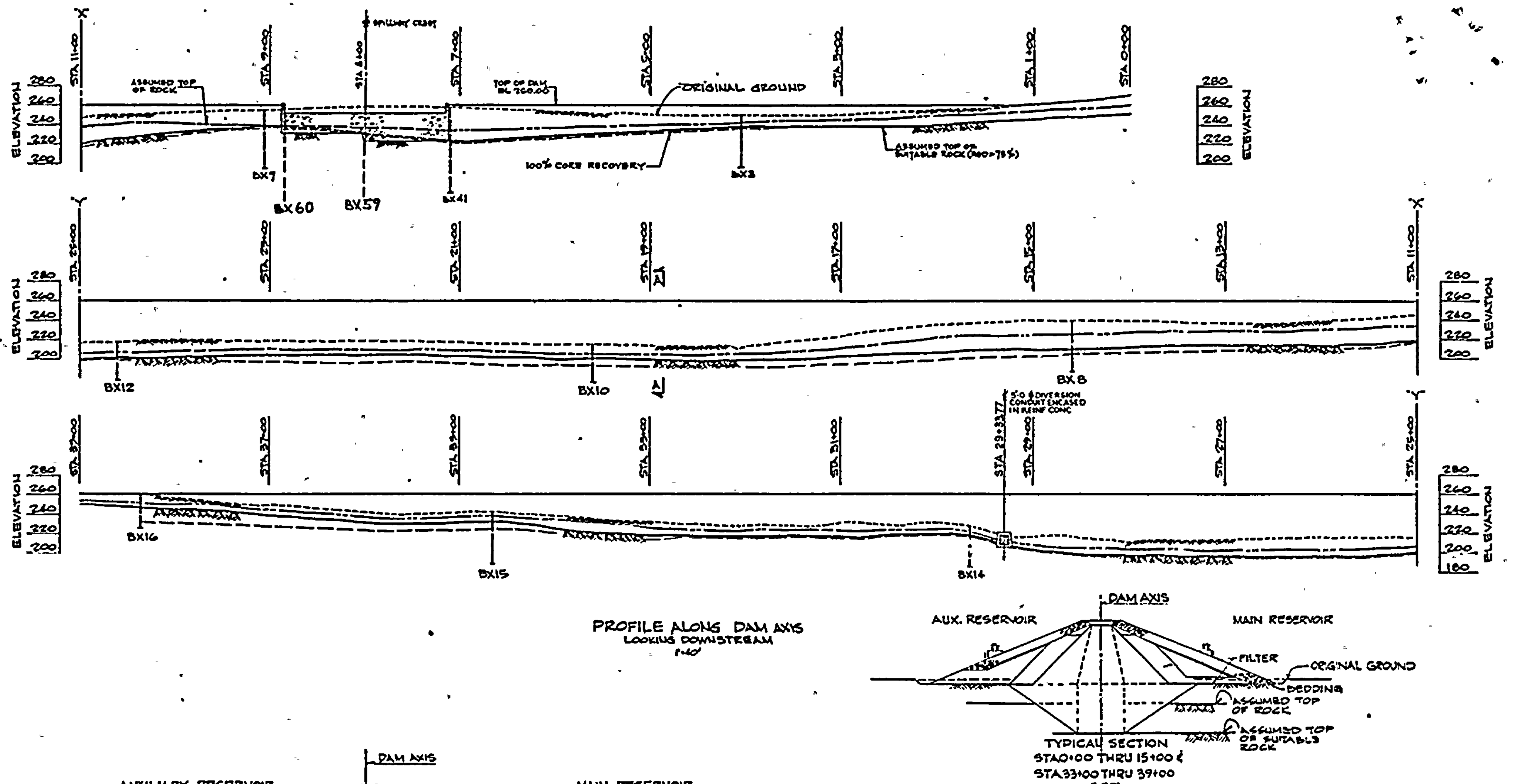

SECTION A-A (FIG 2.6-27)
1"=20'

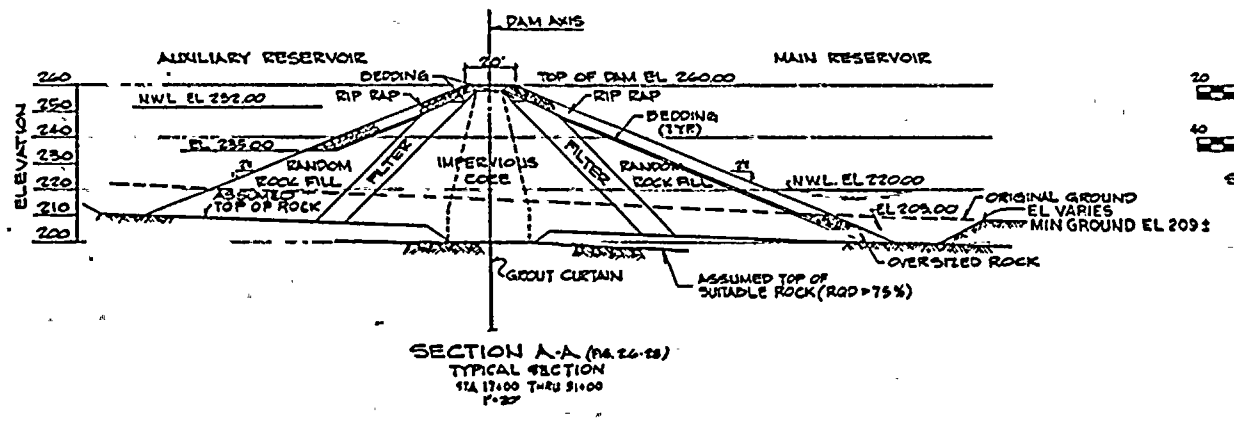
AMENDMENT NO. 27

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
UNITS 1, 2, 3 & 4

MAIN DAM PROFILE, SECTION & MATERIALS

2.6-27a




AMENDMENT NO. 27

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
UNITS 1, 2, 3 & 4

AUXILIARY DAM - PROFILE, SECTIONS AND MATERIALS

2.6-29

## General

Question 3:

"Describe more completely the extent to which vegetation will be removed from the future lake bed so that we might assess the value of the bed for ecological production as well as potentials for erosion and siltation."

CP&L Response:

This was discussed on page B.8-1 and C.1-1 of the Environmental Report, Amendment No. 28.

Cost Benefit

Question 1:

"Please update Table 4.1-2."

CP&L Response:

Attached is a revised Table 4.1-2 which shows the 1972 and 1973 actual summer peak loads. We have also updated the forecast loads to include the latest forecast (May, 1973) and changed the last column in the table to show average annual percent increase rather than average annual compound growth rate.

TABLE 4.1-2

CP&L SUMMER PEAK DEMANDS & INCREASES

| | Year | Summer Peak MW | Annual Increase MW | Annual Increase % | Average Annual % Increase |
|---|---|---|---|---|---|
| | 1965 | 1931 | - | - | |
| | 1966 | 2184 | 253 | 13.10 | |
| | 1967 | 2270 | 86 | 3.94 | |
| Actual | 1968 | 2834 | 564 | 24.85 | |
| | 1969 | 3055 | 221 | 7.80 | 11.97 |
| | 1970 | 3484 | 429 | 14.04 | |
| | 1971 | 3625 | 141 | 4.05 | |
| | 1972 | 4119 | 494 | 13.63 | |
| | 1973 | 4711 | 592 | 14.37 | |
| | 1974 | 5206 | 495 | 10.51 | |
| | 1975 | 5783 | 577 | 11.08 | |
| | 1976 | 6440 | 657 | 11.36 | |
| Forecast | 1977 | 7152 | 712 | 11.06 | 10.93 |
| | 1978 | 7943 | 791 | 11.06 | |
| | 1979 | 8819 | 876 | 11.03 | |
| | 1980 | 9776 | 957 | 10.85 | |
| | 1981 | 10801 | 1025 | 10.48 | |

Question 3:

The cost information on P. 8.4-8 is not clear and appears to disagree in part with that on P.E.4-1. Please clarify. The table on E.4-1 should also include mechanical-draft towers.

CP&L Response:

For comparative purposes, the following tables shows a cost comparison between the natural draft towers required and mechancial draft towers, and the 10,000 acre multi-use reservoir which the Company was required to abandon:

| | Base Case 10,000 Acre Cooling Lake | Natural Draft Towers with 4,000 Acre Makeup Pond | Mechanical Draft |
|---|---|---|---|
| Initial Capital Cost | 64,000,000 | (Lake) $24,000,000<br>(Towers) $73,000,000 | $24,000,000<br>72,780,000 |
| ANNUAL CHARGES | | | |
| *Carrying-Charge on Investment | 9,985,000 | $15,150,000 | $15,098,000 |
| **Power Cost | 10,000 | 860,000 | 1,450,000 |
| **Capacity Penalty | Base Case | 1,390,000 | 560,000 |
| Maintenance | 30,000 | 240,000 | 425,000 |
| Annual Charges Total | $10,025,000 | $17,640,000 | $17,533,000 |

*Based on 15.6% levelized fixed charge rate on the initial capital cost.
**Initial Study estimates, these values may be subject to change.

A summary table on Page E.4-1 shows the capital and annual costs for the 10,000 acre lake and natural draft towers. For the benefit of showing the estimated cost differential between the two systems, the following cost data is presented:

| Item | 10,000 Acre Cooling Lake | Cooling Towers | Difference |
|---|---|---|---|
| Initial Capital Cost | $64,000,000 | $97,000,000 | $33,000,000 |
| *Capitalized Annual Replacement Power Costs | Base Case | 16,776,000 | 16,776,000 |
| Total Cost Differential | | | $49,776,000 |

----------

*Capitalized using levelized fixed charge rate of 15.6% - (2,617,000) (Annual replacement power cost) 15.6% = $16,776,000)

This cost, however, does not include the cooling tower blowdown line or diffuser which has not been completely designed at this time.

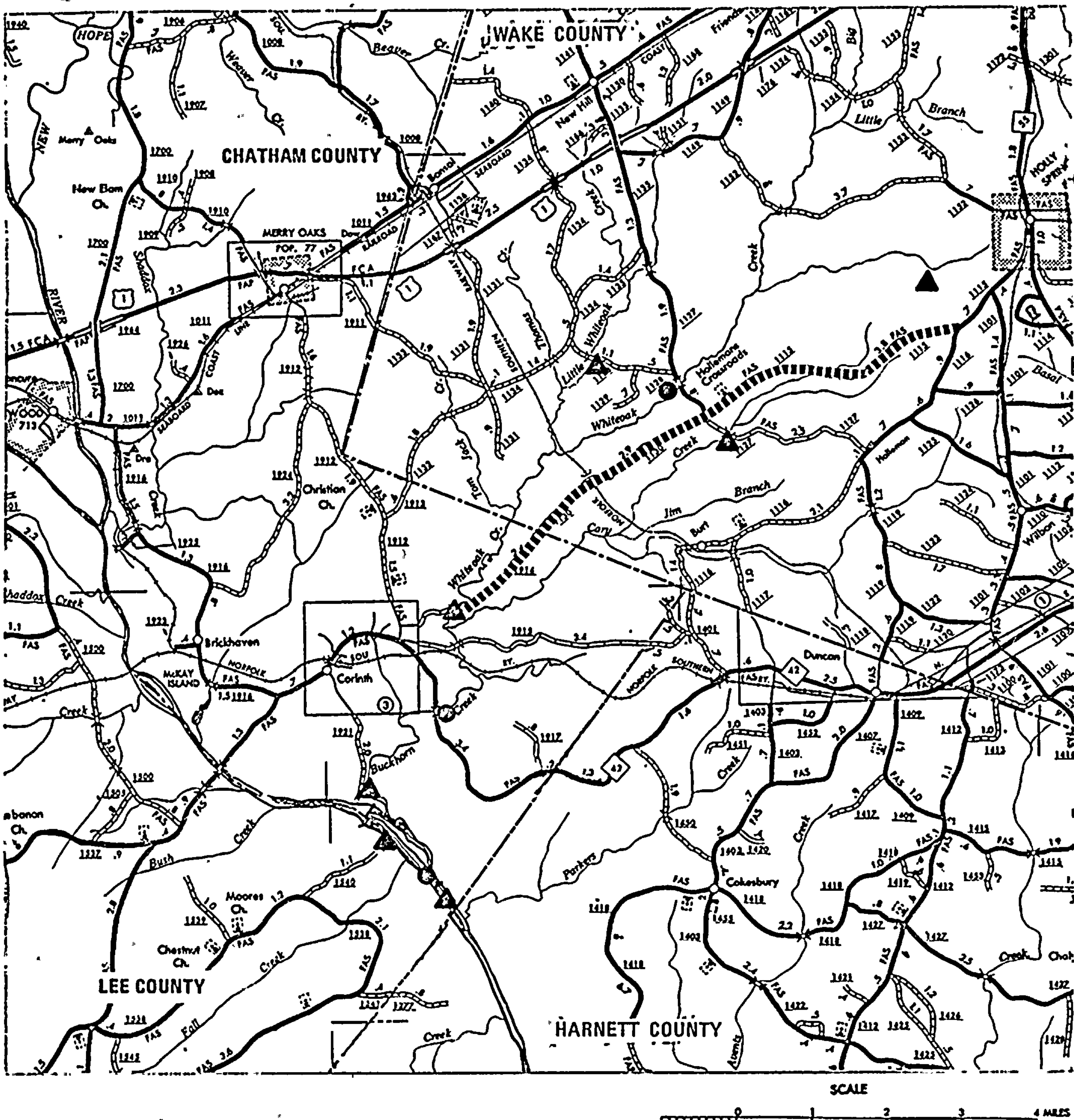
## Cost Benefit

Question 4:

"Please explain more completely the nature of land limitation restrictions of mechanical draft towers at the Buckhorn Creek site."

CP&L Response:

Section 8.4.2.1.1.1, Land Use, indicates that the mechanical draft towers require so much land that the towers are impractical. This is based upon the fact that the low discharge point, drift potential, fogging and icing characteristics, etc., are such that the location of mechanical towers must reflect these anticipated characteristics. To ensure the facility reliability and minize the impact of cooling towers, a criteria relating to tower placement and location would locate the towers symmetrically to the plant center line at a distance of no less than 800 feet and probably 1000 feet from any major plant structure, switchyards, or electrical equipment. This would ensure that salt deposition, icing, and fogging would not adversely affect the plant availability. Utilizing the above criteria along with the attempt to minimize impact upon other plant design, the current plant location on the peninsula would not allow the mechanical draft cooling towers to be located at this site.




LEGEND

▲ WATER QUALITY AND BIOLOGICAL SAMPLING STATION

● WATER QUALITY SAMPLING STATION

▮▮▮▮▮▮ WILDLIFE SURVEY ROUTE

CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
UNITS 1, 2, 3 & 4

SAMPLE STATIONS & WILDLIFE SURVEY ROUTE

FIGURE 6