DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1890
WILMINGTON, NORTH CAROLINA 28402

IN REPLY REFER TO
SAWCO77-N-073-006-0311

30 October 1978

Mr. M. A. McDuffie, Senior Vice President
Engineering and Construction
Carolina Power and Light Company
PO Box 1551
Raleigh, NC 27602

Dear Mr. McDuffie:

In accordance with the written request of 6 April 1977 and subsequent modifications indicated in the final EIS for Carolina Power and Light Company, Mayo Electric Generating Plant, dated September 1978, there is inclosed a permit authorizing you to discharge fill materials into waters of the United States, Mayo Creek and adjacent wetlands, for the construction of a main reservoir dam and cofferdam and relocation of a road in connection with the proposed 1440 MW coal-fired Mayo Electric Generating Plant near Roxboro, Person County, North Carolina.

If any change in the authorized work is required because of unforeseen or altered conditions or for any other reason, plans revised to show the change must be sent promptly to this office. Such action is necessary as revised plans must be reviewed and the permit modified.

Please carefully read your permit. The general and special conditions are important. Your failure to comply with these conditions could result in a violation of Federal law. Certain significant general conditions require that:

1. You must begin your work on or before 30 November 1979 and complete construction before 31 December 1981.

2. You must notify this office in advance as to when you intend to commence and complete work.

3. You must allow representatives from this office to make periodic visits to your worksite as deemed necessary to assure compliance with permit plans and conditions.

IA

Hand delivered to me by Frank Ulverton 30 Oct. 1978

SAWCO77-N-073-006-0311 30 October 1978

Mr. M. A. McDuffie, Senior Vice President

The inclosed Notice of Authorization, ENG Form 4336, must be conspicuously displayed at your worksite.

Sincerely yours,

Adolph A. Hight

ADOLPH A. HIGHT
Colonel, Corps of Engineers
District Engineer

2 Incl
1. Permit
2. ENG Form 4336

Application No. SAWC077-N-073-006-0311

Name of Applicant Carolina Power and Light Company

Effective Date (See page 4)

Expiration Date (If applicable) 31 December 1981

DEPARTMENT OF THE ARMY
PERMIT

Referring to written request dated 6 April 1977 for a permit to:

( ) Perform work in or affecting navigable waters of the United States, upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C. 403);

(XX Discharge dredged or fill material into navigable waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 404 of the Federal Water Pollution Control Act (86 Stat. 816, P.L. 92-500);

( ) Transport dredged material for the purpose of dumping it into ocean waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (86 Stat. 1052; P.L. 92-532);

Carolina Power and Light Company
PO Box 1551
Raleigh, NC 27602

◄ (Here insert the full name and address of the permittee)

is hereby authorized by the Secretary of the Army:

to discharge fill materials into waters of the U.S. for the construction of a main reservoir dam and cofferdam and relocation of a road

◄ (Here describe the proposed structure or activity, and its intended use. In the case of an application for a fill permit, describe the structures, if any, proposed to be erected on the fill. In the case of an application for the discharge of dredged or fill material into navigable waters or the transportation for discharge in ocean waters of dredged material, describe the type and quantity of material to be discharged.)

in Mayo Creek

◄ (Here to be named the ocean, river, harbor, or waterway concerned.)

at NEAR Roxboro, Person County, North Carolina

◄ (Here to be named the nearest well-known locality—preferably a town or city—and the distance in miles and tenths from some definite point in the same, stating whether above or below or giving direction by points of compass.)

in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit (on drawings: give file number or other definite identification marks);

subject to the following conditions:

I. General Conditions:

a. That all activities identified and authorized herein shall be consistent with the terms and conditions of this permit; and that any activities not specifically identified and authorized herein shall constitute a violation of the terms and conditions of this permit which may result in the modification, suspension or revocation of this permit, in whole or in part, as set forth more specifically in General Conditions j or k hereto, and in the institution of such legal proceedings as the United States Government may consider appropriate, whether or not this permit has been previously modified, suspended or revoked in whole or in part.

b. That all activities authorized herein shall, if they involve a discharge or deposit into navigable waters or ocean waters, be at all times consistent with applicable water quality standards, effluent limitations and standards of performance, prohibitions, and treatment standards established pursuant to Sections 301, 302, 306 and 307 of the Federal Water Pollution Control Act of 1972 (92-500; 86 Stat. 816), or pursuant to applicable State and local law.

c. That when the activity authorized herein involves a discharge or deposit of dredged or fill material into navigable waters, the authorized activity shall, if applicable water quality standards are revised or modified during the term of this permit, be modified, if necessary, to conform with such revised or modified water quality standards within 6 months of the effective date of any revision or modification of water quality standards, or as directed by an implementation plan contained in such revised or modified standards, or within such longer period of time as the District Engineer, in consultation with the Regional Administrator of the Environmental Protection Agency, may determine to be reasonable under the circumstances.

d. That the permittee agrees to make every reasonable effort to prosecute the work authorized herein in a manner so as to minimize any adverse impact of the work on fish, wildlife and natural environmental values.

e. That the permittee agrees to prosecute the work authorized herein in a manner so as to minimize any degradation of water quality.

f. That the permittee shall permit the District Engineer or his authorized representative(s) or designee(s) to make periodic inspections at any time deemed necessary in order to assure that the activity being performed under authority of this permit is in accordance with the terms and conditions prescribed herein.

g. That the permittee shall maintain the structure or work authorized herein in good condition and in accordance with the plans and drawings attached hereto.

h. That this permit does not convey any property rights, either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations, nor does it obviate the requirement to obtain State or local assent required by law for the activity authorized herein.

i. That this permit does not authorize the interference with any existing or proposed Federal project and that the permittee shall not be entitled to compensation for damage or injury to the structures or work authorized herein which may be caused by or result from existing or future operations undertaken by the United States in the public interest.

j. That this permit may be summarily suspended, in whole or in part, upon a finding by the District Engineer that immediate suspension of the activity authorized herein would be in the general public interest. Such suspension shall be effective upon receipt by the permittee of a written notice thereof which shall indicate (1) the extent of the suspension, (2) the reasons for this action, and (3) any corrective or preventative measures to be taken by the permittee which are deemed necessary by the District Engineer to abate imminent hazards to the general public interest. The permittee shall take immediate action to comply with the provisions of this notice. Within ten days following receipt of this notice of suspension, the permittee may request a hearing in order to present information relevant to a decision as to whether his permit should be reinstated, modified or revoked. If a hearing is requested, it shall be conducted pursuant to procedures prescribed by the Chief of Engineers. After completion of the hearing, or within a reasonable time after issuance of the suspension notice to the permittee if no hearing is requested, the permit will either be reinstated, modified or revoked.

k. That this permit may be either modified, suspended or revoked in whole or in part if the Secretary of the Army or his authorized representative determines that there has been a violation of any of the terms or conditions of this permit or that such action would otherwise be in the public interest. Any such modification, suspension, or revocation shall become effective 30 days after receipt by the permittee of written notice of such action which shall specify the facts or conduct warranting same unless (1) within the 30-day period the permittee is able to satisfactorily demonstrate that (a) the alleged violation of the terms and the conditions of this permit did not, in fact, occur or (b) the alleged violation was accidental, and the permittee has been operating in compliance with the terms and conditions of the permit and is able to provide satisfactory assurances that future operations shall be in full compliance with the terms and conditions of this permit; or (2) within the aforesaid 30-day period, the permittee requests that a public hearing be held to present oral and written evidence concerning the proposed modification, suspension or revocation. The conduct of this hearing and the procedures for making a final decision either to modify, suspend or revoke this permit in whole or in part shall be pursuant to procedures prescribed by the Chief of Engineers.

l. That in issuing this permit, the Government has relied on the information and data which the permittee has provided in connection with his permit application. If, subsequent to the issuance of this permit, such information and data prove to be false, incomplete or inaccurate, this permit may be modified, suspended or revoked, in whole or in part, and/or the Government may, in addition, institute appropriate legal proceedings.

m. That any modification, suspension, or revocation of this permit shall not be the basis for any claim for damages against the United States.

n. That the permittee shall notify the District Engineer at what time the activity authorized herein will be commenced, as far in advance of the time of commencement as the District Engineer may specify, and of any suspension of work, if for a period of more than one week, resumption of work and its completion.

o. That if the activity authorized herein is not started on or before 30th day of November, 19 79, (one year from the date of issuance of this permit unless otherwise specified) and is not completed on or before 31st day of December, 19 81, (three years from the date of issuance of this permit unless otherwise specified) this permit, if not previously revoked or specifically extended, shall automatically expire.

p. That no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized by this permit.

q. That if the display of lights and signals on any structure or work authorized herein is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard shall be installed and maintained by and at the expense of the permittee.

r. That this permit does not authorize or approve the construction of particular structures, the authorization or approval of which may require authorization by the Congress or other agencies of the Federal Government.

s. That if and when the permittee desires to abandon the activity authorized herein, unless such abandonment is part of a transfer procedure by which the permittee is transferring his interests herein to a third party pursuant to General Condition v hereof, he must restore the area to a condition satisfactory to the District Engineer.

t. That if the recording of this permit is possible under applicable State or local law, the permittee shall take such action as may be necessary to record this permit with the Register of Deeds or other appropriate official charged with the responsibility for maintaining records of title to and interests in real property.

u. That there shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein.

v. That this permit may not be transferred to a third party without prior written notice to the District Engineer, either by the transferee's written agreement to comply with all terms and condition of this permit or by the transferee subscribing to this permit in the space provided below and thereby agreeing to comply with all terms and conditions of this permit. In addition, if the permittee transfers the interests authorized herein by conveyance of realty, the deed shall reference this permit and the terms and conditions specified herein and this permit shall be recorded along with the deed with the Register of Deeds or other appropriate official.

The following Special Conditions will be applicable when appropriate:

STRUCTURES FOR SMALL BOATS: That permittee hereby recognizes the possibility that the structure permitted herein may be subject to damage by wave wash from passing vessels. The issuance of this permit does not relieve the permittee from taking all proper steps to insure the integrity of the structure permitted herein and the safety of boats moored thereto from damage by wave wash and the permittee shall not hold the United States liable for any such damage.

DISCHARGE OF DREDGED MATERIAL INTO OCEAN WATERS: That the permittee shall place a copy of this permit in a conspicuous place in the vessel to be used for the transportation and/or dumping of the dredged material as authorized herein.

ERECTION OF STRUCTURE IN OR OVER NAVIGABLE WATERS: That the permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the authorized structure or work, shall, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the waterway to its former conditions. If the permittee fails to comply with the direction of the Secretary of the Army or his authorized representative, the Secretary or his designee may restore the waterway to its former condition, by contract or otherwise, and recover the cost thereof from the permittee.

MAINTENANCE DREDGING: (1) That when the work authorized herein includes periodic maintenance dredging, it may be performed under this permit for _____years from the date of issuance of this permit (ten years unless otherwise indicated); and (2) That the permittee will advise the District Engineer in writing at least two weeks before he intends to undertake any maintenance dredging.

II. Special Conditions (Here list conditions relating specifically to the proposed structure or work authorized by this permit):

ne project must be constructed in accordance with the plans, descriptions, and commitments included in the Final EIS, Carolina Power and Light Company, Mayo Electric Generating Plant, September 1978.

This permit shall become effective on the date of the District Engineer's signature.

Permittee hereby accepts and agrees to comply with the terms and conditions of this permit.

CAROLINA POWER AND LIGHT COMPANY

By: _____ October 30, 1978

PERMITTEE DATE

Senior Vice President, Engineering and Construction
Title

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

_____ 30 October 1978

ADOLPH A. HIGHT, COLONEL DATE

DISTRICT ENGINEER,
U.S. ARMY, CORPS OF ENGINEERS

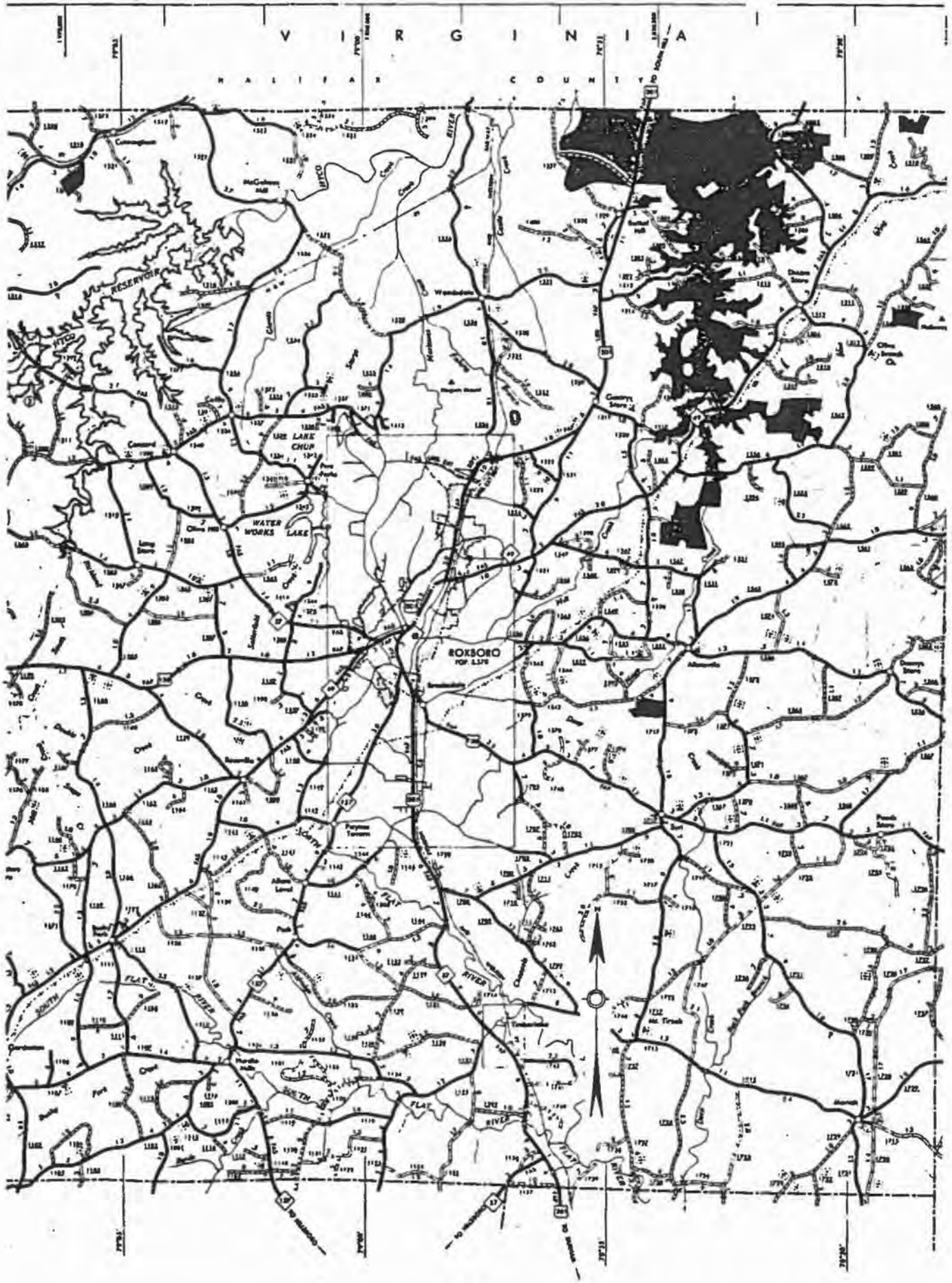
Transferee hereby agrees to comply with the terms and conditions of this permit.

_____ _____

TRANSFEREE DATE

PERSON GAME LAND

Carolina Power & Light Co., Continental Hopewell Woodlands Inc., Champion International, Person County (9,254 acres)



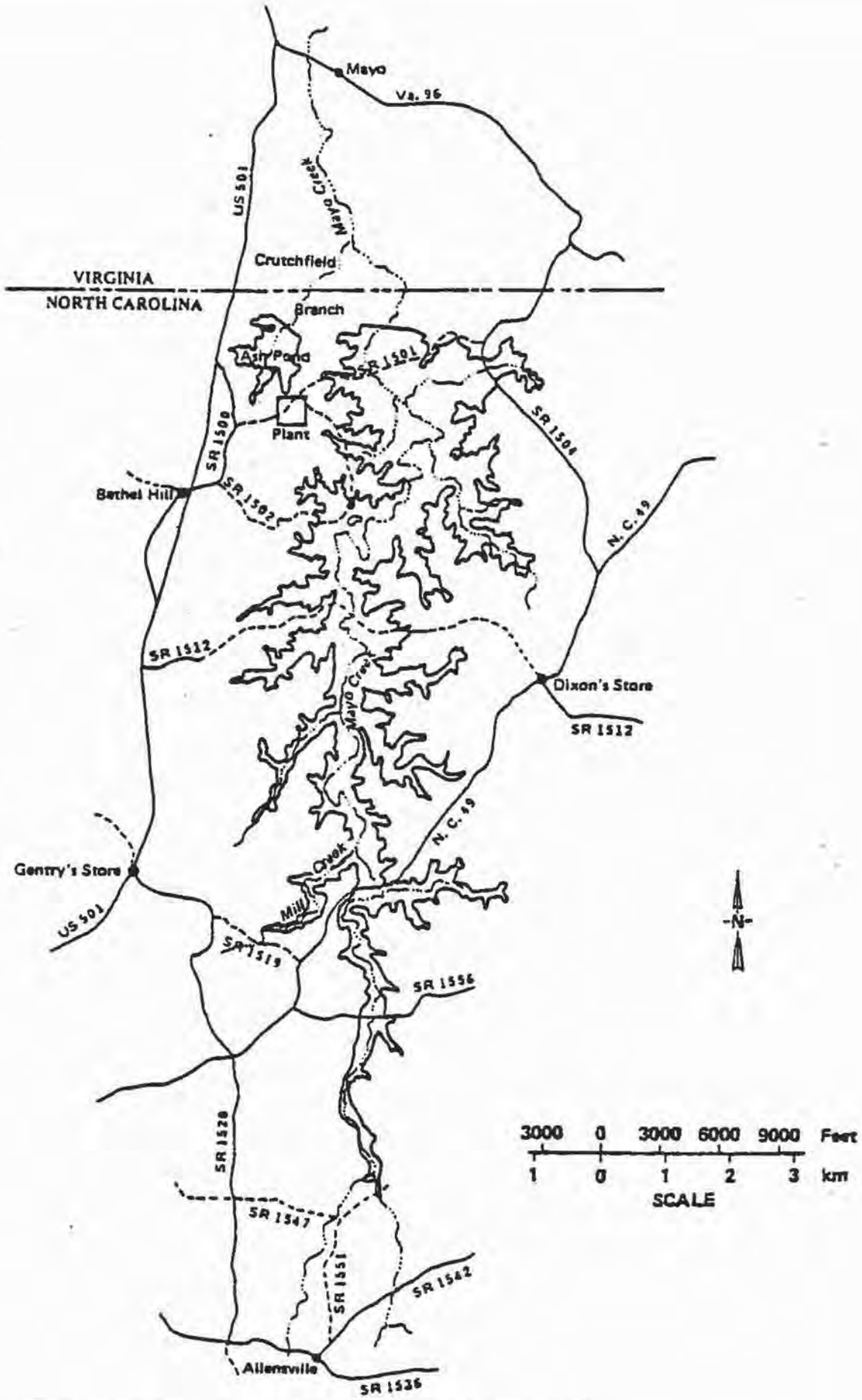


Figure 1.3–2 MAYO ELECTRIC GENERATING PLANT SITE

Summary

Mayo Electric Generating Plant

( ) Draft Environmental Statement (X) Final Environmental Statement

Responsible Office: U.S. Army Engineer District
PO Box 1890
Wilmington, NC 28402
Telephone (919) 343-4640
FTS 671-4640

1. Name of Action: (X) Administrative ( ) Legislative

2. Description of Action: The proposed action concerns an application by Carolina Power and Light Company for a permit to discharge fill materials into waters of the United States in connection with the proposed 1440 megawatt (MW) Mayo Electric Generating Plant. This permitting authority is administered by the Corps of Engineers under authority of Section 404 of the Clean Water Act. The aspects of the project that require a permit are the discharge of fill into waters of the United States, Mayo Creek and adjacent wetlands, for construction of a main reservoir dam and associated cofferdam, and the relocation of a road. The reservoir is to impound approximately 2,800 acres. The purpose of the reservoir is for cooling and makeup water for the proposed coal-fired generating plant. All aspects of the project except the transmission corridors are to be located in the Mayo Creek drainage basin in Person County, northeast of Roxboro, North Carolina.

Other aspects of the proposed project not requiring permits such as ash ponds, transmission corridors, plant construction, etc., are all discussed in detail.

3.a. Environmental Impacts: If the project is completed as proposed, CP&L projects that it will be able to meet the estimated loads of CP&L's wholesale and retail customers and maintain a margin of reserve capacity. Without the plant, CP&L indicates it will be unable to meet its customers demands in the 1980's. The plant would employ an average of 500 individuals during construction and 150 during operation. Also the completed facility could provide by 1985 over $3 million of tax revenue annually to Person County. Finally, the proposed 2,800 acre reservoir would provide recreational opportunities for the general public.

b. Adverse Environmental Effects: Approximately 5,000 acres of the total of 7,986 acres of terrestrial habitat would be altered by the reservoir, plant site and transmission corridors. This includes the displacement of 23 families and a loss of a total of 700 acres of cropland and pastureland. The flow below the main reservoir dam and ash pond dam will be reduced and aquatic habitat altered. Air quality will be impacted by stack emission and water quality impacted by waste water discharges. Finally, the aesthetics of the area will be altered.

4. Alternatives to the Proposed Action: Several types of alternatives were considered. These included different site locations, types of fuels, waste disposal and transmission corridors. Also the no action alternative which includes a discussion of energy conservation, was considered.

5. Comments Requested:

Environmental Protection Agency, Region IV
Forest Service, USDA
Clearinghouse and Information Center
Greensboro Area Office, HUD
ECOS, Inc.
U.S. Department of Commerce
Federal Energy Administration
U.S. Department of the Interior
Fifth Coast Guard District
Department of HEW
Environmental Defense Fund, Inc.
Conservation Council of North Carolina
Federal Highway Administration
League of Women Voters
National Audubon Society
NC Wildlife Federation
National Wildlife Federation
Soil Conservation Service, USDA
N.C. Conservation Chairman, Sierra Club
Board of Person County Commissioners
Mayor, City of Roxboro
Mayo Area Conservationists
Mrs. Mary M. Winstead
Mr. Doyle T. Peed
Mr. and Mrs. Travis W. Peed

5. Comments Requested (Cont.):

Mr. John H. Merritt
Mr. and Mrs. G. W. Kane
Mr. John W. Merritt
Mr. Marvin Stewart
Mr. Alan Johnson
Mr. Robert P. Wheeler
Mr. Victor S. Bryant
Mr. Thomas Erwin
Mr. T. Mdodana Ringer, Jr.
Mrs. Rama J. Williams
Mr. and Mrs. Buck Street
Mr. and Mrs. Edwin M. Robertson, Jr.

6. Draft Statement to EPA 5 May 1978.

7. Final Statement to EPA SEP 2 2 1978.

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List of Abbreviations Used

ac	acre(s)
ac-ft	acre-feet
ACSR	Aluminum Conductor Steel Reinforced
Btu/hr	British Thermal Units Per Hour
Btu/lb	British Thermal Units Per Pound
cfs	Cubic Feet Per Second
CP&L	Carolina Power and Light
DEIS	Draft Environmental Impact Statement
DEM	Division of Environmental Management
D.O.	Dissolved Oxygen
EEI	Electrical Energy Institute
FEIS	Final Environmental Impact Statement
ft	Feet
ft^2/ac	Square Feet Per Acre
gm	Gallons Per Minute
ha	Hectare(s)
hm^3	Cubic Hectometer(s) ($1X10^6$ Cubic Meters)
J/hr	Joules Per Hour
J/kg	Joules Per Kilogram
J/kwh	Joules Per Kilowatt Hour
km	Kilometer(s)
km^2	Square Kilometer(s)

List of Abbreviations Used (Cont.)

l/s	Liters Per Second
m	Meters
MCM	Million Circular Mils
mg/l	Milligrams Per Liter
M^2/ha	Square Meters Per Hectare
mi	Mile(s)
mi^2	Square Miles
M^3/S	Cubic Meters Per Second
msl	Mean Sea Level
MVA	Million Volt Amperes
MW	Megawatt
mybp	Million Years Before Present
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
ppm	Parts Per Million
psig	Pounds Per Square Inch Gauge
ug/m^3	Micrograms Per Cubic Meter
umhos/cm	Micromhos Per Centimeter
yds	Cubic Yards

GLOSSARY

These terms have been selected in the hope that this document would be comprehensible to a reader not totally familiar with the operation of a coal fired steam electric generating plant.

Air Heater - An air heater is utilized to reclaim heat from the flue-gas that would otherwise be lost and to add that heat to the air required for the combustion of the fuel.

Ash Pond - Collection pond to which solid residue ash resulting from combustion of coal is transported and allowed to settle.

Bottom Ash - The solid residue which remains in the combustion chamber following coal combustion.

Coal Pile Drainage - Rainfall runoff from coal pile.

Concentration Factor - The ratio of the concentrations of corrosive or fouling chemicals (e.g., silica or total dissolved solids) to ambient water quality.

Cooling Tower Blowdown - A release of cooling tower water designed to help maintain circulating water quality and minimize the accumulation effects of dissolved solids, scale formation, corrosion, and biological fouling.

Cooling Tower Make-Up - As cooling towers operate on a closed cycle basis, water losses resulting from evaporation and blowdown are replenished via make-up water from the reservoir.

Cooling Tower Plume - A visible plume which may form from a cooling tower when warm moist air from a cooling tower mixes with cooler surrounding air resulting in the condensation of water vapor.

Drift-eliminator - Process by which mechanically entrained water droplets generated inside the cooling tower are controlled to prevent being exhausted into the atmosphere.

Electrostatic Precipitator - An ash control device placed between the combustion chamber and the exhaust stack to reduce ash emissions by a screening and ionization attraction process.

Entrainment - A movement of organisms from the intake water canal through the plant cooling water systems.

Fly Ash - The ash collected by the electrostatic precipitators and deposited in hoppers.

Howell-Bunger Valve - A fixed-cone valve regulating water discharge in a widely dispersed (cone-shaped) jet that freely aerates the water.

Impingement - The trapping of organisms against the cooling water intake screening system.

Oily Wastes - Any waste stream containing visible amounts of oil and/or grease.

Precipitator Rapper - A cleaning procedure designed to remove the accumulated ash from the precipitator collecting plates to maintain good collection efficiency.

Precipitator Rectifier An electrical component which converts high voltage alternating current to direct current which is essential for the operation of the precipitator.

Seiche - An oscillation of the surface of a lake intake that varies in period from a few minutes to several hours.

Wastewater Collection Pond - A holding pond where wastewater streams resulting from numerous activities of power plant operation are collected and treated prior to discharge.

Section 1

1.0 PROJECT DESCRIPTION

1.1 PURPOSE

The purpose of this Final Environmental Impact Statement (FEIS) is to comply with Section 102(2)(c) of the National Environmental Policy Act of 1969 (Pub. L. 91-190), and the Council on Environmental Quality Guidelines for Statements on Proposed Federal Action Affecting the Environment, dated 1 August 1973. This statement provides detailed information on the permit application by Carolina Power and Light Company for the Mayo Electric Generating Plant near Roxboro in Person County, North Carolina. The permit application is being considered under Section 404 of the Clean Water Act as administered by the Department of the Army through the Corps of Engineers. The FEIS is being circulated to all interested persons, groups, organizations and local, State, and Federal governments in order to obtain comments on the proposed action. These comments will aid the District Engineer, Wilmington District, U.S. Army Corps of Engineers, in compiling his statement of findings regarding the proposed action.

The specific activities of the proposed project that require a 404 permit are those that require the placement of fill materials in Mayo Creek and associated wetlands. These activities are the placement of fill for the main reservoir dam, cofferdam, and the relocation of NC 49 on Mayo Creek. All significant aspects of the entire project are discussed in this EIS and will be considered when a decision on the project is made.

The DEIS indicated that a 404 permit was required for coal ash discharge into Crutchfield Branch and construction of the ash pond dam. This activity would normally have been covered by a Section 404 nationwide permit [33 CFR 323-2(a)(1)] since the project site is above the 5 CFS flow point. However, this nationwide permit does not apply if the discharge of toxic pollutants is involved [33 CFR 323-2(b)(1)(2)]. We considered coal ash toxic pollutant, but recently the determination was made that the ash discharge was not a 404 matter but rather covered under Section 402 of the Clean Water Act which is administered by the N.C. Division of Environmental Management under the NPDES permit program. Therefore, since the ash pond construction would not invovle the discharge of toxic pollutants covered by Section 404, the dam is permitted by the nationwide permit.

Prior to the issuance of this FEIS, CP&L undertook several activities at the site that did not require Department of the Army permits. In the spring of 1977, CP&L diverted Mayo Creek at the site of the proposed dam. The "S" shaped diversion canal is approximately 732 m (2,400 ft) long. This diversion was performed prior to the effective date of the Corps 404 permitting authority in the area. The effective date of permitting authority was 1 July 1977. The diversion canal intersects the creek approximately 152 m (500 ft) upstream of the dam site, crosses the creek perpendicular to the proposed dam alignment and connects back to the creek some 152 m (500 ft) downstream on the dam alignment.

The canal is deeper than the creek bed and under normal conditions the stream bed is dry between the canal intersections. The water is also diverted from the old creek bed by dikes which are present at the canal and stream bed intersections. Since flow has been diverted out of the old stream bed, the stream bed is no longer considered waters of the United States.

Other activities not requiring a Department of the Army permit such as clearing and logging of the plant site, reservoir area and road relocation right-of-ways have been going on since the fall of 1977. At the time of this printing the reservoir clearing is 72% complete with all material either burned or buried.

Four roads which cross the proposed reservoir require relocation. On NC 49 the foundations for two interior piers have been excavated and the concrete has been placed. On secondary road 1512 all foundations have been excavated and placed with concrete stems and caps in place. The approach embankment has been constructed on the east and west sides of the proposed reservoir. On secondary road 1556, the temporary detour is completed along with the placement of a permanent embankment. On secondary road 1504, the clearing and placement of the embankment is underway and is approximately 10% complete.

Overall construction of the main dam is approximately 30% complete. Excavation of foundations and spillway is 80% complete. Presently, the installation and encasement of the reservoir drain is approximately 70% complete. Approximately 2% of the rock and earthen embankment material has been replaced with 100% of the borrow area cleared.

No wetlands have been filled in this process; however, any wetlands adjacent to the diverted creek have been removed by excavation. If a permit is issued for the closing of the main dam into Mayo Creek, CP&L plans to initiate this work immediately. The closing of the dam would initially consist of the installation of diversion pipes and associated fill.

Representatives of CP&L have been informed that any work that is or has been performed at the site in anticipation of obtaining a Department of the Army 404 permit is done at their own risk. CP&L has acknowledged this risk.

The proposed generating plant was previously advertised by the public notices of 28 April 1977, 23 June 1977, 8 December 1977, and 5 May 1978. The 28 April 1977 public notice announced the application, the 23 June 1977 notice indicated the availability of an Environmental Assessment prepared by the applicant and notified additional people of the application.

The 8 December 1977 notice announced the Corps of Engineers' decision to prepare an Environmental Impact Statement (EIS) pursuant to Section 102 (2)(c) of the National Environmental Policy Act of 1969. the 5 May 1978 public notice informed the general public of the availability of the Draft EIS (DEIS) and of a public hearing on the project in Roxboro on 6 June 1978.

1.2 INTRODUCTION

Carolina Power and Light Company is an electric utility which serves approximately a 78,000 km^2 (30,000 mi^2) area in North Carolina and South Carolina. This area includes a substantial portion of the Coastal Plain and lower Piedmont regions of North Carolina and South Carolina and an area of western North Carolina in and around the City of Asheville. Electric service is rendered to over 200 communities with populations of over 500 persons. In addition, CP&L provides wholesale service to 24 municipal electric systems, 18 rural electric cooperatives and 2 privately-owned utilities. The estimated total population in the territory served by CP&L is in excess of 2,800,000 persons.

The purpose of the Mayo Electric Generating Plant is to provide the additional generating capacity to meet the estimated loads of CP&L's wholesale and retail customers and to maintain a margin of reserve capacity for the system.

CP&L's total power resources, load, and reserve as projected for the period during which the two 720 MW coal-fired Mayo Units are scheduled to be in commercial operation (1982-1985), are shown on Table 1.2-1, both with and without the Mayo Plant. Table 1.2-2 shows the resources, load, and reserve for the Virginia-Carolinas (VACAR) Reliability Subregion of the Southeastern Electric Reliability Council in the 1982-1985 period with and without the Mayo Units. Table 1.2-3 shows the VACAR resources, load, and reserve with all fossil-fired steam units delayed one year. Table 1.2-4 shows resources, load, and reserve for the VACAR Subregion with all fossil-fired steam units having commercial operation dates after January 1, 1982, including the Mayo Units cancelled.

CP&L indicates that the Mayo Plant would constitute 8% of its total power resources in 1982, when unit No. 1 is operational and slightly over 13.5% in 1985 if the second unit is in commercial operation. As indicated in Table 1.2-1, CP&L projects that the installation of these two units would help to relieve a reserve capacity shortage situation during these years, and would approach the 15-20% reserve level which the N.C. Utilities Commission considers reasonable. The plant will operate as base load generation during this period.

According to CP&L, the Mayo Plant would add approximately 3.5% to the VACAR Subregion reserves if the second unit is installed in 1985.

1.3 LOCATION

The Mayo Electric Generating Plant site is located on Mayo (also known as Maho) Creek in Person County, North Carolina, about 16 km (10 mi) northeast of Roxboro. The site is about 16 km (10 mi) east of the CP&L Roxboro Steam Electric Plant (Hyco Reservoir) and 80 km (50 mi) north-northwest of Raleigh, the State capitol (Figure 1.3-1). The Norfolk and Western Railway and U.S. 501 run north and south about 6.5 km (4 mi) and 0.8 km (0.5 mi) respectively, west of the site. North Carolina Highway 49 runs in a southwest-northeast direction, crossing the reservoir near its upper end. Several county roads traverse the site, crossing the reservoir at various places (Figures 1.3-2, and 1.3-3).

The proposed site development involves construction of a dam on Mayo Creek approximately 610 m (2,000 ft) south of the Virginia-North Carolina State line, impounding a 1,135 ha (2,800 ac) reservoir with a normal water level approximately 132 m (434 ft) above mean sea level.

1.4 LAND UTILIZATION

Land requirements for the Mayo project would involve a total of 3,222 ha (7,986 ac), with more than half of this total associated with the reservoir (Table 1.4-1). Included in the category called "Other" would be railroads, service roads, onsite transmission lines, plant administrative and service buildings, and surrounding company-owned lands.

1.5 PROPOSED FACILITIES

1.5.1 Power Plant

The power plant would be located about 1.6 km (1 mi) south of the Virginia State line and would be between US 501 and the proposed reservoir, as shown on Figure 1.3-2. It would consist of power plant structures, cooling towers, coal storage area, railroad siding, an ash pond, and other treatment facilities. Prominent plant features are shown on Figure 1.5-1.

Each unit would consist of one turbine-generator and two coal-fired steam generators with an output capability of 720 MW. The plant would be an outdoor type with enclosures provided for the control room, sanitary facilities, control centers, machine shop, and other facilities as required. The turbine-generators would be in line and oriented in a general north-south direction. Other plant structures include precipitators, chimneys, coal handling equipment, switchyard, and the administration building.

The coal storage area would be located west of the plant site and would consist of the coal pile, a coal unloader, a conveyor system, and railroad facilities for delivery of coal. According to a representative of the State Utilities Commission, the coal contract for the plant was approved by the Commission and the coal will come from eastern Kentucky. The coal is high quality and contains low concentrations of sulfur. The plant will use an average of 10,000 tons of coal per day. This is approximately 100 coal cars per day.

This plant would have four mechanical draft cooling towers, two for each unit. These towers would be located east of the plant and parallel to the turbine-generators. The circulating water pipe would run from the plant to the cooling tower area; each cooling tower would handle one-half of the flow from each generating unit.

The ash disposal area would be located northwest of the plant site on Crutchfield Branch (Figure 1.3-2). The ash pond at Crutchfield Branch would be constructed with a normal operating water level at approximate elevation 146 m (480 ft) msl. The dam for this impoundment would be approximately 760 m (2500 ft) long, the maximum height would be approximately 29 m (95 ft), and the crest would be about 3 m (10 ft) above the normal pond operating level. The borrow area for the dam would be within the ash pond limits. The surface area of the ash pond would be approximately 65 ha (160 ac) and the storage would be about 5.5 hm^3 (4500 ac-ft).

CP&L has acquired over 875 acres of land west of US 501 for possible auxiliary ash pond site (see Figure 1.3-2). If all the bottom and fly ash generated at the plant during its life must be disposed of at or near the site, this auxiliary ash pond will be required. However, this area may not be used if CP&L is able to sell its fly ash. No detail design specifications have been done on the auxiliary ash pond due to the uncertainty of its use but the ash pond could incorporate approximately 130 acres of the area.

1.5.2 Reservoir

A reservoir would be constructed on Mayo Creek to create a dependable supply of water to replace water loss from evaporation and blow down from the plant's cooling towers. The proposed dam and reservoir would be located in the Roanoke River basin as shown on Figure 1.5-2. Mayo Creek is a tributary of the Hyco River which empties into the U.S. Army Corps of Engineers' John H. Kerr reservoir. The drainage area of Mayo Creek at the proposed dam site is 135 km^2 (52 mi^2). There are no impoundments between this project and Kerr Reservoir.

An embankment dam would be constructed on Mayo Creek about 610 m (2,000 ft) south of the Virginia State line to create the impoundment as shown on Figure 1.3-2. This reservoir would have a surface area of 1,135 ha (2,800 ac) at a normal water level of elevation 132 m (434 ft) msl. The reservoir would be approximately 13 km (8 mi) long, about 0.8 km (0.5 mi) wide, and would have a shoreline of about 137 km (85 mi). The average depth would be about 9 m (30 ft). At the normal water level, the reservoir would have a total storage of 105 hm^3 (85,000 ac-ft), of which 60 hm^3 (49,000 ac-ft) would be reserved for cooling tower make-up and plant service water requirements during periods of insufficient creek flow. The proposed Mayo reservoir would take approximately 2-1/2 years to fill to normal pool elevation. However, during 10-year drought periods, approximately 4 years would be required to reach normal pool elevation.

The dam on Mayo Creek would be a zoned embankment; the impervious core would be supported by a pervious shell structure. A typical embankment section is shown on Figure 1.5-3. The dam would be about 30 m (100 ft) high, 855 m (2,800 ft) long, and have a crest width of about 5 m (15 ft).

In order for the main reservoir dam to be constructed, a cofferdam will be constructed in Mayo Creek just upstream of the centerline of the proposed dam. This will allow the main dam to be constructed "in the dry." The water impounded by the cofferdam would be diverted by pipes out of the creek bed and under the main dam. The cofferdam would be constructed essentially along the alignment of the main dam and much of this cofferdam would be incorporated as part of the main dam when construction is complete. Therefore, the impacts of these two structures will be considered as one throughout the rest of this EIS. The borrow area for these structures would be within the reservoir limits (the construction techniques and impact discussions will be the same for the ash pond, see Section 1.5.1).

The storage capacity in the reservoir is designed for use during annual low-flow periods as well as for long-term droughts. The reservoir is designed to supply water for plant use based on the occurrence of a 100-year frequency drought. If this drought condition occurs, the minimum water level in the reservoir is expected to be at elevation 125 m (410 ft) which corresponds to about 7 m (24 ft) of drawdown. However, the reservoir drawdown during an average flow year would not exceed 0.6 m (2 ft).

Average Year Drawdown	0.6 m (2 ft)
10-Year Drawdown	1.2 m (4 ft)
20-Year Drawdown	3.7 m (12 ft)
100-Year Drawdown	7.3 m (24 ft)

The average annual natural flow of Mayo Creek is estimated to be about 1416 1/s (50 cfs); however, there is a significant variability of flow. The natural stream flow is estimated to range from about 565 m^3/s (20,000 cfs) during a 100-year flood to 0.1 CFS on a once in 10 years frequency (the 7-day, 10-year low flow).

According to CP&L, the dam, reservoir, and spillway have been designed to safely pass the probable maximum flood. In order to pass the anticipated maximum flood without damage to the embankment, there would be a normal spillway with an uncontrolled crest of elevation 132 m (434 ft) and a second spillway with an uncontrolled crest at elevation 134 m (439 ft) msl. The combined spillway system would have a maximum reservoir level at elevation 136 m (445 ft) for the largest naturally occurring flood which could occur at this site. The dam and project boundary is 5 feet higher than this elevation in order to provide for wave runup, seiche, and backwater effects. The maximum stream flow during this design basis flood would be approximately 2,158 m^3/s (76,000 cfs).

In addition, there would be a low-level minimum release system with two intake locations in order to allow release flows of about 57 1/s (2 cfs) when the main reservoir is below the normal spillway crest. This release would be discharged through a Howell-Bunger valve in order to provide aeration. However, this release will be held to 0.1 CFS during severe droughts. No water is to be released during reservoir filling.

At the request of the N.C. Utilities Commission, the N.C. Department of Natural Resources and Community Development reviewed the design drawings and accompanying specifications for the proposed Mayo Creek Dam from a dam safety standpoint. The details of this review are included in Section 4.5.

1.5.3 Cooling Towers, Circulating Water System and Water Budget

The Mayo plant would use mechanical draft cooling towers with net make-up water withdrawal for replacement of water loss due to evaporation and blow down; the make-up would be supplied by the reservoir. Each unit would utilize two cooling towers and would circulate about 16 m^3/s (260,000 gpm) of water to remove a maximum of 3.8×10^{12} J/hr (3.6×10^9 Btu/hr) of unusable heat from the condensers. The cooling towers would be reinforced concrete structures with asbestos-cement fill. A sketch of a typical cross-flow cooling tower is shown on Figure 1.5-4.

Each tower would consist of a series of eight cells and would handle one-half of the circulating water flow for each unit. Each cell has one fan and one-eighth of the fill. Approximate dimensions of the cooling tower structure are 91 m (300 ft) long, 21 m (70 ft) wide, and 15 m (50 ft) high. Three pumps would circulate water through the condensers and cooling towers; the pumps would be located between parallel towers.

Expected cooling tower parameters include a design wet bulb temperature of 26.1°C (79°F), a design hot water temperature of 47.8°C (118°F) with a range of 15.7°C (28°F) and an approach to the design wet bulb of 7.3°C (13°F). The towers would be equipped with drift eliminators which will limit drift losses to about 0.01% of the circulating water flow rate. Average evaporative losses from the four towers are estimated to be about 425 l/s (15 cfs) for the plant.

Blowdown would be accomplished from the cold water collecting basin and is projected to have the following average monthly outlet temperatures:

Jan	Feb	Mar	Apr	May	June	
75°	75°	77°	81°	85°	88°	°F
23.9°	23.9°	25°	27.2°	29.4°	31.1°	°C

July	Aug	Sep	Oct	Nov	Dec	
90°	90°	87°	82°	75°	75°	°F
32.2°	32.2°	30.6°	27.8°	23.9°	23.9°	°C

The present design for the Mayo E. G. Plant is to use cooling tower blowdown as the water source for ash sluicing purposes. Should ash sluice water needs be less than the cooling tower blowdown discharge (e.g., during summer months) then some portion of the cooling tower blowdown would be conveyed directly to the Mayo Impoundment and would reflect the above expected temperatures. The water discharged from the ash pond to the reservoir should be close to ambient reservoir temperatures due to retention time.

The ash sluice system requires an average flow of 20 CFS. Coupled with the average evaporation loss of 15 CFS from the cooling towers, approximately 35 CFS of make-up water will be drawn from the reservoir. The make-up water intake would be a concrete structure on the reservoir shoreline with the floor at elevation 119 m (390 ft) msl at a depth sufficient to reduce removal of fishes and other aquatic organisms from the lake. Intake velocities will be limited to 0.15 m/s (0.5 ft/s). Concrete or similar smooth material would be used around the intake in order to minimize the attractiveness of the area to fish. For more details of design of the intake structure see Appendix I.

Corrosion inhibitors are no longer planned to be used in the circulating water system. The circulating water system would be chlorinated to control algae growth. Chloride residuals as well as other chemicals in the cooling tower blowdown are to be held within the limitations provided for in the National Pollutant Discharge Elimination System (NPDES) permit for the plant (see Section 1.5.5.1). Cooling tower blowdown is

expected to be continuous during plant operation. The blowdown volume is expected to be typical for units of this size and should be within the range of 50 million to 80 million l/day [13 million to 21 million gallons per day (mgd)].

CP&L conducted reservoir modeling on the proposed reservoir to determine water quality in the proposed reservoir (Appendix G). The predicted levels of total dissolved solids (TDS) indicated in this model were used in part to establish a concentration factor range compatible to the closed cycle cooling tower system. This factor is to range from 2 to 4. A factor of 2 would probably be used when the TDS is high such as during critical drawdown periods. A factor of 4 will probably be used during normal operation.

The effects of these and other systems on the water budget are indicated in Tables 1.5-1 and 1.5-2.

1.5.4 Ash Handling System

CP&L's ash handling system would consist of bottom ash hoppers, clinker grinders, electrostatic precipitator hoppers, a pneumatic conveying system, and silos. The bottom ash would be collected in bottom ash hoppers; from this point, it would be sluiced to the ash pond (Figure 1.5-5) for sedimentation, pH adjustment treatment, and secondary oil removal. The water would be routed back to the reservoir by an open channel.

The fly ash would be removed from the electrostatic precipitators by a pneumatic conveying system and would be sluiced to the ash pond. Upon reaching the ash pond, the fly ash handling cycle would be identical to the bottom ash cycle, where treatment would be achieved through sedimentation, pH adjustment, and oil removal. It is possible that some ash would be sold, and this will affect the life of the ash pond. Depending on possible sales and on the ash content of the coal, the ash pond could last from about 20 years to about 36 years.

Some typical ash pond effluent parameters and average concentrations are sulfate, 46 ppm; silica, 4.8 ppm; iron 0.75 ppm; and selenium, 0.03 ppm. There would also be small amounts of suspended ash materials in the effluent. CP&L projects that the highest concentration of selenium in the reservoir over a 20-year period will be .013 ppm as a result of the ash pond discharge of 0.03 ppm. This concentration would occur under drought conditions (Appendix G). The average daily water flow from the ash pond would be approximately 50 million l/day (13 mgd) (20 cfs).

1.5.5 Discharge Treatment System

1.5.5.1 Liquid Waste Standards

Wastewater treatment for the plant is to consist of an oily/water treatment system, boiler acid cleaning treatment system, metal cleaning treatment system, low-volume waste treatment system, sanitary waste treatment system, and oil spill prevention facilities.

Wastewater discharges resulting from the operation of the Mayo Plant would be subject to effluent limit concentrations required by the National Pollutant Discharge Elimination System (NPDES) permit. CP&L has not received this permit as of printing of this statement. The company has requested a legal definition from the N. C. Division of Environmental Management (DEM) as to whether the Mayo units are subject to "existing source" or "new source" limitations. The DEM has found the Mayo Plant to be a "new source" and consequently the following discharge categories and limitations indicated in Table 1.5-3 are applicable.

1.5.5.2 Liquid Waste Disposal Areas

Oily waste would be collected in the oily wastewater collector and then routed to the oil/water separator system (Figure 1.5-5). The water, separated from the oil, would be routed to the main reservoir, and the oil would be routed to the fuel oil containment system. The overflow water from the oily wastewater collector would be routed to a wastewater transfer sump. From the transfer sump, the water will be routed to the ash pond for sedimentation, pH adjustment treatment, and secondary oil removal.

To promote natural yard drainage of rainwater, the plant area would be filled to grade elevation with select excavation material. The site would be graded so that natural runoff to the reservoir is allowed and rainwater collection in the yard drainage system is prevented.

Runoff from the coal pile would be collected in the ash pond. Too control coal dust emissions in the area of the coal handling facility, CP&L is planning to install bag filters on the coal crusher and conveyor towers. Additionally the coal arriving at the plant site will have been washed. Residual moisture will help to control coal dust.

Wastewater from boiler acid cleaning would be routed to the metal cleaning waste retention pond by the ash sluice system. The metal cleaning waste pond would be located adjacent to the ash pond for chemical precipitation and pH adjustment.

"No Discharging" wastewater permits have been issued by DEM for concrete aggregate and batching operations. These facilities have no discharge to surface waters. CP&L will be allowed to conduct an equivalency demonstration as a condition of the NPDES permit to show that treatment in the ash pond will precipitate iron and copper compounds present in the metal cleaning wastes. If the ash pond equivalency demonstrations are unsuccessful the company proposes to treat metal cleaning wastes in a retention basin by adjusting the pH of the wastes to produce a precipitate. All precipitants from the metal cleaning waste will either be permanently retained in the waste pond or ash pond.

The low-volume plant waste (plant drains, water treatment wastes, etc.) would be routed to the ash pond for sedimentation, pH adjustment, and secondary oil removal treatment. The low-volume waste will be permanently retained in the ash pond.

All sanitary waste would receive secondary treatment and chlorination. The treated effluent would be discharged to the main reservoir.

The plant systems would be designed to contain oil spills. Fuel unloading facilities used for unloading light-off oil from rail tankers would be provided with collection pans to collect any spilled fuel during unloading operation. The fuel unloading facilities for truck tankers would include a curbed unloading pad and an impervious underground oil spill containment pit. The trucks are to be unloaded within the curbed area; the pit would hold the capacity of the tanker. Other potential oil spill areas would be curbed. All spills from these oil spill prevention facilities would be routed to the oily wastewater collection system.

1.5.5.3 Air Quality Control System

An electrostatic precipitator containing two units for each boiler would be installed to collect the flue gas stream between the economizer and air heater. It would be designed to handle the flue gas emitted from the boiler at a temperature range of 260°C (500°F) to 371°C (700°F) and is commonly known as a hotside precipitator. The precipitator would be designed to allow a particulate (ash) emission rate no greater than 45 g (0.10 lb) of particulate per 1.05×10^9 J (million Btu) of heat input from coal with the highest expected ash content of 25%. The precipitator would have a weatherproof deck, and enclosure for outdoor installation, rectifiers, rapper system, and all required accessories.

Both the collector plates and high voltage discharge electrode system are rapped automatically on a programmed schedule for frequency and cycle to cause precipitated dust to settle into the hoppers for storage and removal.

Daily coal sampling is to be composited on a weekly interval and will be used to test compliance with SO_2 emission limits.

1.5.6 Transmission Facilities

CP&L maintains direct interconnections with Duke Power Company, Virginia Electric and Power Company, South Carolina Electric and Gas Company, and South Carolina Public Service Authority as a member of the Virginia-Carolinas Reliability Subregion of the Southeastern Electric Reliability Council. CP&L indicates that in order to connect the Mayo generating capacity to this existing transmission system requires the construction of a 500 kV switchyard at Mayo Plant, a 500/230 kV substation adjacent to the existing Roxboro Plant, a 500 kV transmission line from Mayo Plant to the Roxboro 500/230 kV substation, and a 500 kV transmission line from the Mayo plant to the existing Wake 500/230 kV substation by way of the future Durham 500 kV substation. In addition, a 230 kV circuit for plant start-up is to be run to the Mayo plant as a tap from the existing Roxboro-Henderson 230 kV line.

1.5.6.1 Switchyard

The Mayo 500 kV switchyard is to be located directly across the main access road from the plant and would occupy an area of approximately 244 m (800 ft) by 305 m (1,000 ft) (Figure 1.5-1). The major components of the switchyard are two 500 kV line terminals, six 500 kV circuit breakers, a 500 kV bus system, and a switchyard relay house containing control and protective equipment for the switchyard and transmission lines. The switchyard is connected to the plant generators by means of a 500 kV tie line to each generator. These tie lines are connected to the generator main transformers, which consist of three 265 MVA, 500/19.5 kV single-phase transformers for each generator.

1.5.6.2 Transmission Corridors

The locations of the proposed transmission lines associated with the Mayo Electric Generating Plant are illustrated in Figures 1.5-6 and 1.5.7. Each of the three proposed transmission lines are described below.

1.5.6.2.1 Mayo-Wake 500 kV

The proposed Mayo-Wake 500 kV line begins at the Mayo Electric Generating Plant Switchyard in Person County, extends through portions of Granville, and Durham Counties via the future Durham Substation (Section 6.2.4.2.1), and terminates at the existing Wake Substation in Wake County (Figure 1.5-6). The total length of the line is approximately 113 km (70 mi).

Tentative plans call for the line to be constructed on steel lattice towers utilizing 2-2515 MCM bundled ACSR conductors per phase. Structure heights would range from 27 m (90 ft) to 48 m (160 ft) above ground, and span lengths would average about 330 m (1,100 ft). The right-of-way would be 54 m (180 ft) wide. The actual width to be cleared for the right-of-way would depend on economic considerations, electrical constraints, and minimal environmental impact. The construction of this line would require a total of approximately 607 ha (1,500 ac) of right-of-way.

The Mayo-Wake line crosses the following number of highways and streams:

28 North Carolina secondary roads

1 North Carolina primary road (N.C. 49)

2 U.S. highways (U.S. 158 and U.S. 15)

1 Interstate highway (I-85)

*15 Streams and/or rivers

*This includes two crossings of the proposed Falls Lake Reservoir.

At the existing Wake Substation, additional capacity would be provided by installing transformers, circuit breakers, and buswork to accommodate the new 500 kV line. No additional land would be required at the Wake Substation. See figure 1.5-6.

1.5.6.2.2 Mayo-Roxboro 500 kV

The proposed Mayo-Roxboro 500 kV Line begins at the proposed Mayo Electric Generating Plant Switchyard and extends to the proposed Person 500/230 kV Substation, all within Person County, North Carolina. The total length of the line is approximately 14.7 km (9.1 mi). See figure 1.5-7.

Tentative plans call for the Mayo-Roxboro line to be constructed on steel lattice towers utilizing 3-1590 MCM ACSR conductors for each of the three phases. The same structure specifications for the Mayo-Wake Line will be used for the Mayo-Roxboro Line. The construction of this line will require a total right-of-way easement area of 80 ha (199 ac).

The proposed Mayo-Roxboro Line will cross the following number of highways and streams:

5 North Carolina secondary roads

1 U.S. Highway (U.S. 501)

4 Streams

To accommodate the Mayo-Roxboro Line, the proposed Person 500/230 kV Substation will be built just west of SR 1336. This substation will be connected to the existing Roxboro Plant 230 kV Switchyard by two short 230 kV lines which will be constructed totally on CP&L property associated with the Roxboro Plant.

1.5.6.2.3 Mayo 230 kV Tap

The Mayo 230 kV Tap Line would tap CP&L's existing Roxboro-Henderson North 230 kV line and extend north approximately 5 km (3 mi) to the Mayo Electric Generating Plant (Figure 1.5-6). The tap line would be located in the same corridor with the proposed Mayo-Wake 500 kV line with a 38 m (125 ft) separation between the center lines of the two lines. This entire construction would take place within Person County.

The 230 kV tap line would be constructed on low-profile wood H-frame structures with one 795 MCM ACSR conductor per phase. The total right-of-way width (including the Mayo-Wake 500 kV line) would be 80 m (265 ft). This right-of-way width includes 15 m (50 ft) west of the 230 kV centerline, 38 m (125 ft) separation between centerlines, and 27 m (90 ft) east of the 500 kV centerline. The construction of this line would require approximately 12 ha (30 ac) of right-of-way.

This line would cross four North Carolina secondary roads and no major streams.

There are no substations associated with the construction of this line. The Mayo 230 kV tap line would connect directly to the two 230 kV start-up transformers at the Mayo Electric Generating Plant and would not connect to the Mayo 500 kV switchyard. See figure 1.5-6.

1.5.6.2.4 Maintenance

Right-of-way maintenance would occur every 3-5 years and would involve mowing and selective cutting of trees near the lines.

1.5.7 Relationship to Other Water Resources Projects

The main reservoir that would serve the Mayo Electric Generating Plant would be located on Mayo Creek in Person County, North Carolina. Mayo Creek is a tertiary tributary in the Roanoke River Basin. The main reservoir dam would control a drainage area of approximately 13,520 ha (52 mi^2) of the Mayo Creek watershed and is to be located approximately 6.4 km (4 mi) upstream of the confluence of Mayo Creek and Hyco River.

Hyco River is a tributary to the John H. Kerr Reservoir on the Roanoke River. Hyco River drained into the Dan River which drained into the Roanoke River prior to the creation of Kerr Reservoir. Mayo Creek makes up about 21.4% of the average annual Hyco River flow.

The Kerr Reservoir was constructed and is operated by the U. S. Army Corps of Engineers. Operation of the Kerr Reservoir provides flood control, recreation, electric power generation, low flow augmentation, and water supply benefits. The Mayo Creek Reservoir will control approximately 0.7% of the total drainage area of 2,020,200 ha (7,800 mi^2) of the Kerr Reservoir.

1.5.8 CP&L Proposed Mitigation of Adverse Environmental Effects

According to CP&L, in the selection of this site and in the design of the plant, minimization of environmental impact was an important consideration. Section 6.1 indicates the environmental studies conducted in plant site selection.

The design of the plant incorporates features that will minimize impact to the biological resources. The plant will use closed cycle cooling instead of once-through, thereby reducing the volume of water withdrawn from the impoundment for plant operation. The make-up water intake structure will be concrete with the basin floor at elevation 119 m (390 ft) msl. Intake velocities will be limited to 0.15 m/sec (0.5 ft/sec). Concrete or similar smooth material will be used around the intake in order to minimize the attractiveness of the area to small fish. The intake point will be as deep as possible to reduce the removal of fish and other aquatic organisms from the lake.

Particulate emissions to the atmosphere from the combustion of coal will be controlled by the installation and operation of electrostatic precipitators that are designed to remove 99.6% of particulate matter from the flue gas stream. Emissions of oxides of sulfur and nitrogen will be controlled by burning low sulfur coal and by boiler design, respectively. Wastewaters that will originate as a result of plant operations will be treated in accordance with best available technology and the discharge will be consistent with the limitations established in the NPDES permit for the plant.

Maintenance of a minimum stream flow during drought conditions will be accomplished by discharge of 2 CFS through Howell-Bunger valves, which will also aerate the water. However, during drought periods the discharge may be reduced to 0.1 CFS - the 7-day, 10-year low flow. No water will be released during reservoir filling.

CP&L indicates that facilities installed at the Mayo plant to minimize adverse environmental effects will cost about $87,000,000 and include such equipment as the mechanical draft cooling towers, electrostatic precipitators and wastewater treatment systems.

The creation of a potential sport fishery (Section 4.2.2.1.1.1 and 4.3.2.1.2) in the Mayo reservoir will constitute a partial mitigation for the loss of creek and terrestrial habitat within the reservoir boundaries. To the extent practicable and consistent with the primary purpose of the Mayo Electric Generating Plant site, the lands and impounded waters associated with the project will be made available to the public in those areas determined by the company to be compatible with the operation of the plant. Property around the lake or plant area will not be sold or leased by CP&L for private development. Also, no private construction of piers, docks, moorings, or similar facilities will be permitted adjacent to the lake.

Cooperative discussions for the mitigation of wildlife and fish resources have been conducted between CP&L, the N.C. Wildlife Resources Commission, (NCWRC) and the U.S. Fish and Wildlife Service (USFWS). These discussions have included the following topics concerning wildlife management: providing (1) wildlife access areas, (2) boat ramp facilities, and (3) game lands program. For fishery management, the stocking of appropriate game species and joint management by the N.C. Wildlife Resources Commission and CP&L have been discussed. In accordance with the requests from the N.C. Wildlife Resources Commission and the U. S. Fish and Wildlife Service, CP&L will leave approximately 20 acres of standing timber which will be partially inundated upon filling of the reservoir. This area of flooded timber will be an attractive habitat for utilization by waterfowl and fish. This area should not cause mosquito problems since the NC Department of Human Resources has regulatory control over the impounded water (Section 1.8). This control includes reviewing design techniques to prevent stagnant water and other habitats which would encourage breeding populations of mosquitoes.

The company has proposed certain lands for wildlife habitat management in cooperation with the N.C. Wildlife Resources Commission. As the project is presently planned, a west auxiliary ash pond area is included to provide additional ash storage capacity if eventually needed. Until such time as it may be required for ash disposal, CP&L anticipates this area being available for involvement in wildlife management programs in cooperation with the N.C. Wildlife Resources Commission. This auxiliary ash pond area is west of US Highway 501 and is approximately 875 acres in size (Figure 1.3-2). The entire area not specifically utilized by plant and related facilities on Mayo project lands east of US 501 will be made available to NCWRC. These lands total approximately 710 acres.

The lands required for this project which will surround the Mayo reservoir as a provision for long term floods is between elevation 434 feet and elevation 450 feet. The area between these two contours is about 1,300 acres. Thus a total of 2,905 acres of wildlife habitat will be protected from private development and this land together with the 2,800-acre Mayo reservoir will be managed in cooperation with the N.C. Wildlife Resources Commission, consistent with the primary purpose of generating electric power. Appendix F contains the entire mitigation plan agreed to between CP&L and the Wildlife Resources Commission and the U.S. Fish and Wildlife Service.

1.6 PROJECT CONSTRUCTION SCHEDULE

Onsite construction activities started in January 1978. Other activities, such as logging and clearing of land, started prior to this date and are essentially complete except for the ash pond area.

However, none of these activities required a Department of the Army permit. The first year will be primarily utilized in preparing the site and in construction of the main dam. This is to allow adequate time for filling the reservoir. Unit #1 is planned to be in commercial operation by 1982. Installation of the Unit #2 boiler and pressure parts will follow consecutively for commercial operation in March 1985. An overall project construction schedule is shown in Figure 1.6-1.

1.6.1 Plant Site Preparation

To provide the necessary requirements of the project, approximately 3,288,000 m^3 (4,300,000 yd^3) of earth and rock will be excavated in a balanced cut and fill operation. Approximately 1,146,900 m^3 (1,500,000 yd^3) of fill material will be excavated from within the coal storage area to obtain the elevation requirements of the project. All excavating operations will be performed strictly in accordance with State regulations for sedimentation, erosion control, and dust abatement. See Appendix H.

1.6.1.1 Site Clearing

For the total project, approximately 1,296 ha (3,200 ac) will require stripping of vegetation. This work is to be accomplished for three basic areas, and each of these areas will necessitate a different criteria for clearing.

1.6.1.1.1 Plant Area

Timber, logs, brush, rubbish, and vegetation that interfered with the grading operation or affect the planned stability of fill areas was removed. Most logging operations have been completed. This material was disposed of onsite by either burning in strict accordance with State regulations or disposal in landfill cells complying with State regulations.

1.6.1.1.2 Dam Area

Clearing of the area required for construction of the dam structure was limited to the area immediately around the dam and the borrow area which is located within the reservoir. These areas were stripped of all above and below ground portions of vegetation and disposed of in accordance with State regulations for burning and landfill operation.

1.6.1.1.3 Reservoir Area

In the area to be occupied by the impounded water, all trees and other growth shall be cut. Most of the logging activities have been completed. Below ground elevation 128 m (421 ft), stump height does not exceed 45 cm (18 in) above average grade; all stumps above ground elevation 128 m (421 ft) are being flush cut with the surrounding grade.

The debris is being disposed of in accordance with regulations by either burning or placing in landfill cells within the reservoir area.

1.6.1.2 Structures

Vacated and abandoned structures within the project boundaries which interfered with construction, operation, and maintenance are being demolished. The debris is being disposed of in compliance with State regulations for solid materials.

1.6.1.2.1 Railroads

The exact route for the railroad line to the Mayo Plant from the main line is now being determined by the Norfolk and Western (N&W) Railway but it is expected that the proposed rail spur from the N&W main line will pass north of the west auxiliary ash pond, cross under US 501, and approach the plant from the southwest as shown on Figure 1.6-2. This rail spur is being designed and constructed by the N&W.

1.6.1.2.2 Roads

Based on investigations involving road counts and school bus routes acquired from local authorities, four traffic corridors crossing the reservoir will be adjusted as necessary to maintain traffic flow. The secondary roads that terminate on property acquired for this project are to be abandoned. Roads crossing the floodplain boundary of the reservoir are being modified as indicated below. The Person County Board of Commissioners approved or required that the following relocations be made (Figure 1.6-3): SR 1501 is being relocated downstream of the dam. The exact location has not been established as of the date of this impact statement. However, if the road would require filling in a wetlands area, CP&L would apply for construction of this road under separate application.

A portion of SR 1512 is being realigned northward along SR 1582 and should then proceed across the creek. SR 1504 is being realigned just east of its present location beginning approximately 200' south of the 1501 intersection and proceeding southward for 2,500'. SR 1556 and NC 49 are being reconstructed to cross the project area approximately in their existing location. As proposed, only the relocation of NC 49 would require a Department of the Army permit.

In the relocation of NC 49, Mayo Creek and most of the adjacent wetlands will be bridged. Approximately 1 acre of wetlands will be filled by the approach causeway. The other location will either bridge all significant wetlands or the filling of the areas are permitted by regulations (33 CFR 323.4-2 (a)(i)). All borrow materials for the roads are to be obtained within the reservoir boundary.

The sections of roads to be abandoned in the project site are also indicated in Figure 1.6-3.

1.6.1.3 Site Power

A 23 kV, three-phase overhead circuit has been constructed from Roxboro North 138/23 kV Substation to the Mayo plant site. The line follows the routing indicated in Figure 1.6-4. The line is approximately 16 km (10 mi) in length. Approximately 11 km (7 mi) of the line will is overbuilt along CP&L's existing distribution lines that serve the area.

The substation and the portion of the 23 kV circuit situated on the Mayo plant site will be removed upon completion of construction at the Mayo plant. The remainder of the 23 kV circuit will remain in place and will be used to serve distribution customers.

1.6.2 Transmission Facilities

The construction procedures for the transmission lines associated with the Mayo Electric Generating Plant are separated into three sections: right-of-way preparation, 500 kV line construction, and 230 kV line construction.

1.6.2.1 Right-of-Way Preparation

In the portion of the right-of-way that is to be totally cleared, all woody vegetation is to be cut to a height not to exceed 10 cm (4 in) above the surface of the ground. All cut debris would be removed and piled on each side of and completely within the right-of-way boundaries, leaving an unobstructed strip for construction. A vista screen would be left and maintained where feasible at all major road crossings. In the vista screens, only selective clearing and trimming are to be done. At stream crossings, a buffer zone of selective clearing of not less than 3 m (10 ft) each side of the stream would be maintained. Also, manual clearing would be done on all steep slopes where the possibility of soil erosion is considered significant. Outside the right-of-way, all trees that, upon falling, would threaten the integrity of the line are to be considered danger trees and would be cut to fall parallel with the corridor. The right-of-way is to be maintained in accordance with the above specifications with a danger tree and mowing cycle occurring approximately every three to five years.

A clearing plan specifying the clearing techniques to be employed for the entire length of the line will be prepared by CP&L prior to construction for all corridors. This plan will mainly emphasize sensitive areas such as streams and swamps so that the clearing contractor would avoid excessive environmental damage like sedimentation and altering asthetics.

An Erosion Control Plan will be filed with the State of North Carolina in accordance with the rules and regulations of the Sedimentation Pollution Control Act of 1973. This plan will specify all protective measures to be taken in areas where significant soil erosion is a possibility. If significant soil erosion does occur, the soil will be stabilized by applying a suitable ground cover in accordance with recommendations of the U.S.D.A. Soil Conservation Service.

1.6.2.2 500 kV Line Construction

Tentative plans call for the 500 kV lines to be built using steel lattice tower structures ranging from 27 m to 48 m (90 ft to 160 ft) in height. Some blasting may be required if rock is encountered in digging the foundations.

1.6.2.3 230 kV Line Construction

The 230 kV line will be built using wood H-frame structures ranging in height from 15 m to 23 m (50 ft to 75 ft). The previously described general clearing practices will take place at all structure locations.

1.7 FUTURE PLANS

Because the designed capacity of the Mayo Electric Generating Plant utilizes the available Mayo Creek water resource, CP&L has no plans for the expansion of this plant.

1.8 PERMITS REQUIRED FOR THE CONSTRUCTION AND OPERATION OF THE MAYO PLANT

Construction and operation of the proposed Mayo Electric Generating Plant will require approvals from both State and Federal regulatory agencies.

The N. C. Utilities Commission issued a Certificate of Public Convenience and Necessity to CP&L, in March 1977, for the Mayo Plant. This certificate was issued after having public hearings considering the need for additional electric power and the overall public need including impacts on the local citizens. In addition, the commission evaluated the projected load and reserve figures presented by CP&L. Then the commission projected their own figures prior to issuing the certificate. CP&L filed applications for permits to impound water with the N. C. Department of Human Resources in September 1974, for the Mayo Creek reservoir and the ash-settling pond. A representative from the local health department in Roxboro will make an inspection of the site prior to issuing any construction permits for the reservoir and the ash-settling pond. After the ponds have been constructed a permit is required from the Department of Human Resources for impounding and maintenance of impounded water. These permits will remain in force as long as maintenance of the impoundments is consistent with the preservation of public health.

In the event CP&L proposes to landfill construction debris, they have indicated that all necessary approvals for solid waste disposal will be obtained from the N. C. Department of Human Resources.

CP&L has obtained engineering data from the N. C. Department of Transportation relative to the existing highways and bridges subject to State jurisdiction in the vicinity of the Mayo site. Conceptual modifications have been presented to the N. C. Department of Transportation for approval. The highway and bridge relocations, as approved by the Department of Transportation, are being constructed in accordance with applicable State specifications. In addition, CP&L has obtained all necessary approvals from the U. S. Department of Transportation and local officials.

In March 1974, CP&L filed application for and received a permit from the N. C. Office of Water and Air Resources (now the Division of Environmental Management) authorizing subsurface investigations at the Mayo site. This permit has been amended several times to include authorization for additional foundation borings and observation wells. In addition, CP&L is to file an application for a well construction permit with the Division of Environmental Management for a potable water supply well.

Prior to commencing any land-disturbing activities in areas exceeding one contiguous acre a Sediment and Erosion Control Plan must be approved by the Land Quality Section with the N. C. Department of Natural Resources and Community Development. CP&L's plan for the plant site, reservoir and ash pond area was approved in December 1977 (See Appendix H). CP&L has not as yet submitted a plan for the transmission corridors.

On 10 August 1977 the N. C. Division of Environmental Managment issued permits for the "Discharge of Air Contaminants into the Atmosphere" for Mayo units one and two (Appendix B, permit B-2). These permits are subject to the "New Source Performance Standards" as promulgated in 40 CFR 60. The Environmental Protection Agency (EPA) has reviewed the permits issued by the State and reviewed the "Preliminary Construction Review and Preliminary Determination of the Mayo Creek Electric Generation Facility of Carolina Power and Light Company to be constructed near Roxboro, North Carolina" prepared by the State (Appendix B, permit B-2). EPA confirmed by letter of 28 October 1977 that the State's permits conform to the "Prevention of Significant Deterioration" (PSD) 40 CFR 52.21 and 52.1778 criteria and that CP&L's proposal is consistent with the Clean Air Act Amendments of 1977 (P.L. 95-95, 7 Aug 1977). EPA's 28 October 1977 letter also included an "Authority to Construct" subject to the conditions of the State permits. See Section 4.3.1 and tables B-5 and B-6 for an explanation of New Source and PSD Standards.

CP&L filed an application for a National Pollutant Discharge Elimination System (NPDES) permit for the Mayo plant with the N. C. Division of Environmental Management in May 1977. The NPDES permit controls the wastewater discharges subject to State/Federal effluent limitations and specifies effluent monitoring requirements. In May 1977, the Division

of Environmental Management issued Certification No. 1187 for the Mayo plant pursuant to Section 401 of the Federal Water Pollution Control Act Amendments of 1972 (Appendix E). This certification requires discharges of wastewater from the proposed plant be conducted in accordance with the terms and conditions to be imposed in the State-NPDES Discharge permit.

CP&L has filed applications with the U. S. Federal Aviation Administration for permits to obstruct navigable airspace for the chimneys to be built at the Mayo plant. These structures are to be obstructions marked in accordance with the Federal Aviation Administration when these structures are completed.

An application has been submitted to the U. S. Army Corps of Engineers by CP&L for a Section 404 permit under the Clean Water Act (CWA). Under this authority, a permit is required for the placement of dredged or fill material into streams with a flow greater than 5 CFS and associated wetlands. Projects above the 5 CFS point are generally permitted by regulation except when the project will involve the discharge of material that is not free of toxic substances. Regulatory authority for dredge and fill projects in areas hydrologically similar to the Mayo site became effective 1 July 1977. This FEIS was published as a result of the Corps' permitting authority (Section 1.1). Aspects of the project that required Corps permits are the placement of fill for the main reservoir dam, cofferdam, and road relocation on Mayo Creek.

Table 1.2-1: CP&L Power Resources, Load, and Reserves With and Without Mayo Electric Generating Plant, 1982-1985 (Summer)

	With Mayo Plant on Schedule			
	1982	1983	1984	1985
Resources (MW)	9,008	9,008	9,908	10,628
Load (MW)	7,480	7,929	8,427	8,914
Reserve (MW)	1,528	1,079	1,481	1,714
Reserve (%)	20.4	13.6	17.6	19.2
	Without Mayo Plant			
	1982	1983	1984	1985
Resources (MW)	8,288	8,288	9,188	9,188
Load (MW)	7,480	7,929	8,427	8,914
Reserve (MW)	808	359	761	274
Reserve (%)	10.8	4.5	9.0	3.1

Table 1.2-2: Virginia-Carolinas Subregion Reserves With and Without Mayo Electric Generating Plant, 1982-1985 (Summer)(1)

	With All Units On Schedule			
	1982	1983	1984	1985
Resources (MW)	42,612*	45,992	47,303	50,980
Load (2) (MW)	34,831	36,589	38,770	41,053
Reserve (MW)	7,781	9,403	8,533	9,927
Reserves (%)	22.3	25.7	22.0	24.2
	Without Mayo Plant			
	1982	1983	1984	1985
Resources (MW)	41,892*	45,272	46,583	49,540
Load (2) (MW)	34,831	36,589	38,770	41,053
Reserve (MW)	7,061	8,683	7,813	8,487
Reserves (%)	20.3	23.7	20.2	20.7

(1) Based on March, 1978 response to FPC Order 383-4

(2) Non-interruptible

*Adjusted for 1330 MW of scheduled capacity outages.

Table 1.2-3: Virginia-Carolinas Subregion Reserves for 1982-1985 Summers With All Fossil-Fired Steam Turbine Units Planned For Installation During This Period Delayed One Year(1)

	1982	1983	1984	1985
Resources (MW)	41,892*	45,592	47,303	49,360
Load (2) (MW)	34,831	36,589	38,770	41,053
Reserve (MW)	7,061	9,003	8,533	8,307
Reserve (%)	20.3	24.6	22.0	20.2

(1) Based on March, 1978 response to FPC Order 383-4

(2) Non-interruptible

Table 1.2-4 Virginia-Carolinas Subregion Reserves For 1982-1985 Summers With All Fossil-Fired Steam Turbine Units After January 1, 1982 Cancelled (1)

	1982	1983	1984	1985
Resources (MW)	41,892*	44,872	46,583	48,640
Load (2) (MW)	34,831	36,589	38,770	41,053
Reserve (MW)	7,061	8,283	7,813	7,587
Reserve (%)	20.3	22.6	20.2	18.5

*Adjusted for 1330 MW of scheduled capacity outages.

(1) Based on March, 1978 response to FPC Order 383-4

(2) Non-interruptible

Table 1.4-1 Land Use for Mayo Electric Generating Plant

Category	Hectares	Acres	% of Total
Plant and Related Facilities	40	100	1.3
Ash Pond and Dam	81	200	2.5
Transmission Corridors	726	1793	22.4
Reservoir (includes area up to 137 m [450 ft] contour)	1660	4100	51.4
Other (auxillary ash pond, and buffer land around ash ponds and plant)	726	1793	22.4
Total Required Land	3233	7986	100.0

Table 1.5-1 Mayo Plant Water Use Average Streamflow and Plant Operations

		CFS
1.	Average streamflow at dam site	50
2.	Average reservoir inflow	46
3.	Average annual lake evaporation 41"	
4.	Average annual precipitation 42"	
5.	Net natural evaporation	0
6.	Average annual tower evaporation	15
7.	Total seepage (including ash pond and reservoir)	3
8.	Minimum release	2
9.	Estimated maximum plant use *	4
10.	Plant use: 15 + 3 + 4 = 22 CFS	22
11.	Downstream flow: 46 - 22 = 24 CFS	24

*Includes plant use for boiler makeup and other small losses such as those from the heat of ash, cooling tower blowdown forced evaporation, and cooling tower drift.

Table 1.5-2 Mayo Plant Water Use Maximum Values*

	CFS
1. Forced evaporation (plant)	26.5
2. Net natural evaporation	5.5
3. Seepage main reservoir	2.5
4. Seepage ash pond	0.5
5. Estimated plant use	4.0
6. Blowdown evaporation	0.5
7. Ash pond evaporation	0.5
	40.0

Storage available	60,000 AC-FT
for two years	30,000 AC-FT/Yr
for two years	41.5 CFS
Streamflow 100 yr. drought	14.0 CFS
Total flow available	55.5 CFS

*Instantaneous maximums for worst case analysis

Table 1.5-3 U.S. Environmental Protection Agency Standards of Performance for New Sources: Maximum Allowable Discharge Concentrations by Waste Source [1,2]

	Effluent Characteristics													
	Total Suspended Solids		Oil and Grease		pH	PCB[4]	Copper, Total		Iron, Total		Free Available Chlorine[5]		Zinc, Chromium, Phosphorous and Other Corrosion Inhibitors		Heat
Waste Source	Daily Max[3]	Daily Ave[3]	Daily Max	Daily Ave	Allowable Range		Daily Max	Daily Ave	Daily Max	Daily Ave	Max. Instantaneous	Chlorination Period Ave	Daily Max	Daily Ave	
1. All discharges					6.0-9.0	ND[6]									
2. Low volume wastes[7]	100mg/l	30mg/l	20mg/l	15mg/l											
3. Bottom ash transport water[8]	100mg/l	30mg/l	20mg/l	15mg/l											
4. Fly ash transport water	ND[6,9]	ND[6,9]	ND[6,9]	ND[6,9]											
5. Metal clearning wastes and boiler blowdown	100mg/l	30mg/l	20mg/l	15mg/l			1.0mg/l	1.0mg/l	1.0mg/l	1.0mg/l					
6. Cooling tower blowdown[10]											0.5mg/l	0.2mg/l	NDA[6]	NDA[6]	
7. Main condenser															ND[6,9,11]
8. Material storage runoff[12]	50mg/l	50mg/l													
9. Construction runoff[12]	50mg/l[9]	50mg/l[9]			6.0-9.0										

Table 1.5-3 U.S. Environmental Protection Agency Standards of Performance for New Sources: Maximum Allowable Discharge Concentrations by Waste Source[1,2] (Cont.)

[1] The quantity of pollutants discharged from waste sources 1-6 shall not exceed the quantity determined by multiplying the flow from the waste source times the concentration in the table.

[2] In the event that waste streams from various sources are combined for treatment of discharge, the quantity of each pollutant or polluted property attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

[3] Daily Maximum: Maximum 24-hour value; Daily Average: Average value for 30 consecutive days.

[4] PCB: Polychlorinated biphenyl compounds.

[5] Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator that the units in a particular location cannot operate at or below the level of chlorination.

[6] NDA: No detectable amount and ND: No discharge.

[7] Include, but are not limited to waste waters from wet scrubber air pollution control systems, ion exchange water treatment systems, water treatment evaporator blowdown, laboratory and sampling streams, floor drainage, cooling tower basin cleaning wastes, and blowdown from recirculating house service water systems.

[8] The quantity of pollutants discharged in bottom ash transport water shall not exceed the quantity determined by multiplying the flow of bottom ash transport water times the above concentrations and dividing the product by 20.

[9] Limitations remanded and set aside by the United States Court of Appeals for the Fourth Circuit on 16 July 1976.

[10] Blowdown shall mean the minimum discharge of recirculating cooling water for the purpose of discharging materials contained in the process, the further buildup of which would cause concentrations or amounts exceeding limits established by best engineering practice.

[11] There shall be no discharge of heat from the main condensers except heat may be discharged in blowdown from recirculated cooling water systems provided the temperature at which the blowdown is discharged does not exceed at any time the lowest temperature of recirculated cooling water prior to the addition of the makeup water.

[12] Any untreated overflow from facilities, constructed, and operated to treat the volume of material storage runoff and construction runoff which results from a 10-year, 24-hour rainfall event shall not be subject to the pH and total suspended solids limitations stipulated for this waste source.

pH measured in standard units
mg/l - milligrams per liter

Source: U.S. Environmental Protection Agency "Steam Electric Power Generating Point Source Category: Effluent Guidelines and Standards," Federal Register, Vol. 39, No. 196, 8 October 1974. 40 CFR Part 423.

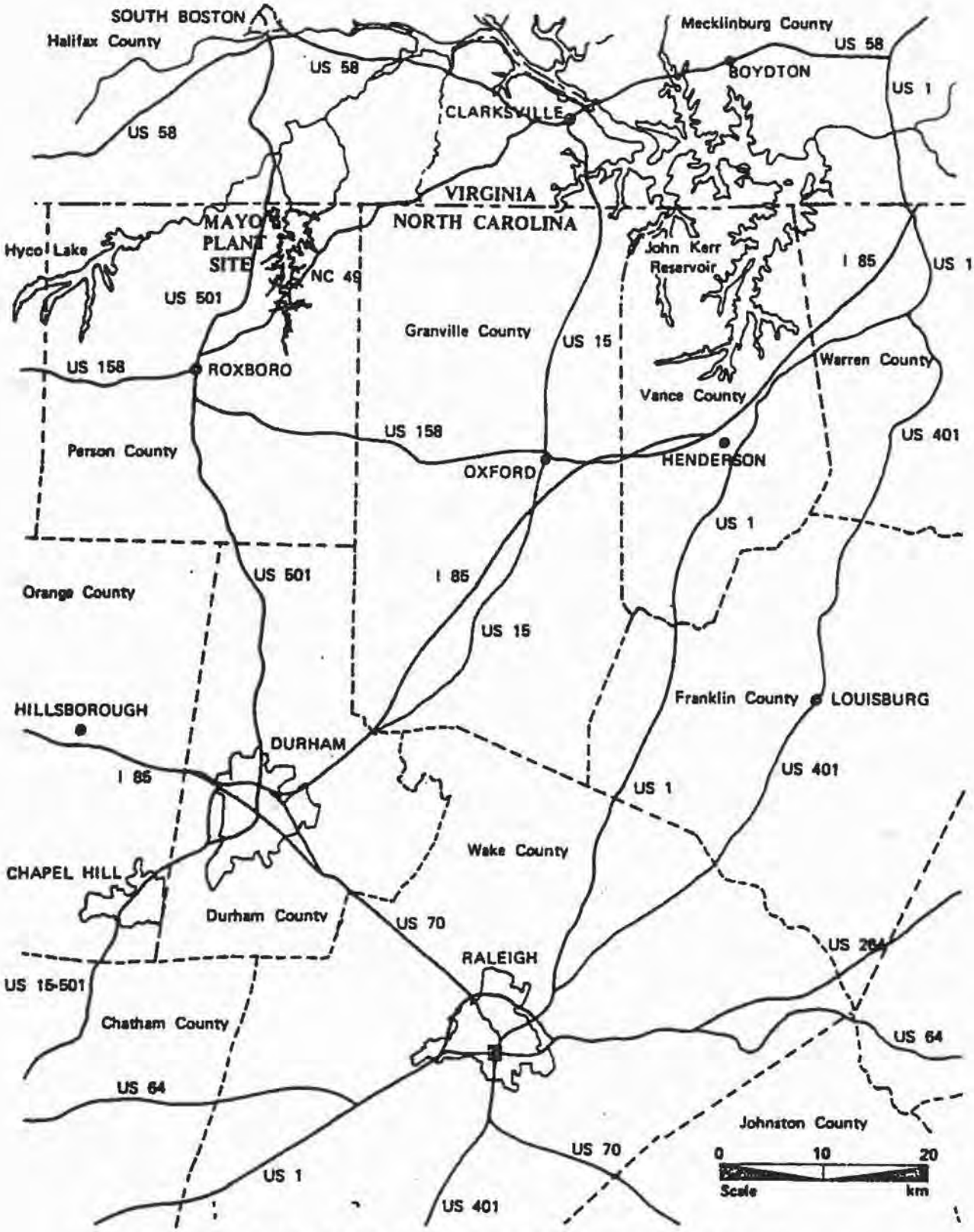


Figure 1.3-1 LOCATION OF MAYO ELECTRIC GENERATING PLANT

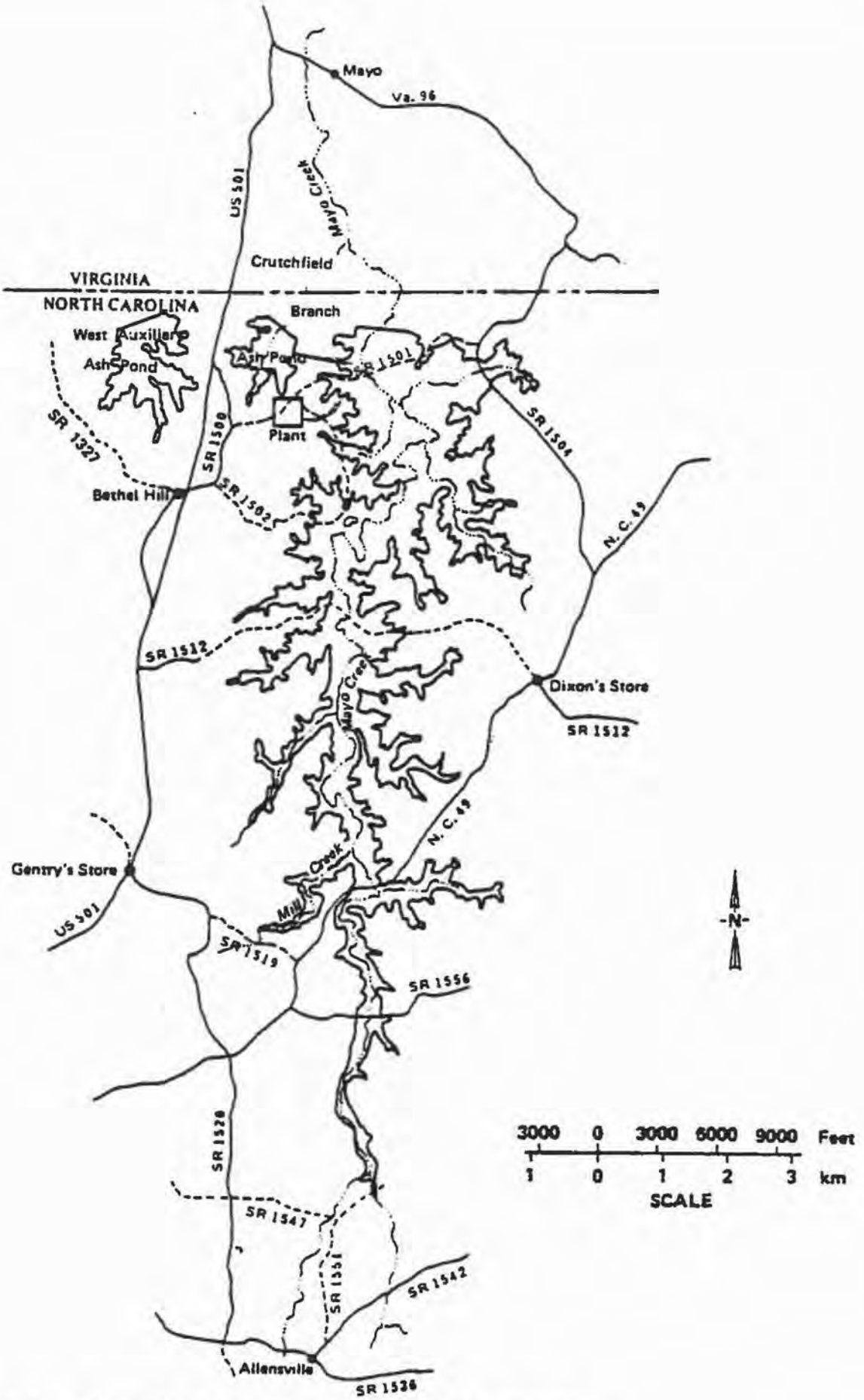
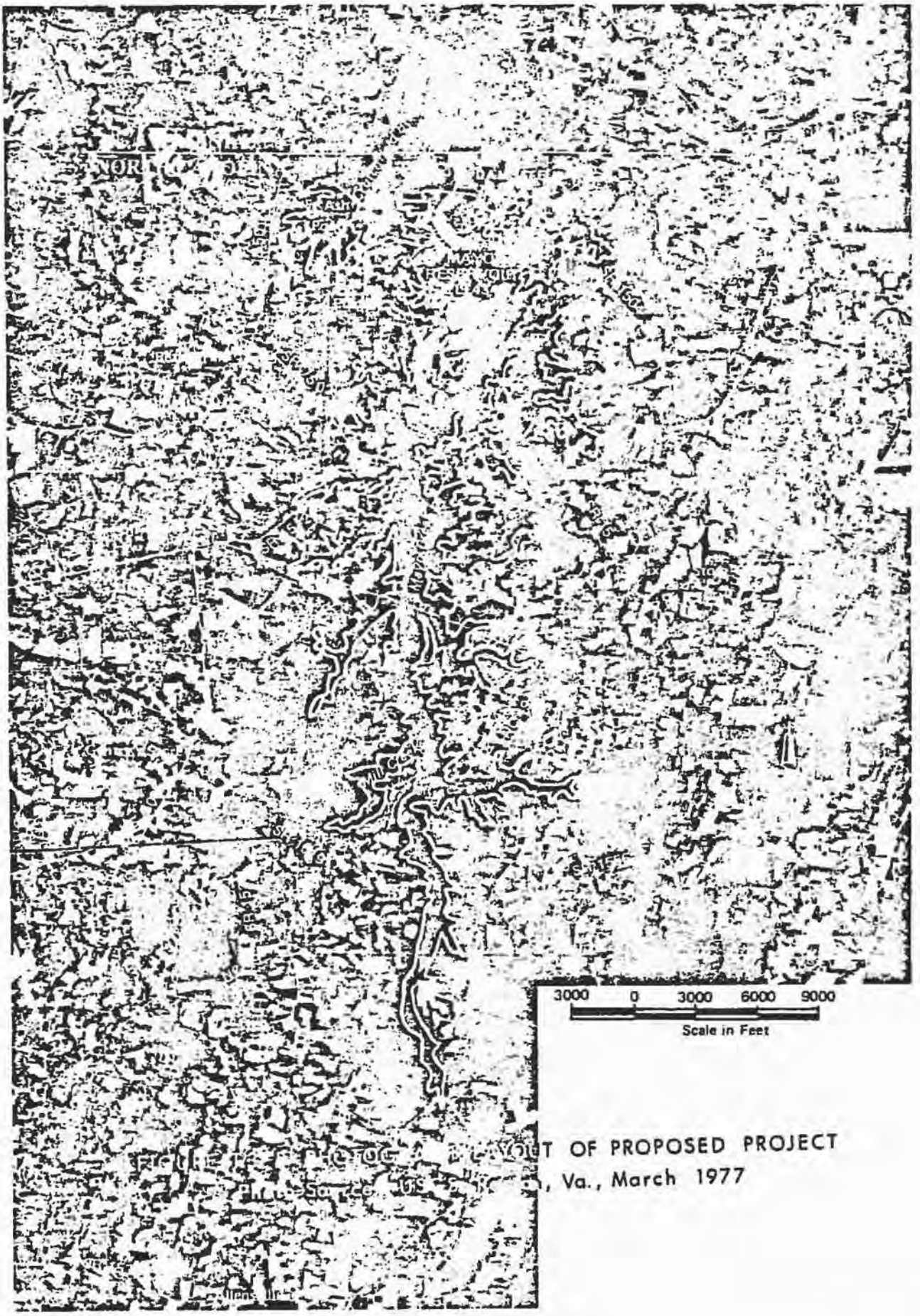


Figure 1.3 – 2 MAYO ELECTRIC GENERATING PLANT SITE



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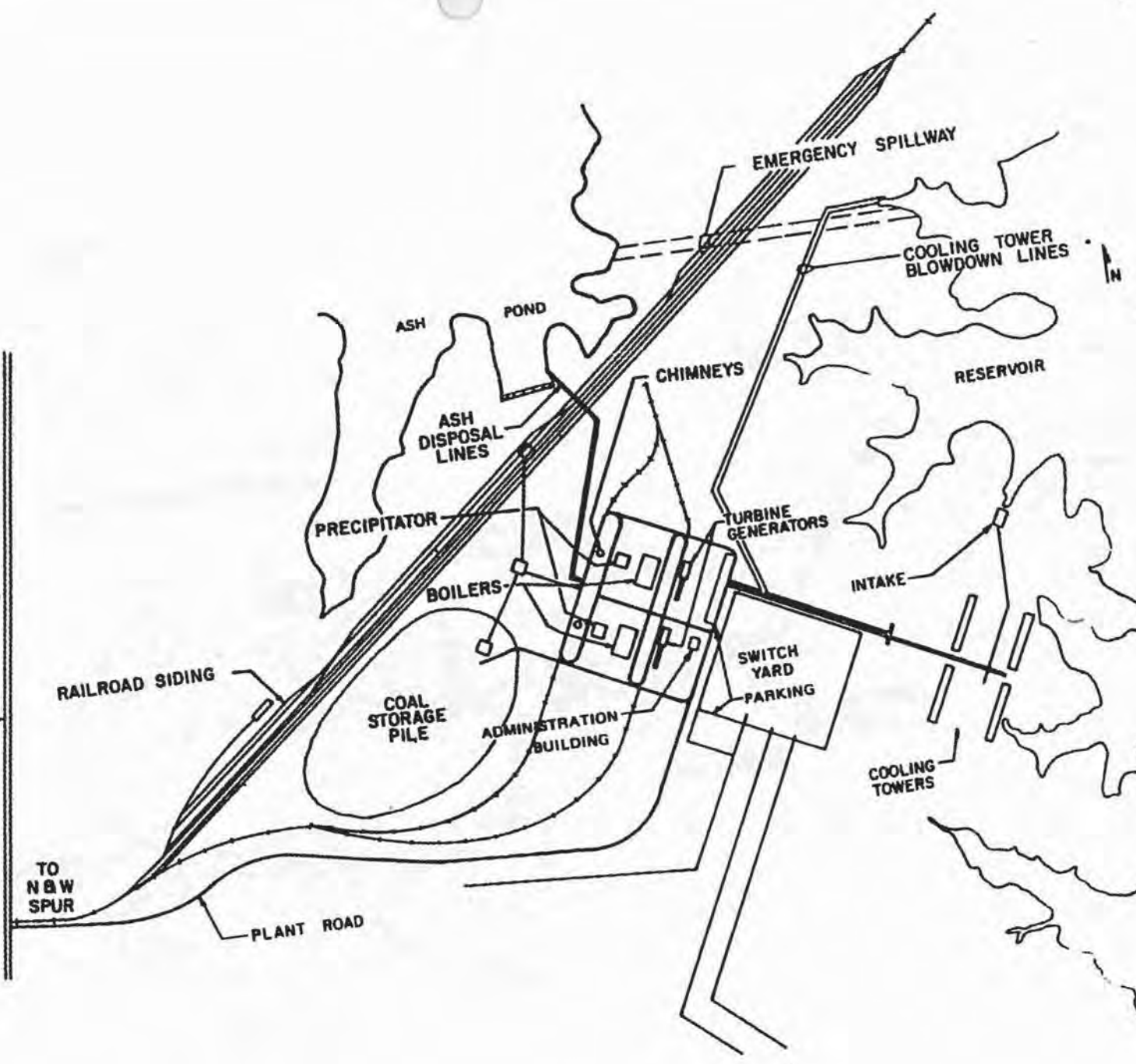


Figure 1.5-1 MAYO ELECTRIC GENERATING PLANT PLOT PLAN

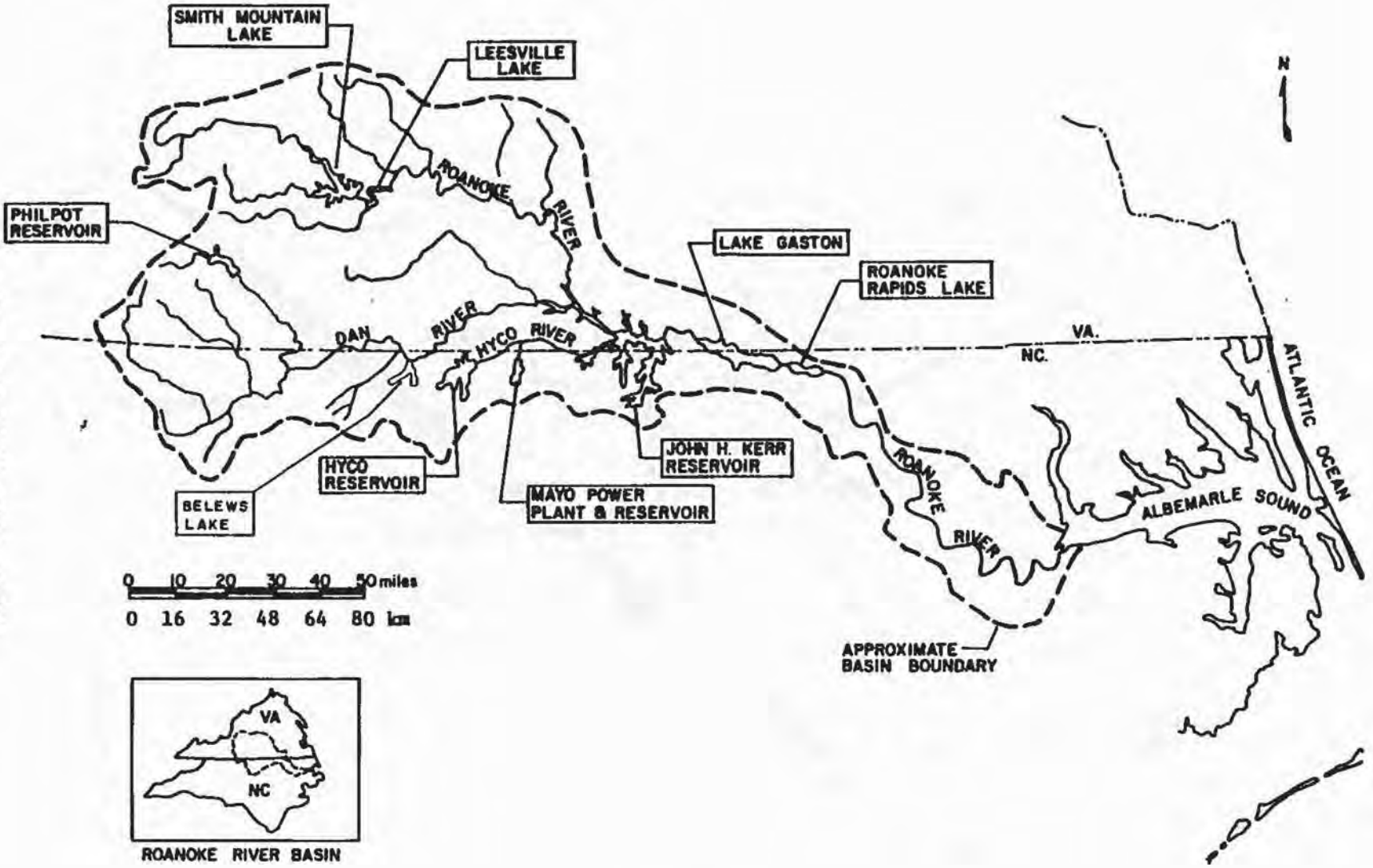
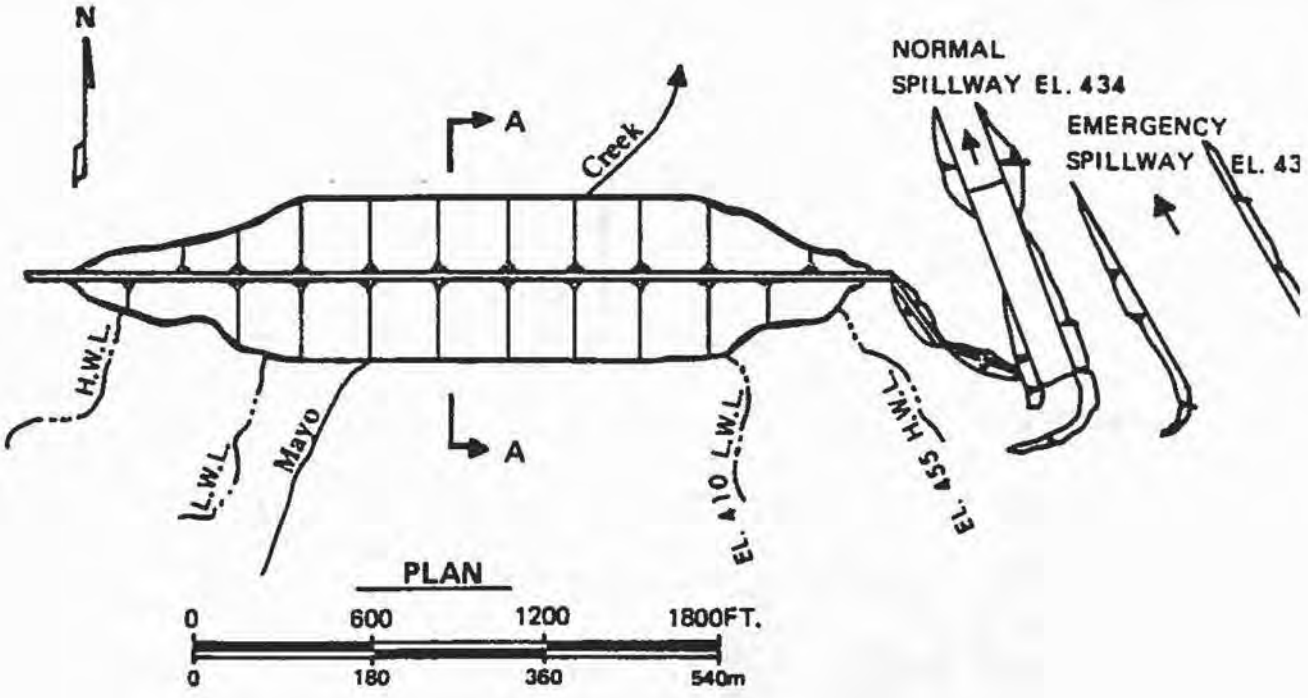
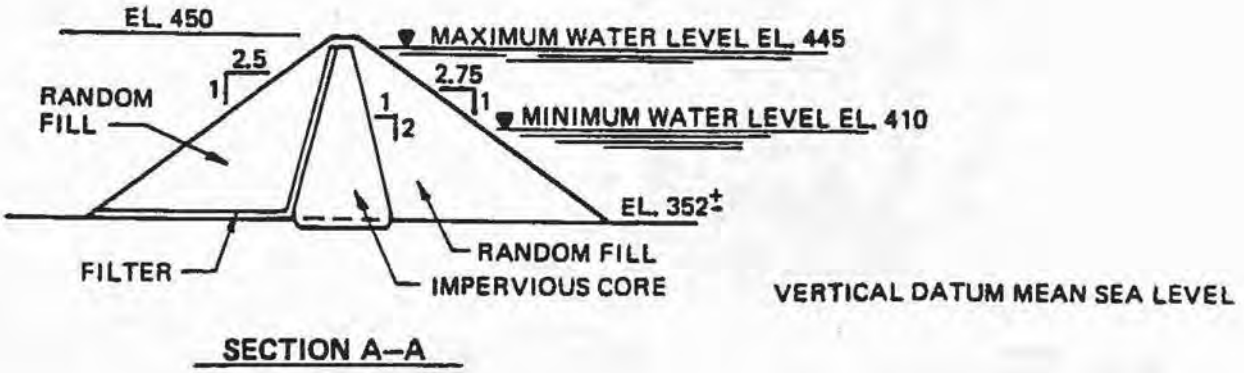


Figure 1.5–2 ROANOKE RIVER BASIN





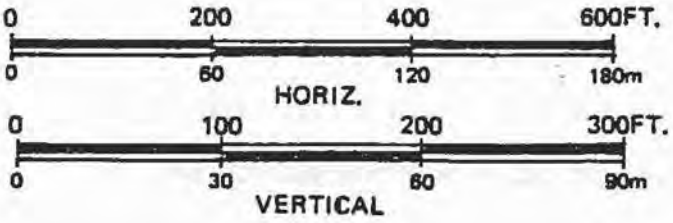


Figure 1.5-3 TYPICAL EMBANKMENT SECTION

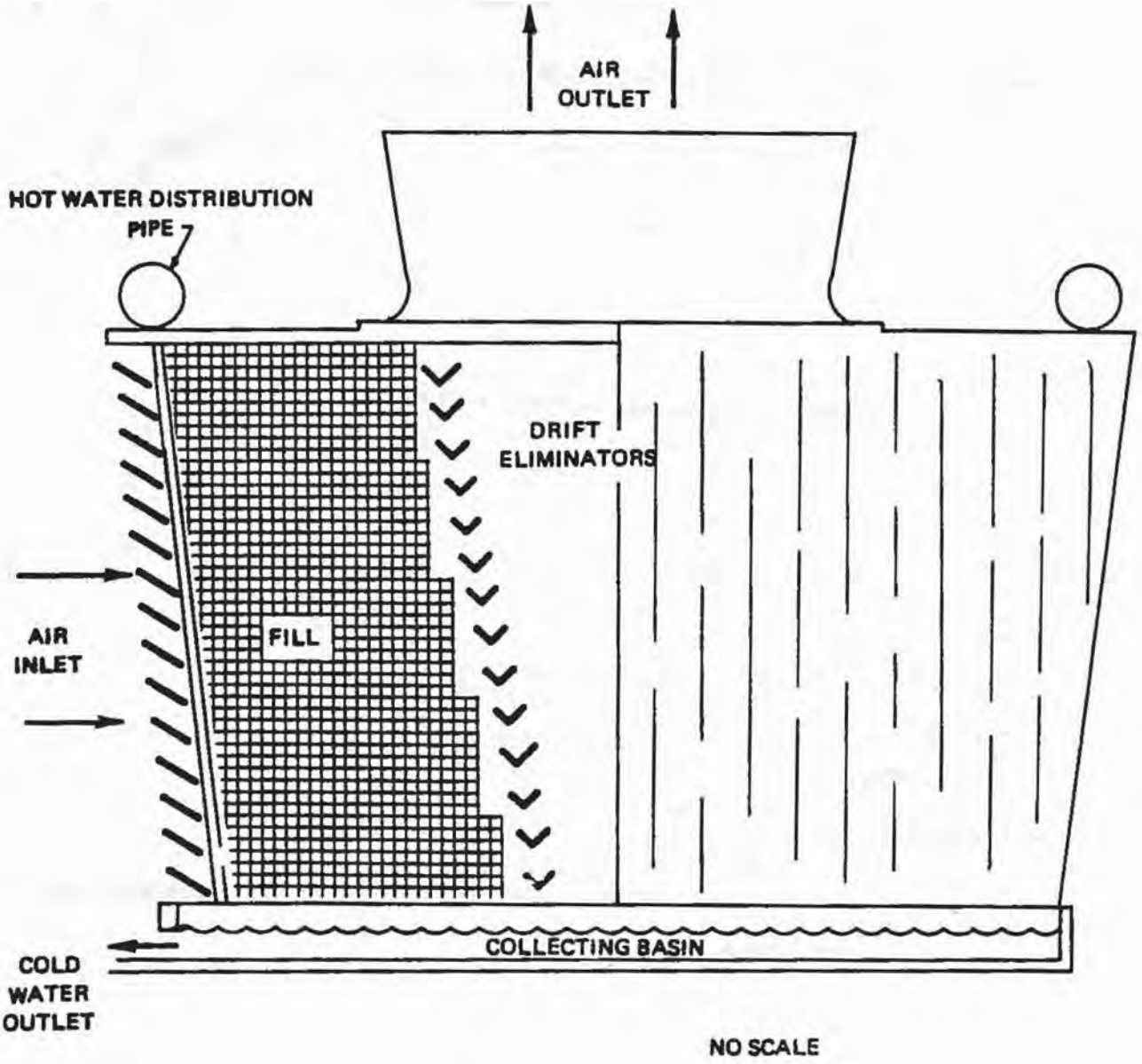


Figure 1.5–4 TYPICAL CROSS–FLOW COOLING TOWER

MAYO ELECTRIC GENERATING PLANT

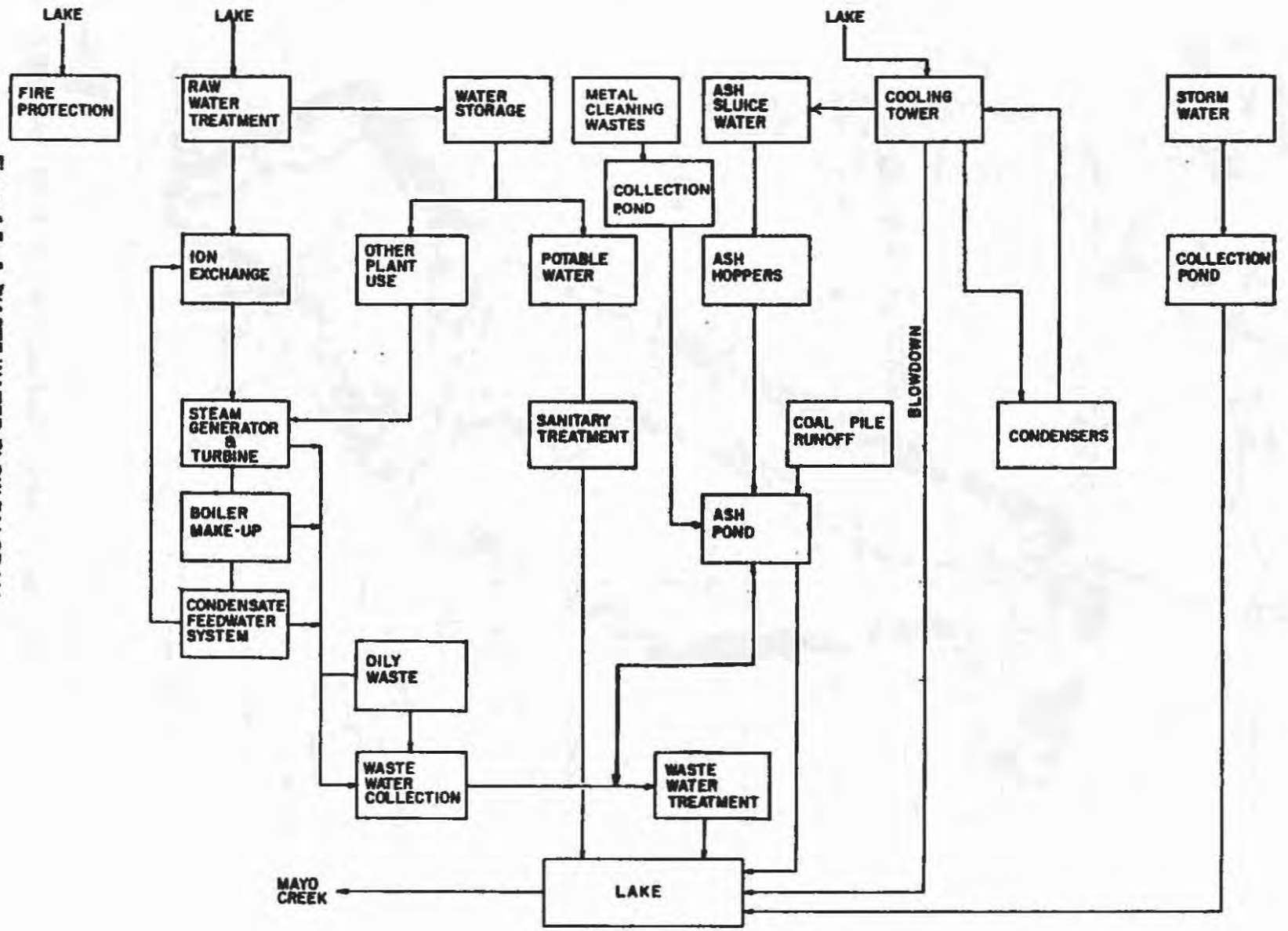


Figure 1.5-5 WASTE WATER FLOW DIAGRAM

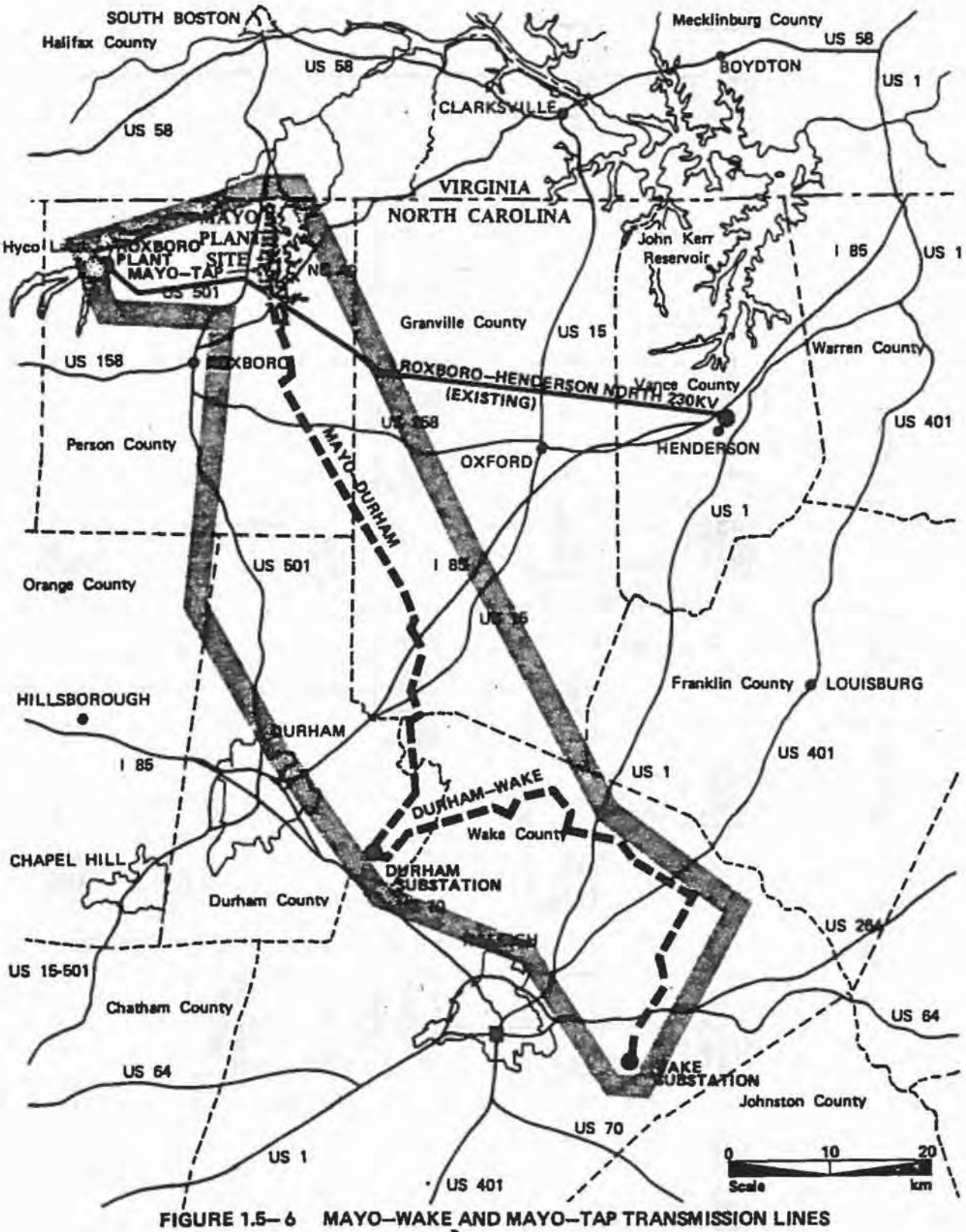


FIGURE 1.5–6 MAYO–WAKE AND MAYO–TAP TRANSMISSION LINES

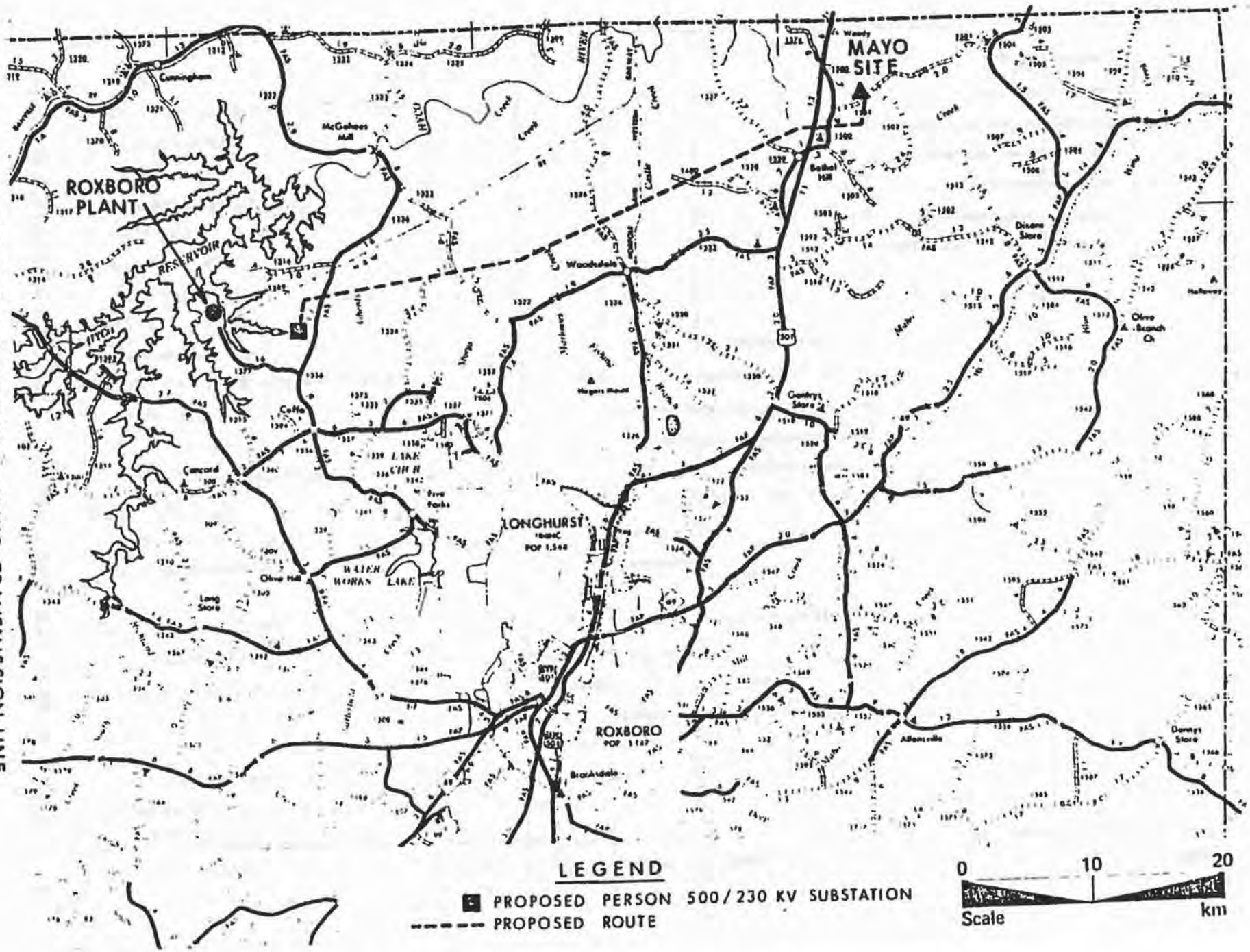


FIGURE 1.5-7 ROXBORO - MAYO TRANSMISSION LINE

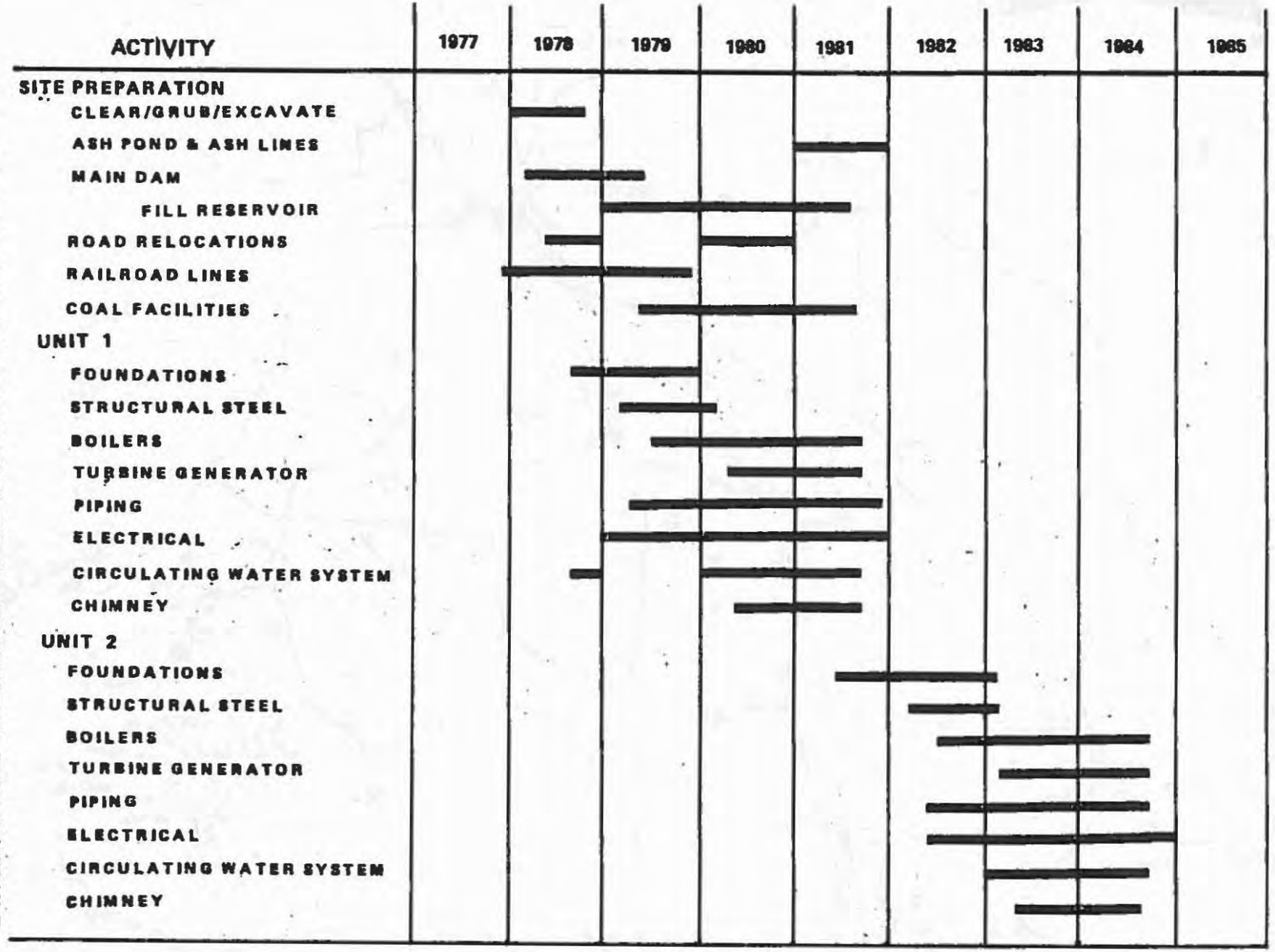


Figure 1.8—1 MAYO ELECTRIC GENERATING PLANT CONSTRUCTION SCHEDULE

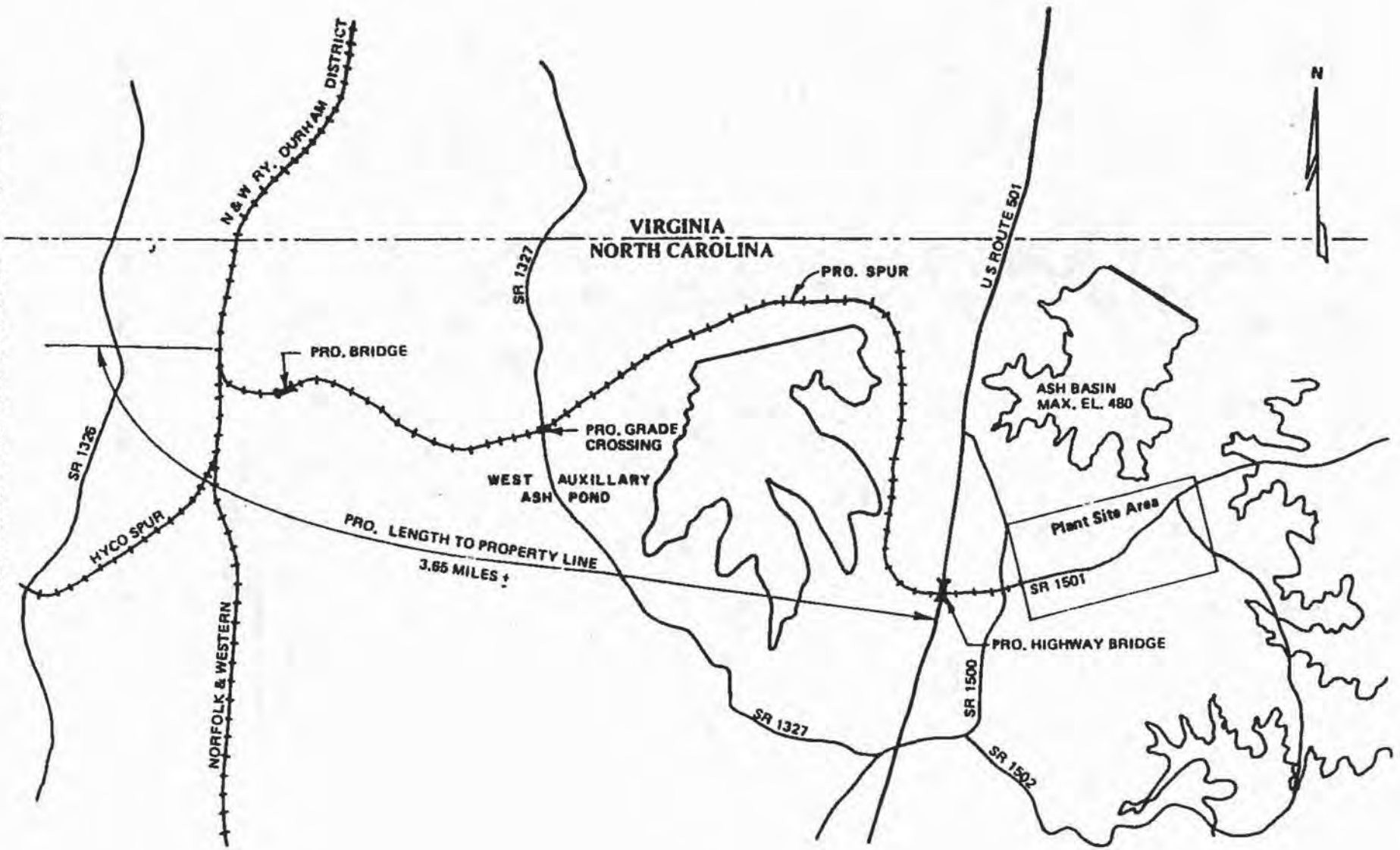


Figure 1.6-2 PROPOSED RAILROAD ROUTINGS

1-41

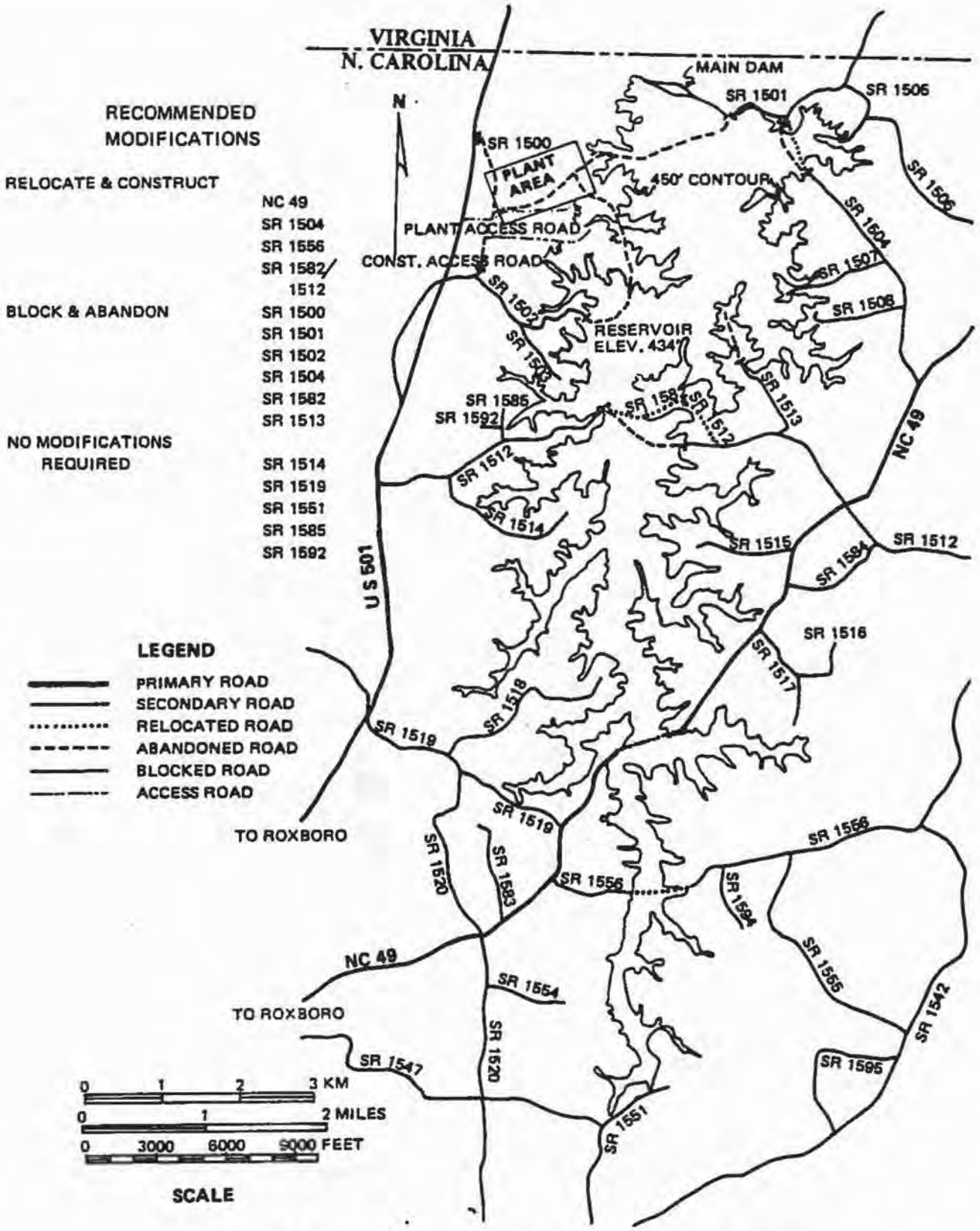


Figure 1.6-3 MAYO PROJECT ROAD RELOCATIONS

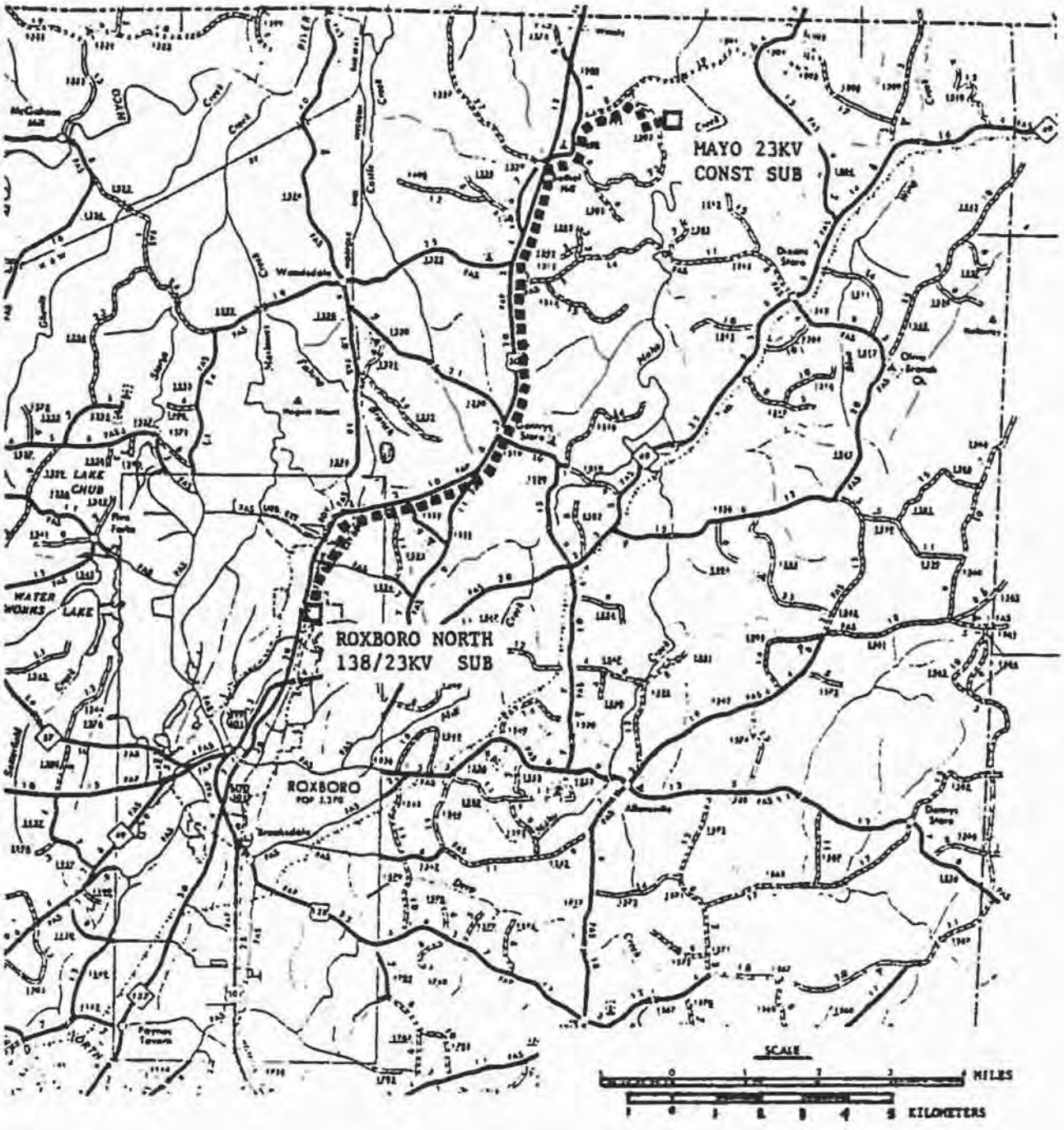


Figure 1.6—4 23 kV CONSTRUCTION POWER LINE ROUTING

Section 2

2.0 ENVIRONMENTAL SETTING WITHOUT THE PROJECT

2.1 INTRODUCTION

Prior to the alteration indicated in Section 1.1, Person County in the vicinity of the proposed Mayo Electric Generating Plant typified the northern Piedmont area of North Carolina. The rolling, hilly terrain, interspersed with cultivated fields, planted pine stands, and second-growth hardwoods, reflected the largely agricultural nature of the area.

Mayo Creek, like many other small Piedmont streams, had good water quality capable of supporting diverse populations of aquatic life. However, because it was a small stream, it was subject to large flow variations reaching essentially no flow under drought conditions. Also, recent landing clearing has increased turbidity and probably reduced diversity.

Prior to alteration, good diversification of fishes existed in the area, but fishery populations in the lower reaches were reduced by heavy siltation. Those sport fish species present in the proposed impoundment area either occurred in low numbers or were too small to normally interest fishermen. No significant numbers of big game were present, except for a fair population of deer, but small game was fairly abundant. Hunting pressure on the site was relatively low. The vegetative communities of the site especially the bottom land hardwoods provided habitat for a wide variety of wildlife. Essentially all of this vegetation and associated fauna has been eliminated from the reservoir area.

2.2 Physical Features

2.2.1 Physiography and Geology

2.2.1.1 Physiography

2.2.1.1.1 Relief

The site is located in the Piedmont Physiographic Province of North Carolina near the North Carolina-Virginia state line. The general terrain is rolling to moderately steep, typical of the Piedmont Province. Topographic lows near 106 m above mean sea level (msl) (350 ft) occur in the vicinity of the proposed main dam with higher elevations of 183 m msl (600 ft) along the drainage divides.

2.2.1.1.2 Drainage

The Mayo Creek watershed (Figure 2.2-1) encompasses an area of approximately 155 km^2 (60 mi^2) and drains north along an elongated north-south path. The watershed extends from the confluence of Mayo Creek and the

Hyco River, about 3 km (2 mi) north of Mayo, Virginia, to its headwaters in an area about 5 km (3 mi) east of Roxboro, North Carolina, a distance of about 29 km (18 mi). The width of the drainage area is from 1.6 to 8 km (1 to 5 mi).

On 20 June 1975 the U. S. Geological Survey constructed a temporary stream gage on Mayo Creek at the SR 1501 bridge near Woodsdale, North Carolina, just upstream of the proposed dam site. The records are indicated in Table 2.2-1. A permanent stream gage location has been constructed downstream of the proposed dam site to record flow downstream of the dam if the proposed construction is completed. Based on the SR 1501 bridge gage and other miscellaneous data, the predicted 7-day 10-year low flow for Mayo Creek at the permanent gage is 2.8 l/s (0.1 cfs) Based on additional USGS data, the average flow of Mayo Creek is estimated to be approximately 50 cfs (Riggsbee, 1978).

The drainage area of Crutchfield Branch at the site of the ash pond dam is approximately 194 ha (0.75 mi^2). The stream at this point is intermittent but probably has an average annual flow of less than 28.2 l/s (1 cfs).

The stream in the vicinity of the possible auxillary ash pond dam is also intermittent and has a drainage area of less than 518 ha (2 mi^2). The average annual flow would be less than 56.5 l/s (2 cfs).

2.2.1.2 Geology

2.2.1.2.1 Regional Geology

The site is within the Piedmont Geologic Province, a northeast trending, maturely dissected plateau between the Blue Ridge and Coastal Plain Geologic Provinces (Figure 2.2-2). The region is underlain primarily by metamorphic and igneous rocks of Precambrian to early Paleozoic Age, most of which have been extensively folded and faulted. No faulting since Triassic time ($\pm$180 million years before present) has been documented. The Piedmont Province of the southeastern United States has been divided into several northeast trending lithologic-structural belts. The Mayo site lies at the western edge of the Carolina Slate Belt near the eastern boundary of the Charlotte Belt. The Carolina Slate Belt is characterized by a thick sequence of volcanic tuffs and flows that have been metamorphosed to the green schist metamorphic facies; most rocks are fine grained and are slaty to phyllitic. The Charlotte Belt is characterized by a high degree of anatexis and metamorphism to higher levels of the amphibolite facies. The rocks are mostly coarse grained gneisses, schists, and amphibolites.

2.2.1.2.2 Site Geology

2.2.1.2.2.1 Structure

The site lies on the western flank of the overturned Virgilina clinorium and the east flank of the Charlotte Belt anticlinorium (Figure 2.2-2). The foliation of site rocks trends northeast and dips steeply southeast reflecting the regional structural conditions of the Virgilina Synclinorium which trends northeast and is overturned to the northwest. Second order folds superimposed on the larger fold axis produce northwestward dipping structures in localized areas. Drainage patterns suggest that the predominant joint sets trend ± NS, N±30°E and N±60°W. A major fault enters the central part of the site area. This fault is one of several faults which occurred in this region 670 to 570 m.y.b.p. A fault of minor significance was found in the Mayo Creek floodplain in the vicinity of the main dam (Figure 2.2-3). Other minor faults are suspected to exist in the Mayo Valley. It is emphasized that the faults and suspected faults in the site vicinity do not constitute earthquake hazards. The only engineering significance of these faults lies in their influence on the location of rock types and their influence on rock joint spacing and depth of weathering. These effects can be handled by construction techniques; the faults do not seriously affect the economic feasibility of the site, and they have no insolvable adverse effect on the safety of the plant or dam site.

2.2.1.2.2.2 Lithology

The site area may be divided lithologically, from west to east, into four northeast trending belts (Figures 2.2-3).

a. The western belt underlies most of the Bowes Branch drainage basin (Figure 2.2-3). For the purposes of this report, it has been divided into two major rock types: dominantly felsic gneisses and dominantly intermediate and mafic gneisses. Both are highly deformed and have been metamorphosed to amphibolite grade.

The felsic gneisses consist largely of medium grained biotite gneiss and biotite-muscovite gneiss. The felsic gneiss generally has a thinly developed soil profile consisting of micaceous fine to medium sandy silts.

The intermediate and mafic gneisses consist of thinly interlayered hornblende gneiss, hornblende-biotite gneiss, and biotite gneiss. Several areas along the eastern boundary of the unit are underlain dominantly by hornblende gneiss similar to the hornblende gneiss of the west-central belt. The mafic and intermediate genisses weather to greenish clayey silts and fine sandy silts. The depth of soil and saprolite development is generally greater than other lithologies in the area.

The dominant foliations for the western belt strike from N-S to N 40° E and dip generally from 30° to 50° to the east and southeast. In places, the rocks also have a much less well developed secondary foliation, or slip-cleavage.

b. The west central belt consists of a granitic gneiss-hornblende gneiss complex that underlies the U.S. 501 area west of the site. The eastward edge of this belt, as a group, is along the axis of Crutchfield Branch. However, rocks similar to those in this belt also occur as isolated northeast trending bodies within the next belt to the east, including portions of the plant and the west abutment of the Mayo Creek Dam. The southeastern portion of the Bowes Branch drainage basin is also underlain by this belt.

The granitic gneiss is a light to medium gray, medium to coarse grained rock ranging from granite to quartz monzonite to quartz diorite in mineral composition.

The foliation trend is N 10° to 30° E and dips 50° to 70° SE. Moderate to steeply dipping joints are commonly spaced 0.7 to 1.7 m (2 to 5 ft) apart.

c. The east central belt consists of the Hyco formation (Figure 2.2-3), primarily a fine to medium grained light gray quartzo-feldspathic rock with varying degrees of porphyritic or porphyroblastic texture and varying development of cleavage and schistocity. It grades from a gneissic quartz porphyry most commonly seen toward the western side of the belt, to a quartzo-feldspathic sericitic phyllite, most common in the eastern side of the belt. Epidote is common as a plagioclase alteration product.

In the site area, cleavage in this rock is for all practical purposes parallel to compositional banding. Cleavage planes are generally spaced 1 to 2 cm (2 to 3 in) apart in the western belt and 10 to 20 cm (4 to 6 in) apart in the eastern Hyco area. The cleavage strikes N 10° to 60°E and dips 60° to 80°SE, the steepest dips being more common on the east side of the belt. Lineations caused by mineral elongation usually plunge parallel or obliquely to maximum cleavage dip. Crenulations on cleavage surfaces are usually aligned approximately parallel to the strike trend. Joint spacing varies widely; most commonly the joints are moderately to steeply dipping and are spaced 0.3 to 1 m (1 to 3 ft) apart.

Included in the Hyco belt are sills of chloritic phyllite and chlorite schist that are usually 0.2 to 2 m (0.5 to 5 ft) thick. These chloritic seams are thought to be meta-andesites and metabasalts, sometimes resembling, in hand specimen, sheared metagabbro. They are usually significantly softer and more deeply weathered than the enclosing rocks.

Also included are northeast trending lenticular bodies of granitic gneiss in the western half of Hyco belt, and lenticular bodies of metagabbro in the eastern half of the belt.

d. The easternmost belt is underlain by the Aaron slate (Figure 2.2-3) primarily an aphanitic, chloritic rock with highly developed slaty cleavage essentially parallel to the compositional banding.

The structural alignment in the Aaron slate follows the N 10° to 30° trend of the other belts, and the cleavage dips 60° to 80°SE in the site area. Cleavage planes are spaced usually 0.5 to 2 cm (1 to 6 in) apart.

Other major rock types underlying the site area are as follows:

a. Metagabbro: Included in the Aaron slate belt, in an area east and southeast of Calvary Church, is a gabbro pluton. The inner portion of the gabbro body consists of a medium to coarse grained metagabbro which is fractured by moderate to steep joints, usually spaced 0.2 to 1 m (0.5 to 3 ft) apart. Though well developed cleavage is not present, partings parallel to foliation are abundant near the outer edges of the metagabbor body.

b. Quartz Veins

Quartz veins occur as small veinlets throughout all four belts. The main veins trend northerly, reflecting the orientation of mineralized veins east of the site area. The veins in the site area contain small amounts of metallic sulphides and oxides, but no indication of economic mineral deposits was seen.

c. Diabase Dikes

Several narrow northwest trending diabase dikes occur in the site area. They are exhibited by ochre-colored, spherically weathered boulders and outcrop in stream beds. The traces of the dikes are shown on Figure 2.2-3.

2.2.1.3 Seismology and Seismicity

The site lies in the Piedmont seismo-tectonic province in a relatively inactive area. During historic times the southeastern United States (with the exceptions of the immediate vicinities of Charleston, South Carolina, and New Madrid, Missouri, and Giles County, Virginia) has experienced only occasional scattered earthquakes of moderate intensity. The epicentral locations of all reported historic earthquakes of the Modified Mercalli Intensity V or greater in the southeast are shown on Figure 2.2-4. The historic earthquakes of the southeast of most significance to the site area are indicated in Table 2.2-2.

Earthquakes in the southeast have not been related to known geologic structures. An analysis of a probabilistic intensity spectrum of earthquakes affecting the site includes consideration of the earth-

quake history of the piedmont, the seismo-tectonic province in which the site is located. Experienced intensities of large earthquakes which have occurred outside of the piedmont were considered.

Carolina Power and Light Company consultant, Law Engineering and Testing Company, made a statistical analysis of the earthquake history in the piedmont seismo-tectonic province within 320 km (200 mi) of the site. A study of isoseismal intensities of the three large historical eastern earthquakes which have occurred outside the piedmont show these to be of intensity V or VI at the site. The probability of piedmont originated earthquakes is considered equal throughout the sub-region. Their probabilistic contribution to the overall return period in years for earthquakes of intensity V MM or greater in the Carolinas-Virginia piedmont is a function of their frequency of occurrence, the area of the piedmont sub-region considered, and isoseismal distribution for each level of intensity. The Charleston, New Madrid, and Giles County earthquakes are considered special events and isolated occurrences in this study. Based on this study, the external earthquakes are expected to provide a return period contribution of 1 in 133 years for intensity V.

2.2.2 Groundwater

CP&L cannot obtain access to most of the ash pond site since it is still in private ownership. Attempts to purchase and condemn the land have been unsuccessful to this point. Thus a complete groundwater study cannot be accomplished at this time. However by letter of 16 June 1978, CP&L committed to completion of a groundwater study when complete access to the site is possible.

In addition the N.C. Division of Environmental Management by letter of 16 August 1978 stipulated that certain conditions would be included in the NPDES permit as follows:

"1. The Company shall be required to complete the groundwater studies and provide controls as necessary for the prevention of pollutant materials from entering groundwater and thereby reentering the surface waters some point downstream of the proposed dam.

2. There shall be no discharge from the proposed ash settling pond to Crutchfield Branch except as may be provided by an NPDES permit issued for such discharge. All discharges from the ash pond not covered by such NPDES permit shall be discharged to the cooling water makeup pond for the project.

3. The Company shall provide such testing as is necessary to assure that pollutants are not discharged to the groundwaters and thereby to the downstream point of the Crutchfield Branch in violation of the provisions stated above."

The Division indicated that "We believe that by including this language in the NPDES permit for the Mayo project sufficient controls will be available to assure that examination of potential groundwater pollution is completed and that appropriate remedial action is taken by the Company prior to the completion of the project."

2.2.3 Soils

Soils in the Mayo Creek site are primarily residual in nature, having been derived in situ from the underlying rock formations. Soil types, therefore, can be closely correlated generically with the various rock types exposed in the area (Figure 2.2-3).

As the rock formations have generally been described in preceding sections as occurring in several northeast trending belts, soil types can be described as having similar zonal concentrations due to their material of origin.

The intermediate and mafic gneisses of the western belt give rise to greenish clayey silts and fine sandy silts. Deeper than average weathering in this area results in more overburden than is normally encountered across the site. The felsic gneisses of the western belt have generally developed shallow soil profiles consisting of micaceous fine to medium sandy silts.

The granite gneiss-hornblende gneiss rocks of the west central belt have gradationally weathered from soft rock to hard-medium saprolite to light colored slightly micaceous silty sand, slightly micaceous sandy silt to red clayey silts near the surface. The red clayey silts represent the more advanced weathering stage of the parent material and is found most abundantly in the upland areas.

The upper soils of the Hyco formation in the east central belt consist of very light gray to white saprolites, including slightly micaceous fine sandy silt, overlain in upland areas by 2 to 3 m (5 to 10 ft) of red brown clayey residuum.

The Aaron slate of the easternmost belt primarily develops tan to buff saprolites with an overlying residual layer of red brown fine sandy clayey silts which often includes gravel sized limonitic nodules. The profile typically consists of approximately 2 to 3 m (approximately 7 to 10 ft) of stiff to very stiff residuum underlain by 2 to 3 m (5 to 10 ft) of soft weathered rock (hard saprolite) including moderately hard rock lenses.

The metagabbro plutonic body located east and southeast of Calvary Church develops a residual soil described as a very stiff red brown clayey to sandy silt 0.7 to 2 m (2 to 5 ft) thick. The clayey silts are underlain by hard red fine sandy silt saprolites of variable thickness.

Residual soil types change rapidly and erratically over short horizontal distances due to the moderate to steeply dipping parent rock materials.

The depth of soils in this area is erratic due to differential rock weathering caused by structural and lithological variations such as faulting, jointing, cleavage, and compositional banding.

Soils present in creek and river floodplains in the area are primarily alluvial material deposited by stream action and consist of clayey sandy silts 3 to 4 m (10 to 13 ft) thick with a 0.7 to 1 m (2 to 3 ft) thick layer of gravel at the alluvial base. Residual soil and soft rock has been eroded away so that the alluvial soil is based on moderate to hard rocks of the Hyco formation.

2.2.4 Existing Ambient Air Quality - CP&L Measurements

Background air quality measurements have been performed by CP&L in Person County, North Carolina, since early 1975. During 1975 and 1976, sulfur dioxide and particulate sampling was performed in the vicinity of the Roxboro Steam Electric Plant (16 km [10 mi] west of the Mayo site) to provide a field assessment of the existing ambient air quality. The Roxboro Plant was considered the dominant particulate and sulfur dioxide source within the impact area of the proposed Mayo Plant and also has terrain and meteorological conditions similar to that of the Mayo Creek area. In addition, measured concentrations not directly influenced or attributed to the Roxboro Plant may be considered representative of background levels for the area surrounding both the Mayo and Roxboro region.

In January 1977, air sampling began in the vicinity downwind of the Mayo site and included the continuous measurement of particulates, sulfur dioxide, and oxides of nitrogen. Figure 2.2-5 shows the location of the ambient air quality monitoring stations. Ambient standards are indicated in Table B-6.

2.2.4.1 Particulate Concentrations

Particulate concentrations were measured at each of the four sampling stations with high-volume samplers operating over 24-hour intervals (midnight to midnight). The procedure was performed in accordance with the method outlined in the Federal Register (36 FR 8191).

The 24-hour particulate values, monthly and annual averages, are presented in Table B-1. Of the 361 particulate samples measured, only one measurement exceeded the 24-hour air quality standard value. This measurement occurred on February 26, 1977, and occurred at the Hagers Mount site. Wind directions recorded at the Raleigh-Durham Airport (72 km [45 mi] south-southeast of Mayo) during this date were from a south to southwesterly direction, and therefore the particulate concentrations were not attributed to the Roxboro Plant. The most likely cause of this excursion is fugitive dust emissions from agricultural operations typical of rural areas, partially influenced by a dust storm originating in the mid-western United States that was reported during the last week of February 1977. It should be noted that this value is not a contravention of the standard since it is permissible to exceed the standard value of 150 ug/m^3 once per year.

The annual average air quality standard of 75 ug/m^3 was not exceeded, nor was the annual average air quality guideline of 60 ug/m^3 exceeded. The weighted average of these annual values were about 32 ug/m^3 and comprised about 40% of the annual standard and 54% of the annual guideline.

The results of these measurements are summarized in Table B-2.

2.2.4.2 Sulfur Dioxide Concentrations

Sulfur dioxide (SO_2) levels were measured at each of the four sampling stations with sequential bubbler type samplers. These samplers employed the West-Gaeke 24-hour procedure in accordance with the method outlined in the Federal Register (36 FR 8187). Sulfur dioxide levels were measured continuously at the Hagers Mount site with a Bendix Model 8300 Total Sulfur Analyzer equipped with a Bendix Model 8835 H_2S Scrubber Module. Since the total sulfur concentration is primarily comprised of sulfur dioxide and hydrogen sulfide (H_2S), removal of the hydrogen sulfide leaves only sulfur dioxide.

The maximum 24-hour and 12-month averages measured since January 1975, are presented in Table B-3. There were no concentrations measured at the monitoring sites that exceeded the 24-hour or the annual average air quality standards of 365 and 80 ug/m^3, respectively. The maximum 24-hour concentration of 117 ug/m^3 occurred at the East Ridgeville site on June 11, 1976. On this date, observations from the National Weather Service at Raleigh-Durham Airport indicate that the wind directions were in the south and west-southwest sectors. Therefore, the monitor was measuring background concentrations since it was not sampling downwind of the Roxboro Plant. The results of the sulfur dioxide meausurements are summarized in Table B-4.

2.2.4.3 Nitrogen Dioxide Concentrations

Nitrogen dioxide (NO_2) levels were measured at the Hagers Mount site with both a sequential 24-hour bubbler type sampler and a Bendix Model 8101-B Oxides of Nitrogen Analyzer. The 24-hour sampler utilized the modified Jacobs-Hochheiser procedure outlined in the Federal Register (38 FR 15175). The continuous analyzer was operated in accordance with manufacturer's suggestions. This analyzer operates on the principle of photometric detection of the chemiluminescence resulting from the gas phase reaction of NO with ozone. Since this reaction only occurs between NO and ozone, the amount of NO_2 is determined by deriving the difference between NO_x and NO levels.

The results from the sequential 24-hour samplers did not produce a measurable concentration of nitrogen dioxide.

Data is summarized below on the basis of 92 days of continuous sampling with the oxides of nitrogen analyzer:

	Maximum Value-NO_2 (ug/m^3)[1]	Maximum Value-NO (ug/m^3)[1]
1-hr. average	112	159.9
3-hr. average	94	86.1
24-hr. average	56.4	24.6

[1]The limit of detectability is 9.4 ug/m^3.

2.2.5 Climatology

2.2.5.1 Meteorological Data Sources

Meteorological data presented is from the first-order weather station at Raleigh-Durham Airport (RDU), North Carolina, 72 km (45 mi) south-southeast of the site area (Table 2.2-3) and the cooperative weather substation of Roxboro, Henderson, and Oxford, North Carolina. The Roxboro substation record includes only precipitation and temperature. The wind data from Raleigh-Durham Airport were considered representative of the Mayo Creek area and were used for the diffusion analysis.

2.2.5.2 Winds

The meteorological conditions of the Northern Piedmont are controlled largely by the size and location of the Bermuda High, a semi-permanent feature in the subtropical belt of high pressure. Winds in the region show a pronounced bimodal distribution. The principal mode for the year is from the south or southwest with these directions more prevalent in spring and summer. Another mode is from the north or northeast which is the principal mode of autumn. The summer southerly flow is associated with the position of the Bermuda High over the southeastern United States while the northerly flow is associated with winter continental high pressure systems.

The average wind speed varies in the site area from 4.29 m/sec (9.6 mi/hr) in March to 2.28 m/sec (6.3 mi/hr) in July and August. Figure 2.2-6 gives annual wind direction frequency of occurrence at the Raleigh-Durham Airport.

2.2.5.3 Temperature, Relative Humidity, and Fog

The average monthly temperature in the area of the proposed plant ranges from 3.7°C (38.6°F) in January to 25.0°C (77°F) in July. Recorded extremes of 40°C (104°F) and -17.8°C (0°F) are typical of the plant site.

A daily minimum temperature below freezing could be expected on 82 days each year. Mean dew point tempertures range from 19.4°C (67°F) during the summer to 0°C (32°F) during the winter. The average monthly relative humidity is lowest in April, 62%, and highest during September, 79%.

Based on Raleigh-Durham Airport observations, heavy fog with visibilities less than or equal to 402 m (1320 ft) occurs during 36 days each year. The average duration of such incidents was normally less than three hours.

2.2.5.4 Precipitation

The average annual precipitation in the site area is 112 cm (44 in). The average monthly precipitation varies between 7.4 cm (2.9 in) and 9.1 cm (3.6 in) except during late spring and summer. During these months, the average is about 11.4 cm (4.5 in), reflecting the effects of increased thunderstorm activity. Snowfall is generally restricted to the months December through March with an annual mean snowfall of 24.1 cm (9.5 in).

2.2.5.5 Severe Weather

The storm pattern of the area consists of extratropical cyclones during the late fall, winter, and early spring, and thundershowers during spring and summer. The mean number of days each year with thunderstorms is approximately 44. Seventy-seven percent of these occur during May through August.

Due to the site's distance from the coast, the impact of hurricanes is no more significant than the wind speeds, gusts, and rainfall of local thunderstorms. Sustained winds greater than 33 m/sec (74 mi/hr) have never been observed at the Raleigh-Durham Airport.

The probability of a tornado occurring in any one year in a given square mile near the proposed plant area is approximately 7.3×10^{-4} or one tornado every 1,400 years (Thom, 1963).

2.2.5.6 Diffusion Climatology

Anticyclones frequently stagnate over the southeastern United States. The limited mixing depth and low transport wind speeds of such anti-cyclones result in long periods of high air pollution potential. The Piedmont Province of North Carolina has a relatively high incidence of stagnation periods, defined as stable conditions, low wind speeds, and no precipitation for four or more consecutive days (Korshover, 1971). For the period 1936-1970, there were 69 stagnation cases with a total number of 284 stagnation days. Of these, four of the stagnation cases lasted seven or more days. These cases of restricted atmospheric dilution capability are most frequent during September through November.

The inversion frequency on an annual basis (percent of total hours) in the proposed plant area is 40 (Hosler, 1961). The following table lists average mixing heights in meters for the site area by season and time of day (Holzworth, 1972):

	Morning	Afternoon
Winter	600 m (1,968 ft)	900 m (2,953 ft)
Spring	500 m (1,640 ft)	1600 m (5,249 ft)
Summer	500 m (1,640 ft)	1600 m (5,249 ft)
Autumn	450 m (1,476 ft)	1300 m (4,265 ft)

Atmospheric stability conditions for Raleigh-Durham Airport have been tabulated by the National Climatic Center and are presented in Table 2.2-4.

2.2.6 Surface Water Quality

The physical and chemical parameters of running waters reflect the local geography and climate of the area (Hynes, 1970). Mayo Creek and Mill Creek water quality are typical of piedmont streams. The low concentrations of nutrients and heavy metals reflect the absence of extensive municipal, industrial, and agricultural practices.

CP&L monitored Mayo Creek surface water chemistry during the years 1973-1974 in a baseline study of the site. More recent and extensive water quality analyses were performed on the Mayo Creek drainage in August and November 1976, and February 1977, as part of the collection of background data for the proposed project. These samples were collected during a wide range of water temperature and flows, and thus reflect the seasonal variations. These data are included in Table 2.2-5.

The pH values ranged from 6.5-7.5. Specific conductance ranged from 71-135 umhos/cm. Dissolved oxygen (DO) levels averaged greater than 9.0 mg/l at all stations and are typical of streams with low BOD and turbidity. The lowest reading, 1.6 mg/l, was measured at station MY4 (Figure 2.3-1) in August 1976, with no other readings below 5 mg/l. This station (which is below proposed dam) is characterized by low flow, log debris and sedimentation. Further, the most severe drought conditions experienced in this region for many years occurred during this period and caused stagnation which contributed to this low reading. High DO values near the 12.0 mg/l level were fairly common at all stations. Total dissolved solids averaged among the seven stations were 148 mg/l with a range of 10-328 mg/l. Turbidity values were less than 25 NTU at all Mayo and Mill Creek stations, although occasional visual observations of high turbidity effects were reported after periods of heavy rainfall.

Waters of the drainage area are considered to be soft with the hardness content ranging from 1-52 mg/1. The average alkalinities at all stations were similar, occurring in the 12-69 mg/1 range. Stations MY6 and MY7 showed slightly higher alkalinity and hardness values than the other stations. Total phosphate levels were variable at all stations and were relatively low, ranging from 0.005 to 1.1 mg/1.

Ammonia nitrogen and nitrate nitrogen levels were also low, ranging as follows: ammonia nitrogen 0.005-0.30 mg/1, nitrate nitrogen 0.005-0.69 mg/1. Weiss and Moore (1975) indicate the nitrogen-phosphorus ratio in similar nearby water approximates a 10:1 ratio, which is an optimum and desired value for aquatic life.

The average concentrations of the major cations analyzed from surface samples at all stations except MY6 and MY7 for 1973-1977 showed the following sequence of decreasing concentrations: Si>Na>Ca>Mg>Fe>Mn. Stations MY6 and MY7 exhibited a shift of calcium and sodium with the resulting sequence: Si>Ca>Na>Mg>Fe>Mn. Chloride ions measurements were slightly lower than the sulfate ions.

2.3 Species and Ecosystems

2.3.1 Aquatic Ecology

2.3.1.1 Introduction

The aquatic resources of Mayo Creek and its tributaries are typical of other piedmont streams in North Carolina. Studies performed by CP&L were conducted in order to provide a data base for the characterization of the stream fauna and to describe the drainage area ecosystem from the viewpoint of aquatic resources. These studies included the collection of water quality and biological samples from a total of seven sampling stations (Figure 2.3-1). Benthos, periphyton, and water quality samples were taken at stations MY1 (SR 1556), MY2 (Hwy 49), MY3 (SR 1501), MY4 (VA Hwy 96), and MY5 (SR 1519). Fisheries collections were made at stations MY8 (SR 1536), MY1 (SR 1556), MY9 (SR 1502), MY3 (SR 1501), MY4 (VA Hwy 96) and MY5 (SR 1519). These sites were chosen to ensure that various stream habitats and their prevailing conditions could be described.

The Mayo Creek drainage is composed of two important physical features, riffles and pools. Thus, the presence of two different, but interdependent habitats creates differing biotic communities. Riffles have an abundant oxygen supply and suitable habitat for the residence for many benthic organisms. Since these organisms are periodically swept into pools downstream, they, along with pool dwelling residents, serve as a food source for fish that reside in the pools. Therefore, the riffle-pool complex provides a diverse habitat suitable to colonization

and population by periphyton and invertebrates which in turn support the fish population.

Since these samples were made, CP&L has performed logging and clearing actions adjacent to much of Mayo Creek. (See Section 1.1) Therefore, the data presented below may not be totally representative of existing conditions.

2.3.1.2 Fisheries

2.3.1.2.1 Description of Fisheries Resources

Beginning in August 1976, CP&L conducted studies for one year to determine the species composition and distribution of fishes in Mayo Creek and its tributary, Mill Creek. Monthly collections were made at stations with a backpack electrofisher. Due to the occasional high turbidities of Mayo Creek, a 3 m (10 ft) standard seine was used to block off the downstream boundary of each section of stream being sampled. This technique greatly increased the catch. During the survey period, 39 fish species and one Centrarchidae hybrid were collected from six stations in Mayo Creek (Table C-1). Extremely cold temperatures and heavy ice formation on Mayo Creek precluded sampling during January 1977. No samples were taken during April 1977.

The distribution and abundances of the fishes of Mayo Creek from the headwaters at station MY8 to downstream station MY4 near the confluence of Mayo Creek and Hyco River can be found in Table C-2 and Figure 2.3-2. The abundance of fishes at the six stations sampled can be segregated into two distinct groups. The abundance of fishes at station MY5 on Mill Creek and stations MY4 and MY8 on Mayo Creek were low with respect to the abundances at stations MY1, MY3, and MY9. Station MY8 is located in the headwaters of the creek upstream of the proposed reservoir site. Summer drought conditions eliminated most fishes from this station. Station MY4, which is below the proposed dam and is located near the confluence of Mayo Creek and Hyco River in Halifax County, Virginia, exhibits habitat degradation as a result of agricultural runoff and upstream logging operations. The substrate at this station is primarily muck and sand and is in sharp contrast to the rock, gravel, and sand substrates typical of most of the other fisheries stations. These poor habitat conditions have influenced the species composition and abundance of fishes at this station (Table C-2 and Figure 2.3-2.) The abundance of fishes at station MY5 (Mill Creek) was also low and probably reflects the habitat differences between the two creeks.

The following is a brief discussion of the fisheries resources at each of the six stations surveyed. As evidenced by Figure 2.3-1, the stations are discussed in sequence from the headwaters station to the lowest creek station sampled.

a. Station MY8 - A total of 171 individuals representing 19 species and one centrarchidae hybrid were collected at station MY8 during the survey period (Table C-2). The dominant species at this location were the redfin pickerel (Esox a. americanus), rosyside dace (Clinostomus funduloides), bluehead chub (Nocomis leptocephalus), crescent shiner (Notropis cerasinus), white sucker (Catostomus commersoni), green sunfish (Lepomis cyanellus), and bluegill (Lepomis macrochirus). These represented 77.2% of the total catch at this station. Dominant species, for purposes of this report, are defined as those species representing greater than 5% of the numerical abundance of all fishes taken at a given station.

b. Station MY1 - At this station a total of 1,068 individuals were collected representing 23 species (Table C-2). The dominant species were rosyside dace (Clinostomus funduloides), bluehead chub (Nocomis leptocephalus), crescent shiner (Notropis cerasinus), and fantail darter (Etheostoma flabellare). These dominant species represented 84.9% of the total catch at this station.

c. Station MY9 - A total of 818 individuals representing 23 species were collected at this station during the survey period. The dominant species were the rosyside dace, bluehead chub, crescent shiner, fantail darter, and margined madtom (Noturus insignis) (Table C-2). These species totaled 73.2% of the total catch.

d. Station MY3 - This station exhibited the greatest abundance of fishes collected during the survey in addition to the widest variety of species (Table C-2). A total of 1,637 individuals representing 28 species were collected. Dominant species were the bluehead chub, satinfish shiner (Notropis analostanus), crescent shiner, swallowtail shiner (Notropis procne), margined madtom, and fantail darter. These species collectively accounted for 78.4% of the abundance at this station. Species unique to this station included the bowfin (Amia calva), highfin shiner (Notropis altipinnis), channel catfish (Ictalurus punctatus), and Johnny darter (Etheostoma nigrum).

e. Station MY4 - The abundance and species distribution of fishes at this station illustrated the effects of habitat degradation as a result of sedimentation. A total of 265 individuals representing 22 species were collected. The dominant species were the bluehead chub, satinfin shiner, crescent shiner, swallowtail shiner, redbreast sunfish, green sunfish, and bluegill (Table C-2). These species comprise 87.2% of the catch at MY4. Noticeably absent or occurring at low numbers at this station were dace (Clinostomus and Phoxinus) and darters (Etheostoma spp.). These species are not tolerant to unstable substrates and excessive siltation. Of particular interest was the presence of the flier (Centrarchus macropterus) and silvery minnow (Hybognathus nuchalis) at this station. Both species were restricted

in their distribution in Mayo Creek to this lowest station and have not previously been reported from this area of the Roanoke drainage. The distribution of the silvery minnow in the Roanoke River drainage is poorly documented and only one known record has been identified; however, numerous catches have been noted in other river basins.

f. Station MY5 - The fisheries fauna of Mill Creek was similar to that of Mayo Creek (Table C-2). No species were found to be unique to Mill Creek. A total of 382 individuals representing 19 species were collected at this station. The dominant species were similar to those of Mayo Creek and included rosyside dace, bluehead chub, crescent shiner, margined madtom, redbreast sunfish, green sunfish, and fantail darter. These species collectively account for 81.2% of the total catch at this station. Although the abundance of fishes at Mill Creek was less than that of similar habitats in Mayo Creek (Figure 2.3-2), the average size of fishes collected was larger.

It can be concluded that Mayo Creek and its major tributary, Mill Creek, supported a diverse ichthyofauna dominated by cyprinids (minnows), percids (darters), and small centrarchids (sunfish). This is a general characteristic of the entire Roanoke River ichthyofauna (Jenkins et al., 1970). This conclusion is further substantiated by comparing these data to those obtained by the North Carolina Wildlife Resources Commission during 1964 (Carnes, 1965). Results of Wildlife Resources Commission rotenone sampling at station MY3 indicated the presence of 16 species of fishes (Table C-3). The dominant species were the bluehead chub, crescent shiner, and fantail darter. The only species listed by the Commission and not collected during the present study is the gizzard shad (Dorosoma cepedianum).

2.3.1.2.2 Sport Fisheries

A preliminary survey conducted by the North Carolina Wildlife Resources Commission indicated little fishing pressure at Mayo Creek. Although access is available for anglers at state road bridges, little evidence of fishing activity was found (Fish, 1968). The Ecological Classification of the creek is Catfish-Sucker from the Virginia state line to 1.6 km (1 mi) above SR 1512, Robin-Warmouth from 1.6 km (1 mi) above 1512 to 1.6 km (1 mi) above Hwy. 49, and Dacetrickle from 1.6 km (1 mi) above Hwy. 49 to the origin. Mill Creek is classified as Robin-Warmouth from the confluence of Mayo Creek to SR 1520 and as Dacetrickle from this point to the origin (Fish, 1968). The Wildlife Resources Commission also reports that fishing is generally poor, but that good catches of channel catfish and redbreast sunfish occasionally occur in the areas downstream of N.C. Hwy. 49. Mayo Creek is a spawning area for Hyco River suckers (catostomids) and good catches of suckers are reported to be taken from the creek during spring spawning. The areas of the creek classified as Dacetrickle offer little or no sport fishing opportunities (Fish, 1968).

Studies conducted by CP&L have identified thirteen species of sport fishes from Mayo Creek. These species included the redfin pickerel, chain pickerel, white catfish, yellow bullhead, brown bullhead, channel catfish, redbreast sunfish, green sunfish, pumpkinseed, warmouth, bluegill, largemouth bass, and yellow perch. Although good diversification of potential sport fishes existed in the site area, those species present either occurred at low numbers or were too small to interest most sport fishermen. Table C-4 summarizes the data collected at both Mill and Mayo Creeks with respect to the number of sport fishes caught and the appropriate length and weight data. It can be concluded from these data and that of the N.C. Wildlife Resource Commission that little sport fishing opportunities existed in the site area.

The streams running through the proposed and auxiliary ash pond sites are small and intermittent and have an average flow less than 2 cfs, and as such do not support a sport fishery.

2.3.1.3 Benthos

Four samplings of this benthos were made in August and November 1976, and February and May 1977, to assess the summer, fall, winter, and spring populations. All quantitative samples were taken with a Surber Square-Foot sampler. In addition, nonquantitative samples were taken with the Surber and also by the "kick" method using a dip net. Collections each time were made at five stations: MY1, MY2, MY3, MY4, and MY5 as shown in Figure 2.3-1. At each of these stations collections were made in riffles ranging in depth from 1.3 cm (0.5 in) to about 15 cm (16 in), or in pools which reached depths of over a meter (yard).

The four sampling periods of Mayo Creek have presented a basic idea of the character of its benthic community. These sets of samples have yielded 117 taxa of benthic organisms. Such a high number of taxa indicates the diversity in this stream. Aquatic diptera dominated the fauna with 47 taxa; other groups include 11 taxa of dryopoid beetles, 12 taxa of caddisflies, 10 taxa of mayflies, 6 taxa of stoneflies and 4 of dragonflies, as well as various other taxa of aquatic insects, molluscs and oligochaetes. A complete species list is given in Table C-5.

Many of the taxa were relatively rare with only a few taxa being abundant. As stated by Wilhm (1969): "Typically, in unpolluted communities relatively few species are common and many species are rare."

The abundance of total fauna in riffles vs. pools is as follows:

Mean No./ft^2 (0.09 m^2)

		Aug.	Nov.	Feb.	May	$\bar{X}$
Mayo Creek	Riffle	46	38	263	52	100
	Pool	94	31	28	91	61
Mill Creek	Riffle	8	27	358	45	110
	Pool	86	50	52	62	62

The benthic fauna of Mayo Creek did not exhibit any unusual features. Many groups of aquatic insects are confined to flowing waters--Simuliidae (black flies)--or are found mainly in flowing waters - Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies), Elmidae (beetles), and Psephenidae (beetles) (Hynes, 1970), and all these are well represented in Mayo Creek. However, since most of the fauna collected were chironomids and these were not abundant in the pools, the basic character of the benthic population was dominated by these lentic forms.

The benthic invertebrates in the ash pond sites streams were representative of a riffle-pool type environment and should be similar to the species in Mill Creek and upper reaches of Mayo Creek.

2.3.1.4 Periphyton

In the Mayo Creek stream ecosystem, the algal community, especially the diatoms are responsible for the primary production that forms the base of the aquatic food web. These primary producers also affect higher trophic organisms (including man) by affecting certain water quality parameters such as dissolved oxygen, pH, water transparency, taste and odor (Weber, 1973).

Quarterly samplings of the periphyton (attached algae) were made by CP&L in September and November 1976 and February and May 1977, to assess summer, fall, winter, and spring diatom populations. A periphyton sampler or diatometer (Patrick, et al., 1954) was set and exposed for a period of four weeks at Mayo Creek stream stations MY1, MY2, MY3, MY4, and Mill Creek (MY5) as shown in Figure 2.3-1. In September, whole water samples and plankton net samples were collected. Analysis of the plankton community indicated a poorly developed plankton flora. Allen (1920) points out that water current in streams above a very modest velocity is distinctly unfavorable to plankton development. Plankton collection was stopped in November 1976, and natural substrate samples (rock and log scrapings) were taken in addition to artificial substrate samples to increase sampling efficiency and to gain additional information on the periphytic community.

Based on four samplings, a fairly good baseline of the algal population of Mayo Creek has been established. Over 16,500 diatoms were counted and identified from collections of periphyton from selected portions of the Mayo stream system. The data yielded 112 taxa of periphytic organisms.

Using 5% of the total number of diatoms counted (16,500) as a cut off point, the dominate species were: Synedra rumpens 5%, S. ulna 13%, Achnanthes minutissima 6%, Navicula rhyncocephla 7%, Gomphonema parvulum 5%, and Nitzschia palea 5%.

Other relatively common stream diatoms found in Mayo Creek were: Cymbella minuta, C. tumida, Meridion circulare, Achnanthes linearis, Navicula cryptocephla, N. gottlandica, N. bacillum, Gomphonema angustatum, Nitzschia linearis, N. sublinearis, and Nitzschia spp.

The periphytic fauna of Mayo Creek did not exhibit any unusual features. The dominant families are of a benthic nature conducive to areas where there was flowing water but the current is not too great. The abundant diatoms in Mayo Creek were common to small stream areas.

The periphytic forms in the ash pond sites streams were representative of a riffle-pool type environment and should be similar to the species in Mill Creek and the upper reaches of Mayo Creek.

2.3.1.5 Dam Sites

The proposed dam site on Mayo Creek is located approximately 610 m (2,000 ft) upstream of the Virginia state line. The creek at centerline of the proposed crossing has been diverted by an "S" shaped canal approximately 732 m (2,400 ft) long. This diversion was performed prior to the effective date of the Corps 404 permitting authority in the area. The diversion canal intersects the creek approximately 152 m (500 ft) upstream of the dam site, crosses the creek perpendicular to the proposed dam alignment and connects back to the creek some 152 m (500 ft) downstream on the dam alignment.

The canal is deeper than the creek bed and under normal conditions the stream bed is dry between the canal intersections.

Prior to this alteration, the stream had a 1 m (3.3 ft) high bank and was approximately 10-12 m (32.8-39.4 ft) wide and averaged .5 m (1.6 ft) deep with an average flow of 1416 l/s (50 cfs). The faunal populations of this portion of the stream were probably similar to station MY3, just upstream.

Crutchfield Branch at the point of the proposed ash pond dam has a 2-4-foot high bank, is approximately 3 m (9.3 ft) wide, contains 9 cm (3.5 in) of water and has an average annual flow of less than 28 l/s (1 cfs). The substrate is mostly rocky with a few shallow pools and little silt. No fishes were observed in the stream. As indicated above, the benthic and periphyton populations in the creek are probably similar to those in the upper reaches of Mill and Mayo Creeks.

The exact location of the auxiliary ash pond dam has not been determined since it is questionable if this site will be used.

2.3.2 Terrestrial Ecology

2.3.2.1 Introduction

In order to provide a description and assessment of terrestrial flora and fauna occurring at the Mayo site, biological studies were begun in late summer of 1976 by CP&L. Random collections and identifications of plant species were begun at that time. Terrestrial vertebrate sampling was initiated in October. Sampling locations for vegetation work and zoological studies are shown in Figure 2.3-3.

The purpose of the terrestrial studies was to inventory vascular plant, amphibian, reptile, bird, and mammal species that occur within the Mayo site area. Field surveys were designed in conjunction with reviews of available literature in order to adequately describe the terrestrial biota of the site. Species lists were reviewed for any species considered endangered or threatened in North Carolina or the United States. In addition, the ecological, recreational and commercial importance of the wildlife species was evaluated.

2.3.2.2 Flora

In late 1977 and the early part of 1978 much of the woodlands in the proposed reservoir and plant site area was logged and cleared by CP&L in preparation for the construction of the proposed project. (See Section 1.1) However, a list of 153 species identified at the site prior to logging is presented as Table C-6. Taxonomic keys used in the identification of plants include Radford et al., (1968), Justice and Bell (1968), and Gleason (1952). Nomenclature follows that of Radford et al., (1968).

Specific sampling areas were chosen during the spring of 1977 in three vegetation types representative of much of the site area. The three sampling areas included a mixed hardwood stand, a pine-hardwood stand, and a bottomland hardwood community.

The vegetation of the Mayo site was typical of the variety of species and communities found throughout the northern piedmont of North Carolina. Studies by Oosting (1942), Nemeth (1968), and Moore (1973) are pertinent to the evaluation of the vegetation of the site.

Patterns of composition of the original oak-hickory forests which dominated much of the region around the Mayo site had previously been altered by many of man's activities such as logging and farming. Figure 2.3-4 is a map of the site area depicting forest cover types prior to the recent logging, and Table 2.3-1 presents a numerical summarization of these cover types.

Fields comprised 22% of the Mayo site and occupied a total of approximately 445 ha (1,100 ac) of the required area. These fields represented land used for agricultural crops such as tobacco, corn, and various grains as well as areas which had been abandoned for 5 to 10 years and now are predominately covered by pines (Pinus spp.) and cedars (Juniperus sp.). Between these two extremes are fields removed from cultivation a year ago containing old tobacco and corn stalks and those that have now grown over with briers (Rubus spp.), broom sedge (Andropogon virginicus), honeysuckle (Lonicera japonica), and various members of the Poaceae and Asteraceae families. Stands of pines, predominately Virginia pine (Pinus virginiana), shortleaf pine (P. echinata) and to some extent loblolly pine (P. taeda), occupied about 97 ha (240 ac) of the total required area. These stands of pines accounted for about 5% of the site area. Many of the pine woods were once under cultivation as evidenced by furrows which still persist on the forest floor. The pine stands existed in a range of mixtures with some hardwood species both as codominants and understory. Typical pine stands contained yellow poplar (Liriodendron tulipifera), sweet gum (Liquidambar styraciflua), and red maple (Acer rubrum) as common understory species. Running pine (Lycopodium flabelliforme) was a prevalent ground cover in several pine stands.

The hardwood-pine and pine-hardwood classifications comprised about 1,321 ha (3,264 ac) and 301 ha (744 ac), respectively, in the entire site area. The total comprised nearly 63% of the Mayo site. Hardwood stands which occupy the drier upland areas were usually dominated by several of the oaks such as white oak (Quercus alba), northern red oak (Q. rubra), southern red oak (Q. falcata), and scarlet oak (Q. coccinea) along with several hickories, mockernut hickory (Carya tomentosa), and sweet pignut hickory (C. ovalis). Sourwood (Oxydendrum arboreum) and dogwood (Cornus florida) and saplings of the overstory species made up the predominant woody understory. Herbaceous species identified in these areas included wind flower (Thalictrum thalictrodes), bloodroot (Sanguinaria canadensis), pussy-toes (Antennaria plantaginifolia var. arnoglossa), dog-tooth violet (Erythronium americanum), and Christmas fern (Polystichum acrosticoides).

The forests of the intermediate slopes contained many of the species mentioned above in varying mixtures in addition to red maple, yellow popular, beech (Fagus grandifolia) and sweet gum. Important in the understory were several haw or hobblebushes (Viburnum spp.) as well as those understory species noted above. Many of the predominately hardwood areas had been logged previously both for hardwoods and pines. What existed in these locales were the grown saplings and culls left standing from past forestry practices. On the steeper slopes and more inaccessible areas of the site, a few older stands existed. These areas, along with the mountain laurel (Kalmia) bluffs scattered along Mayo Creek, represented the most untouched communities found in the site area.

The bottomland-hardwood community consisted of alluvial woods of varying ages occupying the flood plain of Mayo Creek and its tributaries and accounted for 10% of the site area. Predominant tree species found here included river birch (Betula nigra), sycamore (Platanus occidentalis), and hackberry (Celtis spp.). Red maple occurred here to some degree along with several of the oaks. Understory was often present in dense thickets dominated by honeysuckle, ironwood (Carpinus caroliniana), and poison ivy (Rhus radicans). Groundcover included wild onion (Allium spp.), may apple (Podophyllum peltatum) dog-tooth violet (Erythronium americanum) and smilax (Smilax spp.).

The creeks of the site were generally well shaded and highly variable in flow, thus yielding little in the way of aquatic macrophytes. No intensive flora studies were conducted in the proposed and auxiliary ash pond sites as was done in the reservoir area. However, site visits verified that the two ash pond sites had similar species composition as the reservoir area.

The proposed site on Crutchfield Branch is dominated by a hardwood forest with a 15 acre pocket of small pines. The hardwood canopy consisted of red maple, sycamore, tulip poplar, oaks, and sweet gum with an ironwood - dogwood understory. There are also 2-3 small fields of various stages of succession.

The auxiliary site is approximately 80% mixed hardwood forests with a few isolated stands of pines. The remaining 20% is pastureland and cultivated fields.

2.3.2.3 Fauna

2.3.2.3.1 Amphibians and Reptiles

An inventory of the amphibian and reptilian species which occur at the Mayo site was accomplished by conducting field investigations and reviewing the records of the North Carolina State Museum of Natural History and other literature.

The field survey of the amphibians and reptiles was initiated in October 1976 by CP&L. Specimens were collected or identified in the field whenever encountered during all phases of the terrestrial vertebrate sampling program and during some phases of the other biological sampling programs. Because amphibians and reptiles are poikilothermic animals, few observations were made during fall and winter sampling trips. Roadkills and other incidental observations provided some information, but specific investigations of likely amphibian and reptile habitats during the spring and summer months yielded the best results. Seventeen amphibian species and 14 reptilian species were identified (Table C-7). The amphibians included eight species of salamanders, three species of toads, and six species of frogs. The reptiles were represented by two turtle species, two lizard species, and ten snake species.

Although no site specific information on amphibians and reptiles was found in the literature, information reported by DePoe et al., (1961) indicates that the project area lies within the known distributional ranges of 23 species of amphibians and 42 species of reptiles.

2.3.2.3.2 Avifauna

An inventory of the avifauna species which permanently or temporarily inhabit the Mayo Creek area was compiled by conducting onsite investigations, reviewing available literature, and obtaining pertinent unpublished information from the U. S. Fish and Wildlife Service. Table C-8 includes the species identified by these methods.

Because many bird species are migratory, special care was taken to ensure that some measure of seasonal variations in species composition was included in the inventory. To account for such changes, the onsite studies were designed to include quantitative seasonal surveys conducted along a ten-mile route (Figure 2.3-3). The results of those surveys are reported in Table C-9 with notations on all other bird species observed during terrestrial vertebrate field studies. That table provides site specific information concerning the identity of fall and spring transients, winter and summer residents, and an indication of permanent residents. Species which were identified during all four onsite quantitative survey periods are probably permanent residents of the Mayo Creek area. A total of 80 species was found to occur at least seasonally at the Mayo site.

The species observed during nearby Audubon Christmas Bird counts are indicated in Table C-8 and are a further measure of winter resident species in the Mayo Creek area of North Carolina. As a measure of summer resident or breeding bird species, seven years of Federal Breeding Bird Survey data from the three North Carolina routes closest to the Mayo site were obtained from the Migratory Bird and Habitat Research Laboratory of the U.S. Fish and Wildlife Service. The species reported during those surveys also are indicated in Table C-8.

Of the 80 species known to occur at the Mayo site (Table C-8), only five are considered important game species in addition to their ecological value. Those species include mourning dove (Zenaidura macroura), bobwhite (Colinus virginianus), wild turkey (Meleagris gallopavo), wood duck (Aix sponsa), and American woodcock (Philohela minor). Based on field observations and discussions with local residents, there is no concentrated hunting of any of these species within the project boundaries. Of the hunting that does occur, most seems limited to hunters from the immediate vicinity of the Mayo site.

Wild turkey, which is listed under North Carolina hunting regulations as a big game species, was reported by local residents to occur in small numbers along Mayo Creek north of NC 49 to the Virginia state line. No calls were heard by CP&L biologists during the gamebird call count survey, and no other evidence of the turkey's occurrence on the site was documented during field investigations. Site specific information on hunter participation or success relative to wild turkey was not available.

Overall, the quality of habitat at the Mayo site was considered marginal for wild turkey. Except for scattered, small tracts of favorable habitat containing mature mast producing trees, most of the project area was not suitable for wild turkey. Most of the project area was comprised of young to moderately aged mixed pine-hardwood stands interspersed with roads, houses, and farms. The small tracts of favorable habitat interconnected by the narrow strip of bottomland hardwood vegetation in the flood plain of Mayo Creek explained the reported occurrence of a few birds. Because of the wide ranging behavior of wild turkeys, it was possible that individuals which were reported along Mayo Creek were exploring the Mayo Creek drainage from the Hyco River bottomlands to the north of the project. The degree of human activity and occupation along Mayo Creek probably would not allow the area to support many turkeys under any degree of management. Also due to recent logging activities no habitat area is left in the plant site or reservoir area.

The wood duck was the only waterfowl species observed along Mayo Creek during the site study. However, as shown in Table C-10, at least nine other species are reported in the Federal Waterfowl Parts Collection Survey data as harvested in Person County. These species, although not known to frequent Mayo Creek at this time, will probably utilize the proposed reservoir. There was no evidence found of any waterfowl hunting along Mayo Creek within the project area during the terrestrial vertebrate field studies.

2.3.2.3.3 Mammals

Mammal observations were recorded during all phases of the terrestrial vertebrate sampling program by CP&L staff beginning in July 1976. The recorded observations included direct sightings as well as indirect evidence such as tracks, dens, or other signs. Onsite surveys specifically designed to inventory and evaluate the mammal species and populations inhabiting the Mayo site included a squirrel leafnest survey, a canoe float trip on Mayo Creek, and a small mammal trapping program. Through these efforts, 20 species of mammals were identified at the Mayo site (Table C-11). Most of the ecologically and commercially or recreationally important species of the project area are believed to be included in that list.

Further information concerning the occurrence and importance of mammal species within the project area was sought from the literature and several state agencies including the North Carolina State Museum of Natural History and the North Carolina Wildlife Resources Commission. Sources at the Museum of Natural History (letter dated 20 April 1977 from David S. Lee, Curator of Birds and Mammals, N. C. Museum of Natural History, Raleigh, North Carolina), report that little is known about the occurrence of mammals in Person County. The museum's Person County mammal collection includes specimens of only three species. None of these specimens was known to have been collected at the Mayo site.

In addition to their intrinsic ecological value, species considered to be of commercial or recreational value are those categorized by the N.C. Wildlife Resources Commission as either furbearing or game animals. Species identified at the site that are so designated include the beaver (Castor canadensis), raccoon (Procyon lotor), muskrat (Ondatra zibethica), opossum (Didelphis marsupialis), red and gray fox (Vulpes vulpes and Urocyon cinereoargenteus), striped skunk (Mephitis mephitis), whitetail deer (Odocoileus virginianus), eastern gray squirrel (Sciurus carolinensis), eastern cottontail (Sylvilagus floridanus), and woodchuck (Marmota monax).

Furbearing animals, particularly the beaver, were well distributed throughout the Mayo site. During the canoe float trip conducted in November 1976 by CP&L, twenty actively maintained beaver dams and two beaver lodges were observed in Mayo Creek between the state highways NC 49 and VA 96. Other observed signs indicated that raccoon and muskrat also exist along Mayo Creek. The other furbearers found to inhabit the site included opossum, red and gray fox, and striped skunk. One furbearer not identified that may occur along Mayo Creek and its tributaries in small numbers is the mink (Mustela vison). Regardless of the population levels or distribution of these furbearers, no fur trapping activity at the Mayo site was detected. Examination of the North

Carolina Wildlife Resources Commission license files indicated that only ten 1976-77 trapping licenses were issued by Person County license agents. Interviews of several local residents failed to yield any knowledge of trapping activity at or near the site.

Of the game animals inhabiting the Mayo site, the whitetail deer was probably the most important in terms of providing a recreational resource. Although no organized hunting clubs were known within the project area, local landowners pool their efforts to hunt deer in the woodlands along Mayo Creek. Field observations have not found deer to be particularly numerous, but local residents indicate that the population level has been steadily increasing in recent years. The reported deer harvest for Person County during the 1976 hunting season was 170 (memorandum dated 19 April 1977, from Hal S. Atkinson, Jr., Chief, Division of Game, N.C. Wildlife Resources Commission, Raleigh, N.C.).

The most numerous small game mammal inhabiting the project area was probably the eastern gray squirrel. Based on the survey results and the popularity of squirrel hunting in North Carolina, squirrel hunting was probably an important sport among local hunters.

Other game animals observed at the Mayo site include the eastern cottontail and the woodchuck. Neither of these species was found or is believed to be particularly numerous or important to hunters within the project area, but the eastern cottontail and the woodchuck play an important role ecologically.

To further describe and document the mammal populations of the Mayo site, a small mammal trapping study was conducted at four study areas representing four dominant vegetative communities within the project area. The sample areas located as shown in Figure 2.3-3 included an upland hardwood community (SA-1), a pine-hardwood community (SA-2), a bottomland hardwood community (SA-3), and an old field community (SA-4).

The live trapping efforts were unsuccessful. Of the six species caught in snap traps, only the shorttail shrew (Blarina brevicauda) was captured at all four sample areas. The white-footed mouse (Peromyscus leucopus) was found at all three wooded sample areas (SA-1, SA-2, and SA-3), but not in the old field (SA-4). The meadow vole (Microtus pennsylvanicus) and the eastern harvest mouse (Reithrodontomys humulis) were identified only at the old field (SA-4). The pine vole (Microtus pinetorum) occurred exclusively in the upland hardwood sample area (SA-1). The single golden mouse (Peromyscus nuttalli) specimen was collected at the bottomland hardwood sample area (SA-3).

The upland hardwood community (SA-1) was determined to be the most diverse with 28 individuals of three species. The bottomland hardwood community (SA-3) with 16 specimens representing three species was the second most diverse. These were followed by the old field community (SA-4) and the pine-hardwood community (SA-2) with 44 and 8 specimens of three and two species, respectively.

2.3.2.4 Dam Sites

Prior to rediversion, Mayo Creek at the proposed dam site ran essentially south to north and had a relatively wide flood plain. The flood plain on the west side of the creek was approximately 61 m (200 ft) wide and contained a mixture of American beech, red maple, willow oak, sweet gum, and sycamore trees. Along the east side of the creek was a 6-15 m (20-50 ft) wooded fringe containing the same species mentioned above. Common understory species in both wooded areas contained honeysuckle, ironwood and briers. Adjacent to this wooded fringe was a 152-244 m (500-800 ft) wide cultivated field that is also in the flood plain. The field was planted in corn in 1977. This flood plain area was only flooded during extremely high flow periods.

However, since the winter of 1978, all vegetation in the proposed dam alignment has been removed. Excavation of the foundations and spillway is 80% complete and construction of the dam is continuing except of course for the filling of Mayo Creek, which requires a Department of the Army permit.

Crutchfield Branch at the proposed ash pond dam runs south to north. The west bank has a 6-12 m (20-40 ft) border of trees containing various oaks and a few poplar, beech, and ironwood trees. Adjacent to the wooded fringe is a large field that apparently has not been cultivated in 2-3 years.

The terrain rises steeply on the east bank of the creek into a hardwood dominated forest containing various oaks, and hickories with an understory of dogwood and ironwood.

There appears to be little if any flood plain at the site based on the vegetation along the bank and the 0.6-1.2 m (2-4 ft) high bank adjacent to the stream bed.

2.4 Endangered and Threatened Flora and Fauna

As authorized by the Endangered Species Act of 1973 (P.L. 93-205; 87 STAT. 884; 16 U.S.C. Section 1531-1543), the official United States endangered and threatened species list is administered by the U.S. Department of Interior (USDI). The most recent complete Federal list,

published in the Federal Register (42 FR 135), on 14 July 1977, included mammal, bird, reptile, amphibian, fish, snail, insect, and mussel species. None of these species was found at the Mayo site by CP&L investigators.

Although the USDI official list contains only four plant species, the Smithsonian Institute under the direction of Congress as set forth in Section 1541 of the Endangered Species Act of 1973 has prepared a separate list of flora to be considered for endangered or threatened status. That list was published in the Federal Register (40 FR 127) on 1 July 1975. No plant species found at the Mayo site by CP&L investigators is on the Smithsonian list. However, one species, Lewis' Heartleaf (Hexastylis lewisii) was collected in the early 20th century in Person County. The exact location is uncertain. Since the collection, much of the county including the Mayo area has been altered by logging making the area less desirable for propagation of the species.

North Carolina does not have an endangered or threatened species law. However, in 1977 the N.C. State Museum of Natural History published a book entitled Endangered and Threatened Plants and Animals of North Carolina. Of the species found at the Mayo site by CP&L, the following were included in this publication:

Plants	Status
Virginian cowslip (Mertensia virginica)	Endangered
Amphibians	
Four-toed salamander (Hemidactylium scutatum)	Undetermined
Birds	
Turkey vulture (Cathartes aura)	Threatened
Sharp-shinned hawk (Accipiter striatus)	Threatened
Red-shouldered hawk (Buteo lineatus)	Threatened
Americas kestrel (Falco sparverius)	Threatened
Brown creeper (Certhia familiaris)	Threatened
Eastern bluebird (Sialia sialis)	Special concern
Red-tailed hawk (Buteo jamaicensis)	Special concern
Wild turkey (Meleagris gallopavo)	Special concern
Great blue heron (Ardea herodias)	Special concern
Purple martin (Progne subis)	Special concern
Golden-crowned kinglet (Regulus satrapa)	Special concern
Loggerhead shrike (Lanius ludovicianus)	Special concern

Birds	Status
Broad-winged hawk (Buteo platypterus)	Undetermined
American bittern (Botaurus lentiginosus)	Undetermined
Yellow-bellied sapsucker (Sphyrapicus varius)	Undetermined
Swainson's thrush (Hylocichla ustulata)	Undetermined

The status catagories of these species are defined as follows:

ENDANGERED: Within the confines of the State; this includes peripheral forms which may be quite common elsewhere but whose continued existence as part of the North Carolina biota is clearly and imminently at hazard; or in danger of extirpation.

THREATENED: Within North Carolina; forms which are likely to become endangered within the foreseeable future if certain conditions are not met; forms which exhibit a considerable decrease in numbers deemed beyond the limits of normal fluctuation, or documented range contraction, but not yet considered endangered.

SPECIAL CONCERN: Because they exist in small populations (are rare) over a relatively broad range; because they are targeted for exploitation which could become extensive enough to pose a threat; because certain characteristics or requirements make them especially vulnerable to specific pressures; or for other reasons identifiable by experienced researchers.

UNDETERMINED: Because of insufficient data for precise assessment.

The one plant species found at the Mayo site which appears in the State publication is the Virginian cowslip or bluebells. That plant is a perennial herb of the family Boraginaceae that occurs in alluvial woods and bottomlands from New York State to eastern Minnesota, southward to Arkansas, Alabama, and South Carolina (Fernald, 1950; Gleason, 1952). The species has been listed as a peripheral endangered species in North Carolina. The reason for this listing is that North Carolina is near the southeastern edge of its geographical range. Radford et al., (1968) reports its North Carolina occurrence in only Rockingham County, but the plant has also been reported along the Hyco River several miles northwest of the Mayo site (memorandum dated 31 March 1977, from Charles E. Roe, North Carolina Natural Heritage Program, NCDNER, Raleigh, NC). On the Mayo site, the plant was located at SA-3 (Figure 2.3-3) in a bottomland hardwood community and near the SR 1512 bridge crossing of Mayo Creek. The number of specimens that existed within the Mayo site was not known; however, it is expected that the plant was distributed along creek banks in moist wooded areas throughout the Hyco River drainage basin.

The four-toed salamander is the only amphibian species found at the Mayo site which is included on the North Carolina lists. Its status is undetermined. Conant (1975) reports the range of this salamander

from Nova Scotia to Wisconsin and Alabama with disjunct populations in many states. Because this salamander is a secretive animal which is not easily collected, it is probable that the species is more common and widely distributed than originally thought. The fact that this species was not previously reported to occur in Person County more likely reflects the scarcity of information concerning the terrestrial fauna of that county than the actual scarcity of the animal. Populations of the four-toed salamander were discovered in seepage areas on the Mayo Creek flood plain at SA-3 (Figure 2.3-3) and near the SR 1512 bridge.

All 16 bird species listed can be found distributed throughout most of North Carolina as well as the eastern United States, and many of them are considered locally common in areas of favorable habitat. However, the threatened species breeding populations and number of sightings have declined in recent years in North Carolina due to various factors including hunting, reduction of food supply, accumulation of pesticides, and alteration of breeding and overwintering habitat due to logging and forest fires.

2.5 Areas of Historical, Archaeological and Cultural Resources

In 1728 the area now known as Person County was first explored by a team of Virginia surveyors headed by William Byrd. During his explorations he discovered the existence of three Indian tribes, the Saponi, Tutelo, and Occaneechi, and although no one tribe was identified as having permanently inhabited areas of Person County, their movements in and through the county were noted.

The first settlers moved into areas near the Hyco River and established small homesteads and farms. Settlement expanded, and in 1791, by an act of the North Carolina Legislature, the county was created by carving a 32 km by 32 km (20 mi by 20 mi) square from the existing Caswell County. The area was named after Thomas Person, a leader of states' righters during the Revolutionary War period. By the early 1860's, Person County had a well established plantation regime, in contrast to the small farm, yeoman development which was characteristic of the North Carolina piedmont. Following the Civil War, the large estates disappeared resulting in the establishment of small farms and an unusually high number of tenant farms.

The county became a pioneer in the tobacco industry, and by 1890, with the establishment of a railroad through the county, numerous small tobacco factories were established. Until the recent trends of industrial and commercial development in the county, the base of Person County's economy was agriculturally oriented, with tobacco as the main crop.

2.5.1 Historical Sites

In a report prepared by the Person County Soil and Water Conservation District in 1971, historic sites in the county were described as being "scarce" and of "little value." The National Register of Historic Places identifies only one site in Person County, Waverly Plantation, located approximately 17 km (11 mi) west of the Mayo project. The North Carolina Department of Cultural Resources was contacted and requested to provide a listing of known historical and/or architecturally interesting structures in the vicinity of the project site. Of the ten houses included on the list, only one house, the Fontaine House, was located on property which was required for the construction site (letter dated 23 March 1977, from Kathleen F. Pepi, N.C. Department of Cultural Resources). However, by letter of 29 November 1977 to the Advisory Council on Historic Preservation, the State Historic Preservation officer suggested that the Fontaine House not be considered for eligibility to the National Register. Mr. Larry E. Tise, State Historic Preservation Officer stated that CP&L made every reasonable effort to afford interested parties the opportunity to save the Fontaine House. As no individuals or agencies responded to CP&L's offer, the Fontaine House was destroyed to facilitate CP&L's construction plans.

During the location process for a proposed transmission line conducted in February and March of 1978, CP&L became aware of the location of the John Rogers House, located on SR 1326, approximately five miles from the proposed plant site. This house is currently on the study list for inclusion in the National Register of Historic Sites.

The Research Laboratories of Anthropology of the University of North Carolina, Chapel Hill, (Ward and Trinkley, performed an archaeological (historic and prehistoric) survey of the Mayo project site. Six historic sites were identified, including a mill site which lies within the proposed reservoir area. According to the report, except for the mill site, the six historic sites either lie outside the impact zones, or have little historical significance. "Although mitigation is not recommended in the case of the old mill, additional historical research should be undertaken in order to ascertain its role in the development and history of the Mayo Creek communities."

2.5.2 Archaeological Sites

The Research Laboratories of Anthropology identified twelve archaeological sites in the project area. According to the report none of the sites appeared to be of significance for further study.

In addition to these sites, three old cemeteries in the project area were mentioned in letters received from local residents. These cemeteries were investigated on 7 March 1978 by the Research Laboratories of Anthropology of the University of North Carolina (Coe, 1978). Two of the cemeteries were small family type plots containing 5-7 graves each. According to Coe, 1978, these sites "... follow the pattern of burials observed in other contexts that have been identified as the graves of slaves, or freed blacks, before and after the Civil War." These two sites are within the proposed reservoir boundary. The third cemetery contains over seventy graves and the pattern of burial is similar to the other two cemeteries. Also this third cemetery is located on what was the Crutchfield Plantation. However, this cemetery is located north of the proposed ash pond and is not in CP&L's proposed area of acquisition.

On 18 May 1978 at the request of a local resident, the Research Laboratories of Anthropology of UNC investigated another small cemetery in the project area. Most of these graves were marked with field stones but no inscription or other identification were observed. It appears that this cemetery is similar in kind and age to those described above.

2.5.3 Aesthetics:

The Mayo site lies in the piedmont province of North Carolina, a plain which is characterized by low, rounded hills with gentle to moderate slopes. Streams dissect the entire province and have lowered their valleys more than 30 m (100 ft) below their uplands.

Prior to alteration, approximately 73% of the site was forested with various hardwood species occurring in pure stands and in varying mixtures with pines. The hardwood forests ranged from the moist bottomland stands to the dry upland ridge sites. An additional 5% of the site area was pure pine forest. The remaining 22% of land in the project area was open. Some fields were under cultivation for corn, tobacco and other crops while many were abandoned and in various stages of succession.

While the rural, hilly nature of the area was aesthetically pleasing, there were no unique or particularly scenic areas within the project boundary. Additionally, none of the streams in the Mayo site area are candidates for the State's proposed Natural and Scenic Rivers System (letter dated 22 September 1976, from Steven E. Reed, N.C. Department of Natural and Economic Resources).

2.6 Socioeconomic Considerations

2.6.1 Population

The land within the 80 km (50 mi) radius of the proposed Mayo site includes sections of 13 North Carolina and 12 Virginia counties which

have population characterized by rural distribution. Exceptions to this are in approximately 20 urban areas, where concentrations of population occur.

The Mayo site is located in Holloway Township, Person County, North Carolina (Figure 2.6-1). The 1970 population of Person County was 25,914. In 1975 the estimated county population was 26,800. Population trends in Person County have shown population increases between 1920 and 1940, and population decreases in two of the last three decades (Table 2.6-1). The most important trend in recent years has been the shifts of population within the county, with every county township with the exception of Roxboro Township (which includes the City of Roxboro), showing population losses.

The 1970 population of Holloway Township was 1,480. For every decennial census period between 1920 and 1970, the township has been characterized by population decreases with the exception of the period 1930 to 1940 when a gain was noted. During the most recent decennial period, a 6.6% population decrease was noted.

2.6.1.1 Population Characteristics

Person County population density is estimated to average 25.0 inhabitants per square kilometer (64.6 inhabitants per square mile). Approximately 79.3% of the population is considered to be rural, while only one-fifth, or approximately 20.7% of the population, is urban.

Approximately 30% of Person County residents 25 years old and over have completed high school. The statewide average is 39%. The median number of school years completed by the Person County population is 9.4 years as compared to the North Carolina average of 10.6 years. (U.S. Bureau of Census, 1973).

2.6.1.2 Population Centers

Within the 80 km (50 mi) radius of the Mayo project major urban population centers occur in the cities of Raleigh (123,793, 80 km [50 mi] SSE), Durham (95,438, 56 km [35 mi] S), Danville (46,391, 45 km [28 mi] W), Burlington (35,930, 66 km [41 mi] SW), and Chapel Hill (25,537, 68 km [42 mi] SSW). Centers of moderate population occur in Eden (15,831, 71 km [44 mi] W), Reidsville (13,636, 72 km [45 mi] SSW), and Henderson (13,896, 45 km [28 mi] ESE).

Roxboro is the only incorporated city within Person County and is the only urban area within 16 km (10 mi) of the Mayo project. The 1970 population for Roxboro was 5,370, and the estimated 1975 population is 7,600. Between 1910 and 1970 the city has experienced a steady increase

in population (due in part to annexation), with the exception of the 1940-1950 decade.

2.6.1.3 Population Projections

The North Carolina Office of State Planning (1972 and 1976) and the Virginia Division of State Planning and Community Affairs (1975) have projected populations for counties within the 80 km (50 mi) radial area of the plant site to the year 2000. Both sets of projections are based on the U. S. Office of Business Economics and Bureau of Economic Analysis (OBERS) projections of multi-county economic areas. Between 1970 and 1980, the projections generally reflect moderate population increases in the North Carolina counties characterized by rural population distribution and significant population increases in counties with substantial portions of population concentrated in large urban areas. Projections for the same period for Virginia counties reflect slight population increases for eight of the twelve counties included in the 80 km (50 mi) radial area, with decreases in the remaining four counties. For both the Virginia and North Carolina areas for the decennial periods to 1990 and to 2000, population increases have been projected, with greatest growth in counties with large urban areas.

The revised 1976 OBERS projections for Person County show population increases between 1970 and 1980 (Table 2.6-2). Greatest growth should occur in Roxboro Township (Table 2.6-1).

2.6.2 Economic Resources

2.6.2.1 Local Government and Revenue Source

Person County is divided into nine townships: Allensville, Bushy Fork, Cunningham, Flat River, Holloway, Mount Tirzah, Olive Hill, Roxboro, and Woodsdale (Figure 2.6-1). The county seat, Roxboro, is located in Roxboro Township.

Both the City of Roxboro and Person County utilize the Council-Commissioner-Manger form of government. In each case the manager is the appointed administrative head of government while other officials are elected to their respective positions.

Total assessed valuation of taxable property in Person County for 1975 was $447,885,376 with CP&L property constituting approximately 55% of the base. (Reevaluation of real and personal property for fiscal year 1976-1977 reduced the CP&L contribution to the tax base to approximately 44%). The tax rate per $100 assessed value was $0.75, while bonded indebtedness totaled $4,210,000. Additional tax data are indicated in Table 2.6-3.

CP&L property in Person County for tax year 1976 represented 44% of the county tax base, and CP&L provided 44% of Person County's 1976 property tax revenue. The original cost of CP&L property in Person County for tax year 1976 was $304,599,762. Assessed valuation, based on a percentage original cost, was $256,165,709. Assessed valuation was subject to a tax rate of $.50 per $100 of assessed valuation, and CP&L paid Person County $1,280,829 in property tax in 1976.

2.6.2.2 Employment and Labor Force

In 1975, the Person County average annual civilian labor force numbered 13,210. Since 1967, yearly increases have been noted with government services and trade showing the most consistent growth rates in the past six years.

Approximately 29% of the 1975 labor force was working in non-manufacturing categories such as government, trade and service. An almost equal percentage was employed in manufacturing, while approximately 9% was involved in agricultural employment (Table 2.6-4).

Compared to the rest of the State, Person County has a high rate of unemployment. The average annual rate in 1975 was 15.6%. Preliminary data for 1976 indicates a reduction in the unemployment rate to 8.1%.

The overall per capita income for Person County in 1974 was $4108, and was 11% below that of the State. The preliminary 1976 data also indicates that the average weekly wages paid insured workers in Person County was $153.07 or 7% below the $164.32 weekly average paid North Carolina workers.

2.6.2.3 Commercial, Industrial, and Agricultural Development

The City of Roxboro is the center for the majority of commercial and industrial development in Person County. Generally, commercial and industrial establishments are located along major roadways, in established shopping centers, or in the Roxboro central business district. Smaller businesses are scattered throughout the county.

The 1974 annual payroll of industrial establishments in Person County totaled $44,402,000. By number, there are more retail trade establishments in Person County than any other type of commercial and industrial development activity. Retail trade includes food stores, automotive dealers and service stations, restaurants, and clothing stores. However, the largest type of commercial and industrial activity is manufacturing, with the manufacturing of textiles the major industry in the county and providing for a large percentage of the county's employment. Other important manufacturing activities include the production of motor vehicle parts and accessories, and the fabrication of metal products.

Approximately 31% of the land in Person County is developed for agricultural activities. Cropland totals 22,459 ha (55,498 ac) compared to 6,277 ha (15,510 ac) in pasture. Corn leads all crops in acreage and is followed by tobacco, wheat for grain, and hay. Total cash receipts in 1974 were estimated to be $21,958,000. Tobacco revenue constituted over 72% of the total cash value of crops grown in Person County and would be considered the single most important crop. (Federal-State Crop and Livestock Reporting Service, 1976.)

2.6.2.4 Trade

Retail sales in Person County for the 1973-1974 fiscal year totaled $64,085,879. Food, general merchandise, and automotive sales led in total cash receipts, accounting for 64% of all retail sales. (N.C. Office of State Budget and Management, 1975).

2.6.2.5 Forest Resources

Forests, which comprise about 63% of Person County, produced a forest products income for the county of over $1 million in 1973.

Approximately 78% of the land in the Mayo site area is woodland. Most of these areas have been cut over within the past 40 to 50 years with a significant portion having been cut over within the past 10 to 15 years. In addition, most of the land within CP&L ownership has been cut within the last few months. Most of the timber and pulpwood cutting is done by local wood using companies. Usually the land is completely cut over and left to re-seed itself, without formal forest management. This practice has resulted in poor quality and quantity of forest products throughout Person County and especially in the site area. Normally, a landowner sells his timber and pulpwood at a time when he needs the money or prior to selling his land, rather than managing his holding in accordance with a sustained yield timber management plan.

2.6.3 Mayo Creek Project Area Socioeconomics

A total of 23 families (approximately 83 individuals) resided within the project site. However, because of recent land acquisition by CP&L no families remain in the project area. The majority of the twenty-three families that have relocated moved either to areas in the relative proximity of the plant site or the Roxboro area.

The project site contains approximately 700 acres total of cropland, and pastureland which will be taken out of production.

In 1977 the approximate percentages of crops planted at the site included corn - 64%, tobacco - 23%, wheat - 8%, and milo - 5%. The estimated value for the cropland and pastureland is $400,000.

It was estimated by CP&L that the value of all timber products located within the site boundaries was between $150,000 and $200,000.

According to the District Conservationist, SCS for Person County and the Halifax County, Virginia, Agricultural Extension Agency, Mayo Creek is not used for irrigation or livestock watering. However, at least one of the tributaries, Crutchfield Branch, is used for livestock watering as indicated in a letter from Mr. John H. Merritt (Appendix D).

2.6.4 Public Services

2.6.4.1 Public Utilities

CP&L provides electrical service in Person County. Approximately 8,000 residential and commercial customers are served. The major percentage of the county's electricity is generated by the CP&L Roxboro Steam Electric Plant, located northwest of Roxboro on Hyco Reservoir. Capacity of the plant is rated at 1,720 MW. Plans include the addition of a fourth unit in 1980, capable of producing 720 MW.

Public Service Company of North Carolina, Inc., provides Person County with natural gas, while bulk gas is purchased from Transcontinental Gas Pipeline Corporation. Recent energy shortages have drastically reduced the availability of gas as an industrial energy source and have resulted in reduced supply for the county.

The only existing water and sewer systems in the county are located in the City of Roxboro. Roxboro does not supply water or sewer service to any new, large water users.

2.6.4.2 Community Services

Person County operates a consolidated public school system with eight elementary schools, two junior high schools, and one senior high school. Approximately 6,600 students are enrolled.

The North Carolina Department of Community Colleges operates the Piedmont Technical Institute (PTI) in Person County. PTI, currently scattered in several buildings throughout the county, plans to begin construction of a consolidated campus on a 40+ ha (100+ ac) site near Roxboro,

Law enforcement is handled by two organizations in Person County, the Roxboro Police Department and the Person County Sheriff's Department. Both agencies operate from Roxboro with the Roxboro Police Department providing protection within the corporate limits of Roxboro and the Sheriff's Department serving the remainder of the county.

There are two fire departments in the county. The Roxboro unit is supported in part by the county and provides countywide service. The second unit, the Hurdle Mills Volunteer Fire Department, provides protection to the Hurdle Mills Community.

There are 23 physicians, dentists and other practitioners in Person County or 8.6 medical professionals per 10,000 population. This compares favorably to the national figure of 7 per 10,000 population for similar areas. The principal hospital facility for the county is Person County Memorial Hospital. The 86 bed facility was built in 1950 and is located in Roxboro.

2.7 Land Use

2.7.1 Present and Projected Land Use

The majority of land in Person County consists of forests (63%). Other major categories of land use include cropland and pastures (31%) and urban and built up (3%).

Patterns of land use in Person County show concentration of development in and around Roxboro, with other small communities scattered throughout the county. Residential development has been noted principally in areas surrounding Roxboro, and along roadway networks, especially southwest, west, and east, and northeast of Roxboro. A lesser amount of development has been noted in the northwest and southwest quadrants of the county.

In the Mayo site area, approximately 78% of the area is forest, while 22% of the land is open. Residential development has occurred along roadways, but is generally sparse due to the rural nature of the area.

The Sketch Land Development Plan (Berndt, 1975) for Person County cites several major objectives for the county:

a. Encourage new growth in and around Roxboro, so as to promote contiguous development.

b. Control development along highway corridors to enhance entranceways to the city, and to preserve traffic carrying capacity.

c. Encourage wise use of land around Hyco Lake to preserve recreational quality of this facility.

d. Encourage new development only in locations where it can be adequately served by public facilities. New residential development should be directed west of and contiguous to existing residential growth in Roxboro.

e. Preserve prime agricultural land to the extent possible, recognizing the fact that prime agricultural land is also most suitable for urban development.

f. Maintain the small rural character of existing crossroads communities.

g. Discourage urban expansion in unsewered areas where soils are unsuitable for development with septic tanks.

h. Protect prime industrial sites from encroachment by incompatible uses and from conversion to other uses.

i. Exercise extra care in development in Neuse and Tar drainage basins due to water quality requirements.

j. Cooperate with city in controlling development outside city limits.

k. Discourage outlying shopping centers to help preserve the Roxboro central business district.

l. Integrate county highway planning with city thoroughfare plan. Promote by-pass east of Roxboro.

m. Promote a general aviation facility for Person County.

It is the hope of the county that development will be guided by official policy in order to assure compatible land use. In order to accomplish this goal, a countywide zoning ordinance has been prepared for the county based on the Sketch Land Development Plan. However, the zoning ordinance was not adopted, thus, no county zoning restrictions exist in the site area other than those affecting the use and installation of septic facilities.

2.7.2 Recreation Resources

Hyco Reservoir is the principal recreational resource in Person County. The 1,518 ha (3,750 ac) impoundment was constructed in the early 1960's by CP&L as a cooling reservoir for the Roxboro Steam Electric Plant. Its location is 16 km (10 mi) west of Roxboro. The Person-Caswell Lake Authority controls a public park on the reservoir and provides a variety of facilities for recreational activities which include picnicking, camping, boating, and fishing.

Present recreational use of the Mayo site is limited. No public recreational areas are known to exist on the site. Fishing pressure on the creek and its tributaries is light, and although deer, squirrel, and quail hunting are relatively popular among local residents and land owners, organized hunting in the area by hunting clubs has not been noted.

2.7.3 Transportation

2.7.3.1 Highways

Throughout Person County, there are over 1,062 km (660 mi) of roads. Approximately 15% of these roads are classified as primary roads, while other roads are considered secondary.

Roxboro is the center of a highway network with all major roads (U.S. 501, U.S. 158, N.C. 49, N.C. 57, and N.C. 157) passing through its center. Highest traffic volumes within the county are noted in the city. Outside of the city limits, U.S. 501 south has the highest average daily volume.

2.7.3.2 Aviation

Person County has no general aviation facility. The closest facility is near Oxford, in Granville County. The nearest scheduled air carrier facility is in Danville, Virginia. However, the Raleigh-Durham Airport provides a more complete commercial schedule and is more frequently utilized by Person County residents.

2.7.3.3 Rail Service

Rail service for Person County is provided by the Norfolk and Western Railway Company. One single track runs parallel to U.S. 501 through the City of Roxboro. A spur from this line serves the CP&L Roxboro Steam Electric Plant.

2.8 Transmission Corridors

The transmission corridors for the Mayo Electric Generating Plant traverse a variety of terrain and vegetation communities common to the piedmont physiographic region of North Carolina. Wildlife species within the transmission corridors include small game animals such as cottontail rabbits and gray squirrels; game birds such as bobwhite, woodcock, and mourning dove; waterfowl such as ducks; furbearers such as mink, muskrat, fox, and raccoon; and two big game species, whitetail deer and turkey. Within the areas traversed by the transmission corridors, the existing bottomland hardwoods and adjacent uplands consisting of hardwoods, mixed pine-hardwoods, and field and agricultural lands provide a diversity of habitat types that are productive to wildlife.

2.8.1 Mayo-Wake

Specifically, the proposed 113 km (70 mi) route of the Mayo-Wake 500 kV line will cross the following major and minor streams and rivers:

Mayo Creek	Horse Creek
Mill Creek	Richland Creek
Dickens Creek	Smiths Creek
Neuse River (2)	Tom Creek
Lick Creek	Powell Creek
Laurel Creek	Hodges Creek
Water Fork Creek	Marks Creek

2.8.2 Mayo-Roxboro

Specifically, the proposed 14.7 km (9.1 mile) route of the Mayo-Roxboro 500 KV Line will cross the following major streams:

Castle Creek
Marlowe Creek
Storys Creek
Ghents Creek

This proposed line will also pass within 721 feet of the John Rogers House. The John Rogers House is a Federal Period, two-story farmhouse with sealed weather boards, a modillion cornice, and exterior fieldstone and brick end chimneys. This house is on a study list for potential nomination to the National Register of Historic Places.

2.8.3 Mayo Tap

The proposed 5 km (3 mi) Mayo 230 kV tap line crosses no major streams or rivers.

2.9 Road Relocations

None of the road relocations indicated in Figure 1.6-3 involve the crossing of unique habitat (SR 1501 may be an exception since the alignment has not been delineated). However, one of the road relocations, NC 49, would involve filling of significant areas of wetlands.

The area to be utilized for the relocation of NC 49 crosses 200-300 feet of bottomland along Mayo Creek which supports vegetation typical of moist soils. The predominate tree species in the area include sycamore (Platanus occidentalis), red maple (Acer rubrum), sweetgum (Liquidamar styraciflua), and yellow poplar (Liriodendron tulipifera). Understory and ground cover species consist primarily of smilax (Smilax sp.), honeysuckle (Lonicera japonica), and wild onion (Allium sp.).

Table 2.2-1 Streamflow Data, Mayo Creek Near Woodsdale, N. C.[1] (02077660)

	1975		1976	
	l/sec	(cfs)	l/sec	(cfs)
Jan.			2430	(85.8)
Feb.			1408	(49.7)
Mar.			1005	(35.5)
Apr.			748	(26.4)
May			343	(12.1)
June			320	(11.3)
July	4616	(163)	94	(3.32)
Aug.	1314	(46.4)	5.9	(.21)
Sept.	1773	(62.6)	27.2	(.96)
Oct.	439	(15.5)	841	(29.7)
Nov.	827	(29.2)	306	(10.8)
Dec.	1272	(44.9)	753	(26.6)
Average			690	(24.4)[2]

NOTES:

(1) Drainage Area = 135 km^2 (52 mi^2)

(2) This is not the predicted annual average flow of Mayo Creek. This value is the average flow calculated from the only gauge data actually recorded on Mayo Creek. 1975 and 1976 were years of abnormally low rainfall.

Table 2.2-2 Historic Earthquakes in the Southeast United States

Epicenter	Date	Epicenter Distance From Site in Kilometers	Reported Epicentral Intensity M.M.[1]	Estimated Mayo Site Intensity M.M.[1]	Seismo-Tectonic Province of Epicenter
New Madrid, Mo.	12/1811 1/1812	880	XII	V-VI	Upper Mississippi Embayment
Arvonia, Va.	Dec. 22, 1875	120	VII	V	Piedmont
Charleston, S.C.	Aug. 31, 1886	400	IX	V	Atlantic Coastal Plain (Charleston Vicinity)
Giles Co., Va.	May 31, 1897	184	VII-VIII	V-VI	Valley & Ridge

[1] MM - Modified Mercalli scale - ranges from a minimum of I to a maximum of XII

Table 2.2-3 Climatological Data for Closest First-Order Weather Stations to the Mayo Creek Site

	Raleigh-Durham Airport (1)
Temperature, °C (°F)	
Annual Mean	15.1 (59.2)
Annual Maximum	21.3 (70.3)
Annual Minimum	8.8 (47.4)
Record Highest	40.6 (105)
Record Lowest	-17.8 (0)
Heating Degree Days	1952.2
Cooling Degree Days	774.4
Relative Humidity,	
% Annual Average at:	
0100 EST	80
0700 EST	84
1300 EST	54
1900 EST	66
Precepitation cm (inches)	112 (44)
Wind	
Annual Average Speed, Meter/Second (MPH)	3.5 (78)
Prevailing Direction	SW
Fastest Mile	
Speed, Meter/Second (MPH)	32.6 (73)
Direction	WNW
Mean Annual Number of Days	
Precipitation _0.03 cm (.01 inch)	112
Snow, Sleet, Hail _2.54 cm (1 inch)	2
Thunderstorms	
Heavy Fog	
(1/4 mile or less visibility)	36
Maximum Temperature _32.2°C (90°F)	25
Minimum Temperature _0.0°C (32°F)	18

1 Average based on 1940 - 1970 data

Table 2.2-4 Stability Class Distribution
Raleigh-Durham Airport - 1955-1964[1]

Pasquill Stability Class[2]	Frequency (Percent) Annual	Winter	Spring	Summer	Fall
1	1.2	0.0	1.0	2.9	1.0
2	5.5	1.7	5.7	11.0	5.2
3	12.8	8.1	13.2	17.5	12.1
4	44.5	53.2	49.3	53.5	42.1
5	13.8	15.5	13.7	12.2	13.7
6-7	21.9	21.3	17.1	22.8	26.3

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[1] From: "Wind Distribution by Pasquill Stability Classes, STAR Program, Raleigh, North Carolina, 1955-1964," National Weather Records Center, Asheville, North Carolina.

[2] Pasquill stability classes are defined as Category 1, extremely unstable, through Category 7, extremely stable.

Table 2.2-5 Mayo Creek Mean Water Chemistry Values

DATA AVERAGE FOR YEARS 1973-1977
ALL VALUES IN PPM UNLESS NOTED

PARAMETER		LOCATION S1556 MY1	NC49 MY2	S1501 MY3	VA96 MY4	MILCR MY5	NHYCO MY6	SHYCO MY7
AMMONIA (AS N)								
	MEAN	0.022	0.026	0.041	0.042	0.047	0.042	0.036
	N	4	16	16	16	4	14	14
	STDERR	0.009	0.008	0.018	0.012	0.028	0.017	0.017
	MIN	0.010	0.005	0.005	0.005	0.010	0.005	0.005
	MAX	0.050	0.120	0.300	0.170	0.130	0.250	0.250
CHEMICAL OXYGEN DEMAND								
	MEAN	11.650	27.859	20.488	15.124	8.650	27.400	22.933
	N	4	17	17	17	4	15	15
	STDERR	5.470	8.860	3.853	2.872	2.867	5.867	3.894
	MIN	3.600	3.600	4.000	3.600	3.600	4.000	4.000
	MAX	27.000	162.000	55.000	47.000	15.000	91.000	48.000
CHLORIDE								
	MEAN	3.675	3.688	3.676	3.876	3.400	5.020	4.320
	N	4	17	17	17	4	15	15
	STDERR	0.320	0.275	0.212	0.256	0.204	0.305	0.294
	MIN	2.800	1.500	2.200	2.200	3.000	3.300	2.700
	MAX	4.200	6.000	4.900	6.100	3.800	6.700	6.000
DISSOLVED ALUMINUM								
	MEAN		0.031	0.016	0.016		0.016	0.016
	N	0	4	4	4	0	4	4
	STDERR		0.026	0.011	0.011		0.011	0.011
	MIN		0.005	0.005	0.005		0.005	0.005
	MAX		0.110	0.050	0.050		0.050	0.050
DISSOLVED COPPER								
	MEAN		0.025	0.025	0.025		0.025	0.025
	N	0	6	6	6	0	6	6
	STDERR		0.000	0.000	0.000		0.000	0.000
	MIN		0.025	0.025	0.025		0.025	0.025
	MAX		0.025	0.025	0.025		0.025	0.025
DISSOLVED NICKEL								
	MEAN		0.033	0.033	0.033		0.033	0.033
	N	0	6	6	6	0	6	6
	STDERR		0.005	0.005	0.005		0.005	0.005
	MIN		0.025	0.025	0.025		0.025	0.025
	MAX		0.050	0.050	0.050		0.050	0.050
DISSOLVED SILICA (AS SIO2)								
	MEAN	9.850	9.382	8.547	9.441	10.500	9.893	11.093
	N	4	17	17	17	4	15	15
	STDERR	1.220	1.396	1.155	1.382	1.658	1.831	2.017
	MIN	6.400	1.300	0.700	1.000	6.000	1.200	1.300
	MAX	12.000	18.000	15.000	18.000	13.000	19.000	21.000

Table 2.2-5 (continued)

DATA AVERAGE FOR YEARS 1973-1977
ALL VALUES IN PPM UNLESS NOTED

PARAMETER		LOCATION S1556 MY1	NC49 MY2	S1501 MY3	VA96 MY4	MILCR MY5	NHYCO MY6	SHYCO MY7
DISSOLVED ZINC								
	MEAN		0.025	0.025	0.025		0.025	0.025
	N	0	6	6	6	0	6	6
	STDERR		0.000	0.000	0.000		0.000	0.000
	MIN		0.025	0.025	0.025		0.025	0.025
	MAX		0.025	0.025	0.025		0.025	0.025
FIELD DISSOLVED OXYGEN								
	MEAN	9.500	9.236	9.570	8.791	10.467	9.250	9.787
	N	3	11	10	11	3	8	8
	STDERR	2.261	0.560	0.620	0.859	1.686	0.746	0.591
	MIN	5.100	5.000	5.300	1.600	7.100	5.400	6.200
	MAX	12.600	11.600	11.800	11.700	12.300	11.300	11.500
FIELD PH								
	MEAN	6.767	6.927	7.027	6.945	6.867	7.150	7.162
	N	3	11	11	11	3	8	8
	STDERR	0.033	0.091	0.105	0.106	0.033	0.082	0.082
	MIN	6.700	6.600	6.500	6.500	6.800	6.900	6.800
	MAX	6.800	7.500	7.500	7.500	6.900	7.500	7.500
HARDNESS (AS CACO3)								
	MEAN	15.000	21.380	21.393	22.747	9.000	35.154	34.462
	N	4	15	15	15	4	13	13
	STDERR	4.690	1.330	1.126	1.924	2.799	2.589	1.639
	MIN	1.000	4.700	7.900	10.000	1.000	20.000	26.000
	MAX	21.000	26.000	27.000	45.000	14.000	52.000	46.000
KJELDAHL NITROGEN (AS N)								
	MEAN	0.147	0.224	0.267	0.231	0.247	0.212	0.215
	N	4	16	16	16	4	13	14
	STDERR	0.022	0.045	0.075	0.030	0.059	0.043	0.042
	MIN	0.110	0.040	0.050	0.050	0.120	0.050	0.040
	MAX	0.210	0.800	1.290	0.440	0.400	0.550	0.550
LAB PH								
	MEAN	6.200	6.947	6.906	6.906	6.175	7.280	7.333
	N	4	17	17	17	4	15	15
	STDERR	0.308	0.136	0.135	0.141	0.217	0.111	0.103
	MIN	5.500	5.500	5.600	5.700	5.600	6.400	6.300
	MAX	7.000	7.500	7.600	7.600	6.600	7.800	7.800
NITRATE (AS N)								
	MEAN	0.063	0.240	0.209	0.251	0.025	0.258	0.289
	N	3	16	16	16	3	14	15
	STDERR	0.038	0.048	0.039	0.054	0.000	0.048	0.055
	MIN	0.025	0.005	0.005	0.010	0.025	0.005	0.005
	MAX	0.140	0.560	0.450	0.670	0.025	0.570	0.690

Table 2.2-5 (continued)

DATA AVERAGE FOR YEARS 1973-1977
ALL VALUES IN PPM UNLESS NOTED

PARAMETER		LOCATION S1556 MY1	NC49 MY2	S1501 MY3	VA96 MY4	MILCR MY5	NHYCO MY6	SHYCO MY7
SPECIFIC CONDUCTANCE (AS MICROMHOS/CM)								
	MEAN	74.500	90.500	96.500	118.500	71.500		
	N	2	2	2	2	2	0	0
	STDERR	0.500	2.500	5.500	16.500	0.500		
	MIN	74.000	88.000	91.000	102.000	71.000		
	MAX	75.000	93.000	102.000	135.000	72.000		
SULFATE								
	MEAN	12.450	7.171	6.676	6.465	6.925	12.913	9.060
	N	4	17	17	17	4	15	15
	STDERR	7.615	1.890	1.738	1.015	3.548	3.346	0.858
	MIN	0.500	0.500	0.500	1.300	0.500	3.000	3.000
	MAX	33.000	35.000	33.000	19.000	17.000	56.000	16.000
TOTAL ALKALINITY (AS CACO3)								
	MEAN	19.000	22.882	23.912	25.735	16.250	36.733	37.600
	N	4	17	17	17	4	15	15
	STDERR	2.483	1.455	1.658	2.535	1.931	4.189	4.118
	MIN	13.000	15.000	15.000	14.000	12.000	14.000	14.000
	MAX	24.000	35.000	36.500	54.000	20.000	66.000	69.000
TOTAL ALUMINUM								
	MEAN	0.375	0.447	0.415	0.414	0.450	0.738	0.567
	N	4	17	17	17	4	15	15
	STDERR	0.025	0.070	0.063	0.072	0.029	0.277	0.183
	MIN	0.300	0.025	0.100	0.050	0.400	0.025	0.050
	MAX	0.400	1.220	1.170	1.340	0.500	4.220	2.410
TOTAL CALCIUM								
	MEAN	3.907	5.069	4.934	5.212	3.367	8.257	10.661
	N	4	17	17	17	4	15	15
	STDERR	0.361	0.292	0.282	0.389	0.228	0.762	2.732
	MIN	2.850	2.270	2.160	2.640	3.010	3.280	4.270
	MAX	4.430	6.480	6.230	9.570	4.030	12.700	48.000
TOTAL CHROMIUM								
	MEAN		0.017	0.017	0.017		0.017	0.017
	N	0	3	3	3	0	3	3
	STDERR		0.007	0.007	0.007		0.007	0.007
	MIN		0.002	0.002	0.002		0.002	0.002
	MAX		0.025	0.025	0.025		0.025	0.025
TOTAL COPPER								
	MEAN	0.025	0.029	0.030	0.033	0.025	0.027	0.029
	N	4	17	17	17	4	15	15
	STDERR	0.000	0.002	0.003	0.005	0.000	0.002	0.003
	MIN	0.025	0.025	0.025	0.025	0.025	0.025	0.025
	MAX	0.025	0.050	0.070	0.100	0.025	0.050	0.060

Table 2.2-5 (continued)

DATA AVERAGE FOR YEARS 1973-1977
ALL VALUES IN PPM UNLESS NOTED

PARAMETER		LOCATION S1556 MY1	NC49 MY2	S1501 MY3	VA96 MY4	MILCR MY5	NHYCO MY6	SHYCO MY7
TOTAL DISSOLVED ORTHOPHOSPHATE (AS P)								
	MEAN		0.007	0.007	0.007		0.008	0.008
	N	0	11	11	11	0	11	11
	STDERR		0.001	0.001	0.001		0.001	0.001
	MIN		0.005	0.005	0.005		0.005	0.005
	MAX		0.010	0.010	0.010		0.010	0.010
TOTAL DISSOLVED PHOSPHATE (AS P)								
	MEAN		0.014	0.015	0.013		0.014	0.017
	N	0	11	11	11	0	11	11
	STDERR		0.002	0.003	0.003		0.002	0.003
	MIN		0.010	0.010	0.005		0.010	0.005
	MAX		0.030	0.040	0.030		0.030	0.030
TOTAL DISSOLVED SOLIDS								
	MEAN	158.000	127.188	133.813	143.750	150.250	149.000	152.214
	N	4	16	16	16	4	14	14
	STDERR	14.737	14.002	14.099	13.436	19.189	17.457	18.542
	MIN	127.000	16.000	10.000	83.000	115.000	59.000	19.000
	MAX	198.000	264.000	232.000	279.000	201.000	320.000	328.000
TOTAL DISSOLVED SOLIDS (<0.45 MICRON)								
	MEAN	152.667	148.333	152.667	151.000	129.333	130.000	138.000
	N	3	3	3	3	3	1	1
	STDERR	15.070	7.688	7.219	12.014	8.950		
	MIN	128.000	137.000	144.000	138.000	118.000	130.000	138.000
	MAX	180.000	163.000	167.000	175.000	147.000	130.000	138.000
TOTAL HEXAVALENT CHROMIUM								
	MEAN	0.025	0.008	0.008	0.008	0.025	0.004	0.004
	N	4	16	16	16	4	14	14
	STDERR	0.000	0.003	0.003	0.002	0.000	0.002	0.002
	MIN	0.025	0.002	0.002	0.002	0.025	0.002	0.002
	MAX	0.025	0.025	0.025	0.025	0.025	0.025	0.025
TOTAL IRON								
	MEAN	1.027	1.213	1.155	1.364	1.570	1.541	1.230
	N	4	17	17	17	4	15	15
	STDERR	0.028	0.107	0.100	0.187	0.169	0.255	0.167
	MIN	0.960	0.390	0.220	0.550	1.100	0.480	0.680
	MAX	1.090	2.270	1.860	3.330	1.890	4.490	3.130
TOTAL LEAD								
	MEAN	0.025	0.035	0.035	0.035	0.025	0.037	0.037
	N	4	17	17	17	4	15	15
	STDERR	0.000	0.003	0.003	0.003	0.000	0.003	0.003
	MIN	0.025	0.025	0.025	0.025	0.025	0.025	0.025
	MAX	0.025	0.050	0.050	0.050	0.025	0.050	0.050

Table 2.2-5 (continued)

DATA AVERAGE FOR YEARS 1973-1977
ALL VALUES IN PPM UNLESS NOTED

PARAMETER		LOCATION						
		S1556 MY1	NC49 MY2	S1501 MY3	VA96 MY4	MILCR MY5	NHYCO MY6	SHYCO MY7
TOTAL MAGNESIUM	MEAN	1.855	2.285	2.215	2.410	1.145	3.609	3.479
	N	4	17	17	17	4	15	15
	STDERR	0.157	0.080	0.081	0.111	0.056	0.293	0.260
	MIN	1.420	1.790	1.680	1.930	1.020	1.410	1.370
	MAX	2.140	3.200	3.240	3.560	1.270	6.190	5.710
TOTAL MANGANESE	MEAN	0.124	0.105	0.111	0.206	0.102	0.108	0.168
	N	4	17	17	17	4	15	15
	STDERR	0.073	0.046	0.050	0.126	0.030	0.013	0.027
	MIN	0.025	0.005	0.005	0.005	0.050	0.005	0.005
	MAX	0.340	0.830	0.900	2.210	0.190	0.230	0.410
TOTAL MERCURY (PPB)	MEAN	0.375	0.471	0.506	0.524	0.375	0.560	0.500
	N	4	17	17	17	4	15	15
	STDERR	0.125	0.029	0.047	0.062	0.125	0.101	0.049
	MIN	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	MAX	0.500	0.500	1.100	1.400	0.500	1.900	1.000
TOTAL NICKEL	MEAN	0.025	0.034	0.027	0.025	0.025	0.025	0.025
	N	4	10	10	10	4	8	8
	STDERR	0.000	0.006	0.003	0.000	0.000	0.000	0.000
	MIN	0.025	0.025	0.025	0.025	0.025	0.025	0.025
	MAX	0.025	0.080	0.050	0.025	0.025	0.025	0.025
TOTAL ORGANIC CARBON	MEAN	5.200	4.700	6.200	5.300	5.000	4.500	6.500
	N	1	1	1	1	1	1	1
	STDERR							
	MIN	5.200	4.700	6.200	5.300	5.000	4.500	6.500
	MAX	5.200	4.700	6.200	5.300	5.000	4.500	6.500
TOTAL ORTHOPHOSPHATE (AS P)	MEAN	0.075	0.040	0.041	0.048	0.154	0.015	0.015
	N	4	17	17	17	4	15	15
	STDERR	0.068	0.029	0.026	0.036	0.142	0.003	0.003
	MIN	0.005	0.005	0.005	0.005	0.005	0.005	0.005
	MAX	0.280	0.500	0.450	0.630	0.580	0.050	0.040
TOTAL PHOSPHATE (AS P)	MEAN	0.154	0.089	0.085	0.099	0.302	0.035	0.029
	N	4	17	17	17	4	15	15
	STDERR	0.116	0.063	0.057	0.075	0.266	0.005	0.004
	MIN	0.005	0.010	0.005	0.005	0.020	0.010	0.010
	MAX	0.500	1.100	1.000	1.300	1.100	0.070	0.070

Table 2.2-5 (continued)

DATA AVERAGE FOR YEARS 1973-1977
ALL VALUES IN PPM UNLESS NOTED

PARAMETER		LOCATION S1556 MY1	NC49 MY2	S1501 MY3	VA96 MY4	MILCR MY5	NHYCO MY6	SHYCO MY7
TOTAL SODIUM								
	MEAN	4.702	5.381	5.184	5.314	5.370	7.567	7.175
	N	4	17	17	17	4	15	15
	STDERR	0.744	0.221	0.261	0.227	0.739	0.328	0.336
	MIN	2.580	4.250	2.430	4.300	4.000	5.300	4.800
	MAX	6.050	7.860	7.480	8.060	7.470	9.800	9.900
TOTAL SOLIDS								
	MEAN	186.500	193.250	189.500	196.875	193.500	227.643	211.000
	N	4	16	16	16	4	14	14
	STDERR	21.465	21.460	22.471	22.205	18.751	33.485	24.933
	MIN	134.000	116.000	90.000	94.000	164.000	101.000	115.000
	MAX	231.000	445.000	449.000	457.000	244.000	524.000	438.000
TOTAL SUSPENDED SOLIDS								
	MEAN	7.250	11.625	13.938	14.500	10.250	30.000	20.286
	N	4	16	16	16	4	14	14
	STDERR	2.496	1.176	3.350	3.465	2.869	13.044	11.476
	MIN	2.000	4.000	4.000	2.000	5.000	1.000	4.000
	MAX	14.000	20.000	60.000	60.000	18.000	189.000	169.000
TOTAL VOLATILE SOLIDS								
	MEAN	88.000	107.313	101.438	104.000	106.750	101.286	99.500
	N	4	16	16	16	4	14	14
	STDERR	4.021	8.847	10.970	10.017	15.151	8.364	9.843
	MIN	83.000	67.000	33.000	42.000	74.000	61.000	33.000
	MAX	100.000	195.000	193.000	193.000	134.000	161.000	175.000
TOTAL ZINC								
	MEAN	0.025	0.030	0.026	0.029	0.025	0.032	0.027
	N	4	17	17	17	4	15	15
	STDERR	0.000	0.003	0.001	0.002	0.000	0.004	0.002
	MIN	0.025	0.025	0.025	0.025	0.025	0.025	0.025
	MAX	0.025	0.080	0.050	0.060	0.025	0.080	0.050
TURBIDITY (NTU)								
	MEAN	7.200	7.550	5.733	7.100	6.825	26.000	17.700
	N	4	6	6	6	4	4	4
	STDERR	1.046	1.395	0.664	1.111	1.075	15.588	11.130
	MIN	4.800	4.000	3.500	3.800	5.500	5.000	4.300
	MAX	9.600	14.000	7.800	9.600	10.000	71.000	51.000

NOTE: FOR THE PURPOSE OF STATISTICAL EVALUATION ALL DATA REPORTED AS 'LESS THAN' THE REPORTING LIMIT WAS ASSIGNED A FINITE REPORTING LIMIT. IT IS THEREFORE POSSIBLE FOR MEAN VALUES TO FALL BELOW THE DETECTION LIMIT AND/OR CONTAIN SIGNIFICANT FIGURES WHICH ARE NOT INDICATED IN THE ORIGINAL ANALYSIS RESULTS

TOTAL FILTERABLE RESIDUE FOR TOTAL SUSPENDED SOLIDS AND TOTAL NONFILTERABLE RESIDUE FOR TOTAL DISSOLVED SOLIDS WAS RECORDED USING A 0.75-1.25 MICRON FILTER BETWEEN APRIL AND JULY 1973, AND A 1.20 MICRON FILTER FROM AUGUST 1973 ONWARD.

Table 2.3-1 Results of Vegetation Mapping by Aerial Photograph Analysis, 1976[1]

	% Total Acreage	*Required Area	**Not Required Area	Total Area
Pine	5	105.67 ha (261.11 ac)	64.12 ha (158.438 ac)	169.83 ha (419.64 ac)
Pine-hardwood	12	308.72 ha (762.83 ac)	64.80 ha (160.12 ac)	373.52 ha (922.95 ac)
Hardwood-pine	51	1,341.17 ha (3,313.985 ac)	284.02 ha (701.81 ac)	1,625.19 ha (4,015.795 ac)
Bottomland-hardwood	10	300.42 ha (742.32 ac)	0.84 ha (2.068 ac)	301.25 ha (744.388 ac)
Fields [2]	22	445.71 ha (1,101.34 ac)	248.79 ha (614.75 ac)	694.50 ha (1,716.09 ac)
Lakes	< 1	1.61 ha (3.97 ac)	0 ha (0 ac)	1.61 ha (3.97 ac)
Planted pine	< 1	2.88 ha (7.11 ac)	3.84 ha (9.49 ac)	6.72 ha (16.6 ac)
	100%	2,506.17 ha (6,192.665 ac)	666.41 ha (1,646.676 ac)	3,172.62 ha (7,839.433 ac)

*Required Area - lands solely necessary for project.

**Not Required Area - lands in addition to required area that the Company may be obligated to buy from landowners in required area.

[1] Does not include transmission corridors

[2] Includes pastureland and cropland and abandoned cropland and pastureland - approximately 700 acres is presently in production

Table 2.6-1 Population: Person County

DIVISION	1920	1930	1940	1950	1960	1970	PERCENT CHANGE
Allensville Twp.	1,783	1,954	2,154	1,957	1,965	1,901	- 3.3%
Bushy Fork Twp.	1,926	2,036	2,181	2,221	2,030	1,846	- 9.1
Cunningham Twp.	1,551	1,423	1,432	1,192	1,069	967	- 9.5
Flat River Twp.	1,914	1,897	2,006	1,900	1,942	1,867	- 3.9
Holloway Twp.	1,542	1,527	1,750	1,657	1,584	1,480	- 6.6
Mt. Tirzah Twp.	1,493	1,423	1,527	1,380	1,457	1,312	-10.0
Olive Hill Twp.	1,941	2,155	5,092	2,259	2,283	1,802	-21.1
Roxboro Twp.	5,417	8,146	10,329	10,130	12,447	13,372	+ 7.4
Longhurst (u)				1,539	1,546	1,485	- 3.9
Roxboro City	1,651	3,657*	4,599	4,321	5,147*	5,370	+ 4.3
Woodsdale Twp.	1,406	1,478	1,558	1,665	1,617	1,367	-15.5
TOTAL	18,973	22,039	25,029	24,361	26,394	25,914	- 1.8
Percent Change		+16.2	+13.6	-2.7	-8.3	-1.8	

*Boundary Change

Source: Bureau of the Census, 1973

Table 2.6.2 Population Projections for Counties Within 80 km (50 mi) of Mayo Project

North Carolina

County	1970[1]	1980[2]	1990[2]	2000[2]
Alamance	96,362	109,400	124,900	135,700
Caswell	19,055	19,900	20,600	21,300
Chatham	29,554	30,900	32,800	33,700
Durham	132,681	142,800	155,900	164,800
Franklin	36,820	28,600	30,300	31,000
Granville	32,762	34,500	36,200	37,100
Guilford	288,590	327,500	375,600	412,100
Orange	57,707	75,300	89,800	102,500
Person	25,914	28,200	30,600	31,400
Rockingham	72,402	78,600	83,400	87,100
Vance	32,691	34,600	36,700	37,600
Wake	228,453	282,500	330,300	373,900
Warren	15,810	17,300	17,600	17,800

Virginia

City or County	1970[1]	1980[3]	1990[3]	2000[3]
Appomattox	96,362	111,000	124,500	144,000
Bedford	26,728	28,000	29,500	30,700
Brunswick	16,172	15,200	14,800	14,500
Campbell	43,319	55,000	68,000	81,200
Charlotte	11,551	10,900	10,200	9,800
Danville City	46,391	46,500	47,000	47,500
Franklin	26,858	29,900	31,400	33,000
Halifax	30,076	28,500	27,700	27,500
Henry	50,901	62,000	74,800	87,500
Luenburg	11,687	11,400	11,200	11,000
Mecklenburg	29,426	28,500	28,500	28,600
Pittsylvania	58,789	60,000	64,500	67,800
Prince Edward	14,379	14,800	15,500	16,100
South Boston City	6,889	6,900	7,000	7,000

1 Source: U.S. Bureau of the Census, 1973

2 Source: N.C. Office of Planning, 1976

3 Source: Virginia Division of State Planning and Community Affairs, 1975

Table 2.6-3 Tax Data: Person County and City of Roxboro, 1975-1976 Fiscal Year

		City of Roxboro	Person County	Combined Governmental Units
A.	Taxable value all property[1] (real-personal)	$ 60,000,000	$384,295,523	$384,295,5
B.	Tax Rate (per $100 taxable value)	$ .94	$ .75	$ 1.69
C.	Bonded Debt[2] (all sources)	$ 680,000	$ 4,210,000	$4,890,000
D.	Per Capita Bonded Debt	$100.37	$162.46	$262.83
	Person County legal maximum bonding capacity		$ 30,743,641	
	Percent limitation (of assessed value)		8%	
	Present bonded indebtedness		$ 4,210,000	
	Present bonding capacity		$ 26,533,641	
	City of Roxboro legal maximum bonding capacity	$ 4,800,000		
	Percent limitation (of assessed value)	8%		
	Present bonded indebtedness	$ 680,000		
	Present bonding capacity	$ 4,120,000		

[1]Advalorem Tax Levy Breakdown (date of last reevaluation: 1968)

	Person County	City of Roxboro
Residential	25%	50%
Commercial	15%	20%
Industiral	60%	30%

[2]Fiscal Bond Ratings

	Person County	City of Roxboro
Moody's	A	Baa
Standard & Poor's	Non-rated	BBB

Source: Carolina Power & Light Company, 1976

Table 2.6-4 Civilian Labor Force: Person County, 1975

	1975
Civilian Labor Force[1]	13,210
Unemployment, Total	2,060
Rate of Unemployment	15.6
Employment, Total	11,150
Agricultural Employment	1,220
Nonag. Wage & Salary Employ.	8,980
All Other Nonag. Employment[2]	950
Industry Employment by Place of Work[3]	
Manufacturing	3,740
Food	70
Lumber & Wood	50
Other Manufacturing[4]	3,620
Nonmanufacturing	3,790
Construction	400
Trans., Comm., & P. Util.	150
Trade	1,240
Fin., Ins., & Real Estate	120
Service	550
Government	1,280
Other Nonmanufacturing[5]	50

[1] Data based on place of residence.

[2] Includes nonagricultural self-employed workers, unpaid family workers, and domestic workers in private households.

[3] Industry segments are not additive to the "Nonag. Wage & Salary Employ." shown under "Civilian Labor Force" since labor force data are by "place of residence."

[4] Includes tobacco; textiles; apparel; printing; chemicals; rubber; stone, clay, & glass; prim. metals; fab. metals; nonelec. machinery; elec. machinery; trans. equipment; instruments; and misc. mfg.

[5] Includes agricultural services.

Source: Letter dated March 30, 1977 from Donald A. Brande, N. C. Employment Security Commission, Raleigh, N. C.

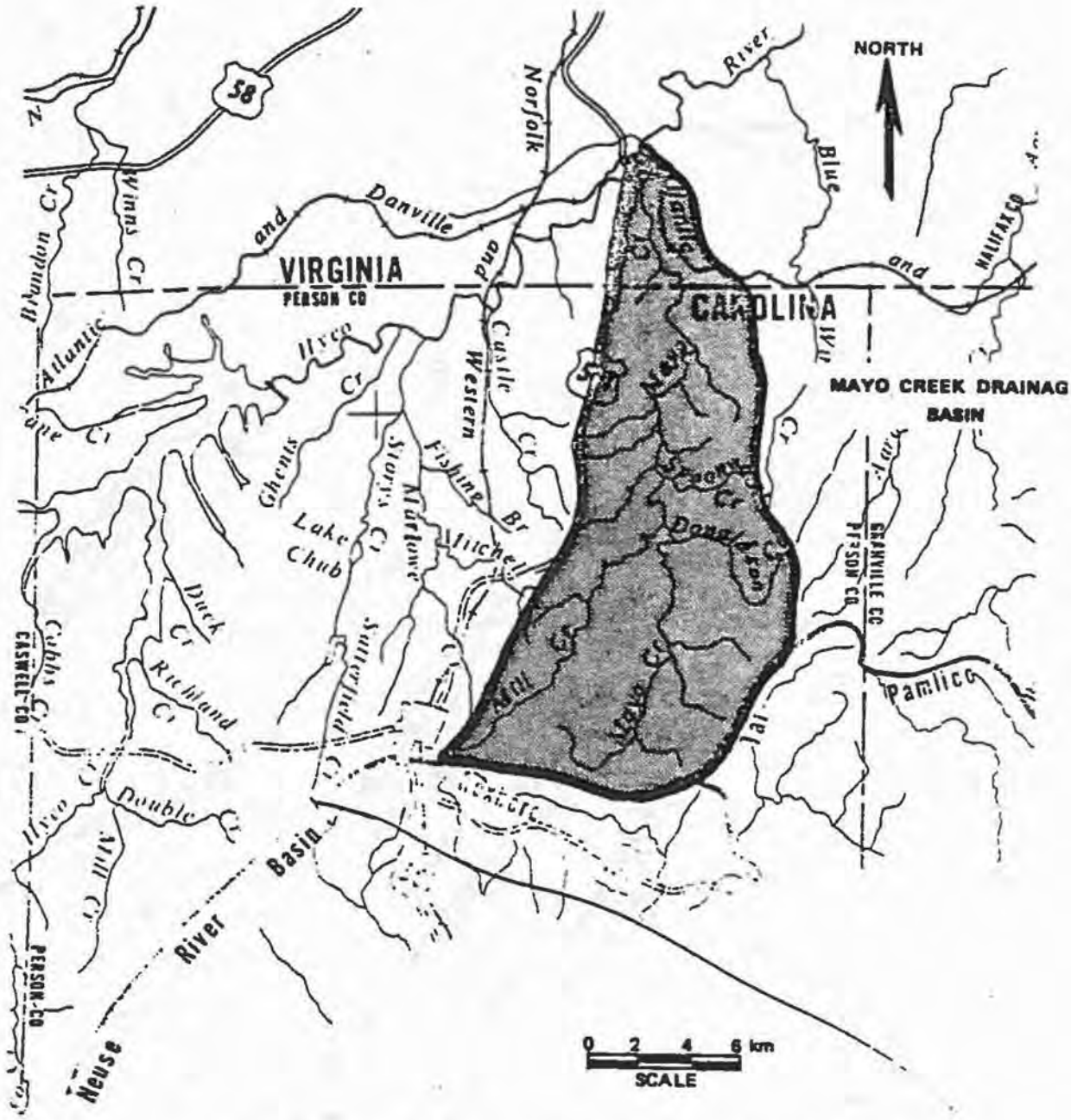

Figure 2.2-1 AREA DRAINAGE MAP — MAYO CREEK SITE

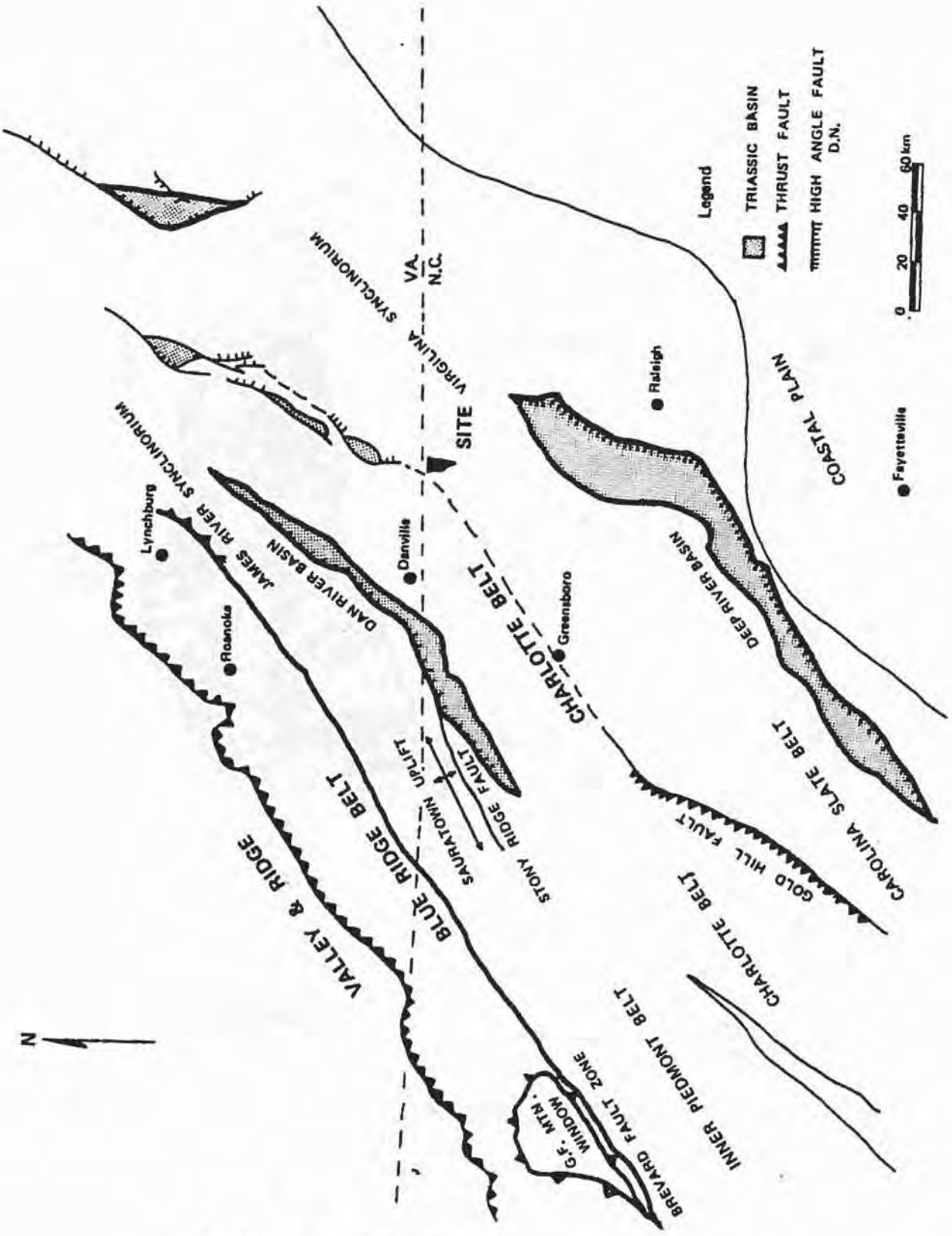

Figure 2.2-2 REGIONAL TECTONIC MAP
MAYO CREEK SITE

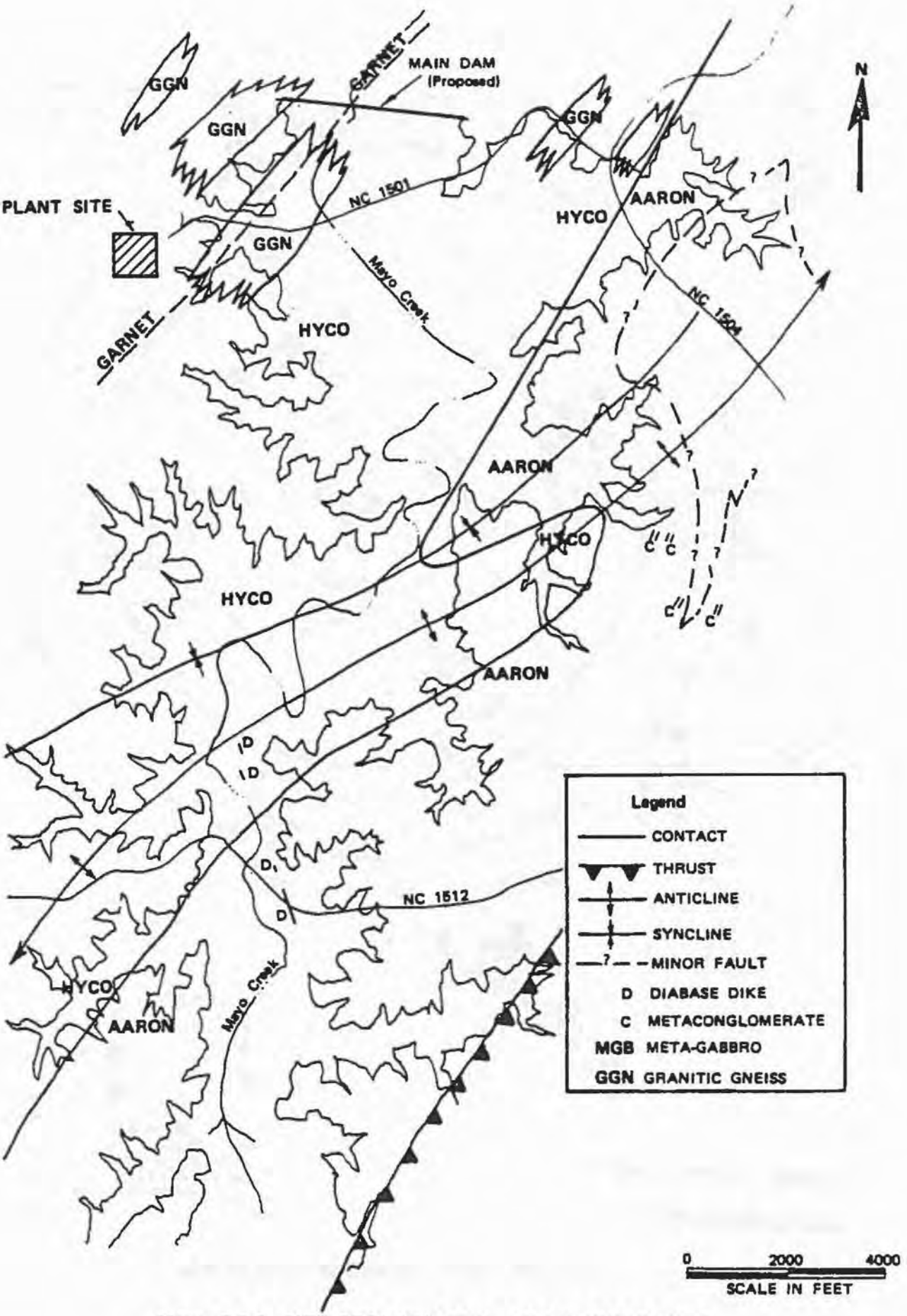

Figure 2.2-3 SITE GEOLOGY MAP – MAYO CREEK SITE

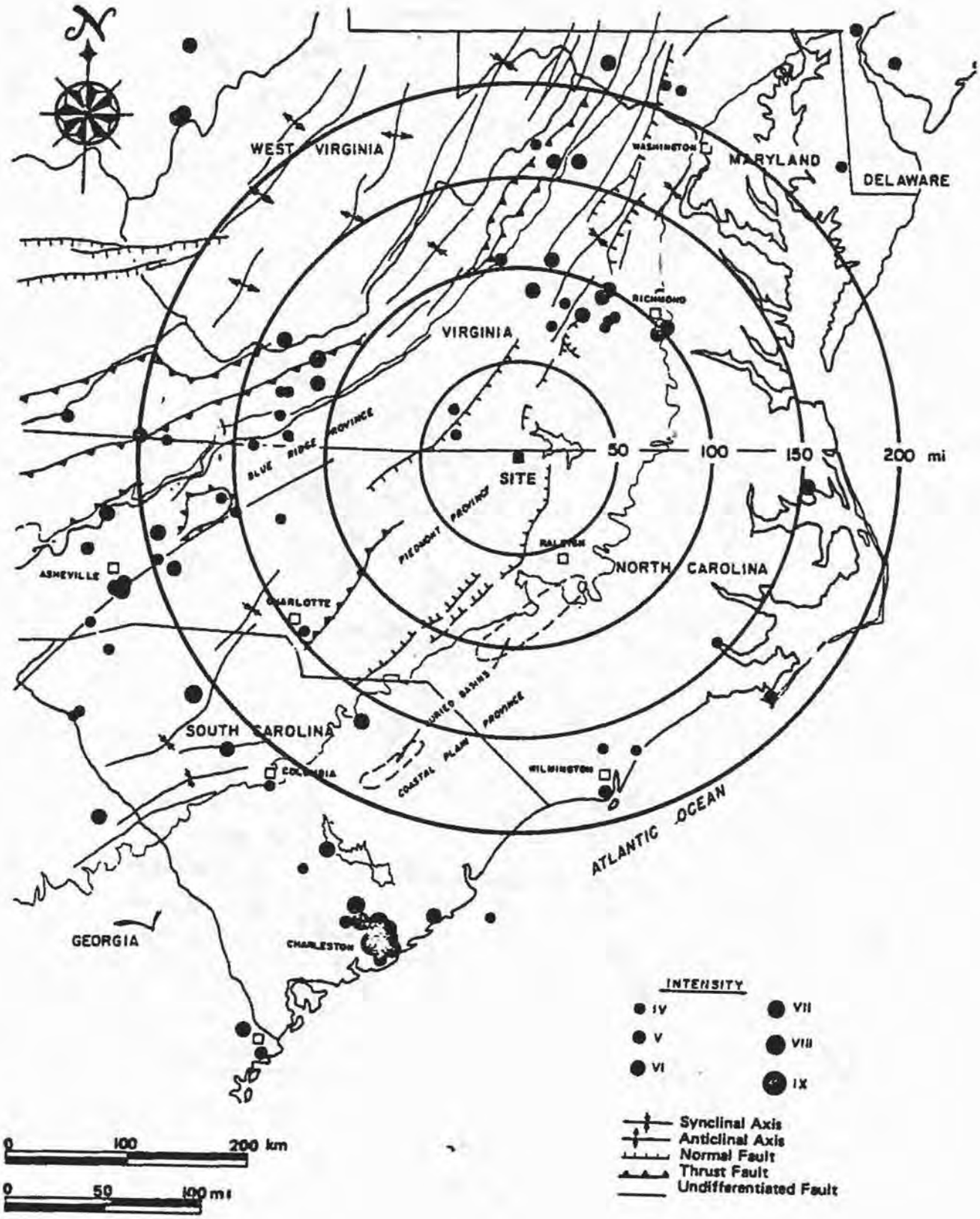

Figure 2.2-4 REGIONAL EARTHQUAKE EPICENTER MAP

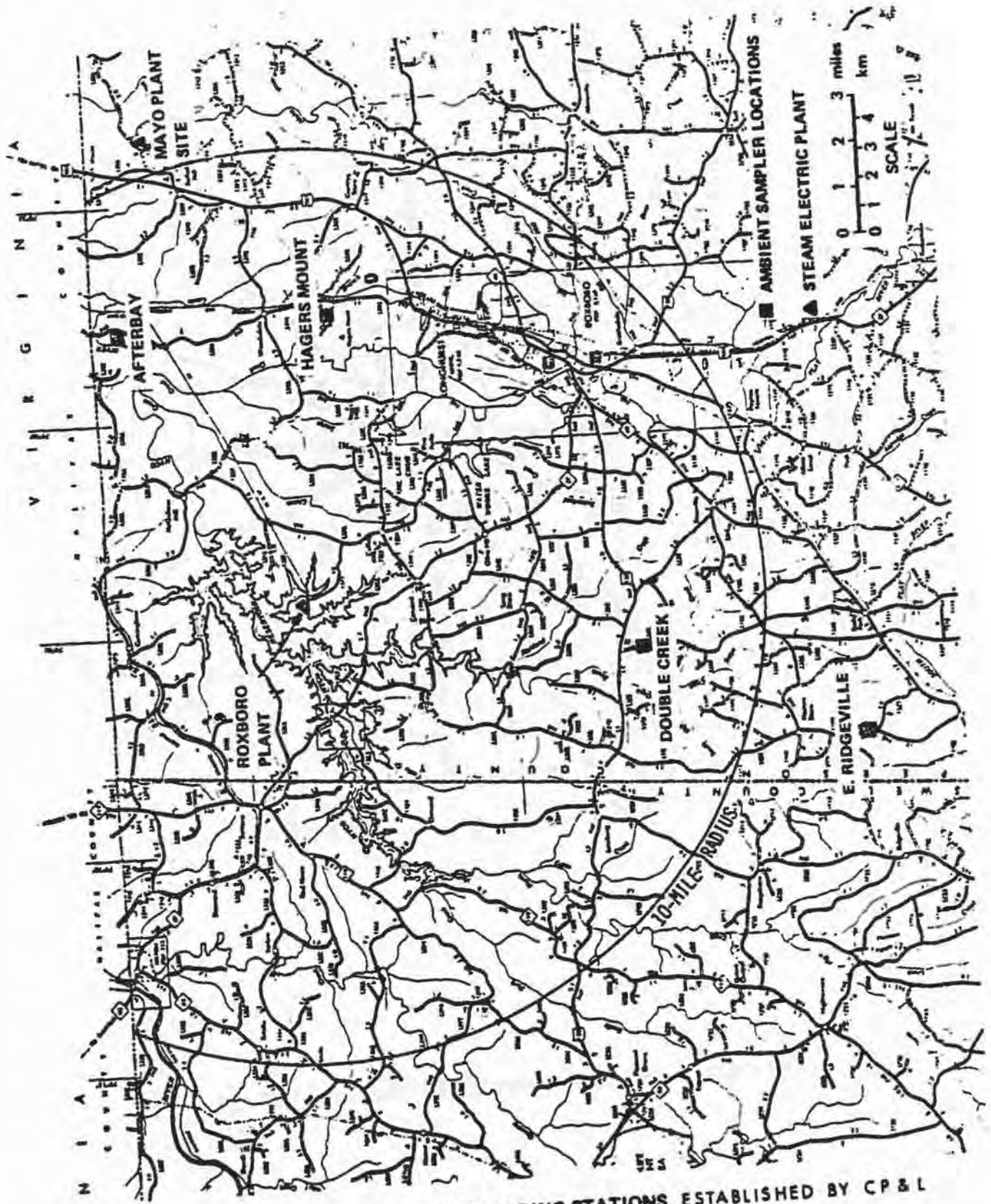

FIGURE 2.2-5 AMBIENT AIR MONITORING STATIONS ESTABLISHED BY CP&L

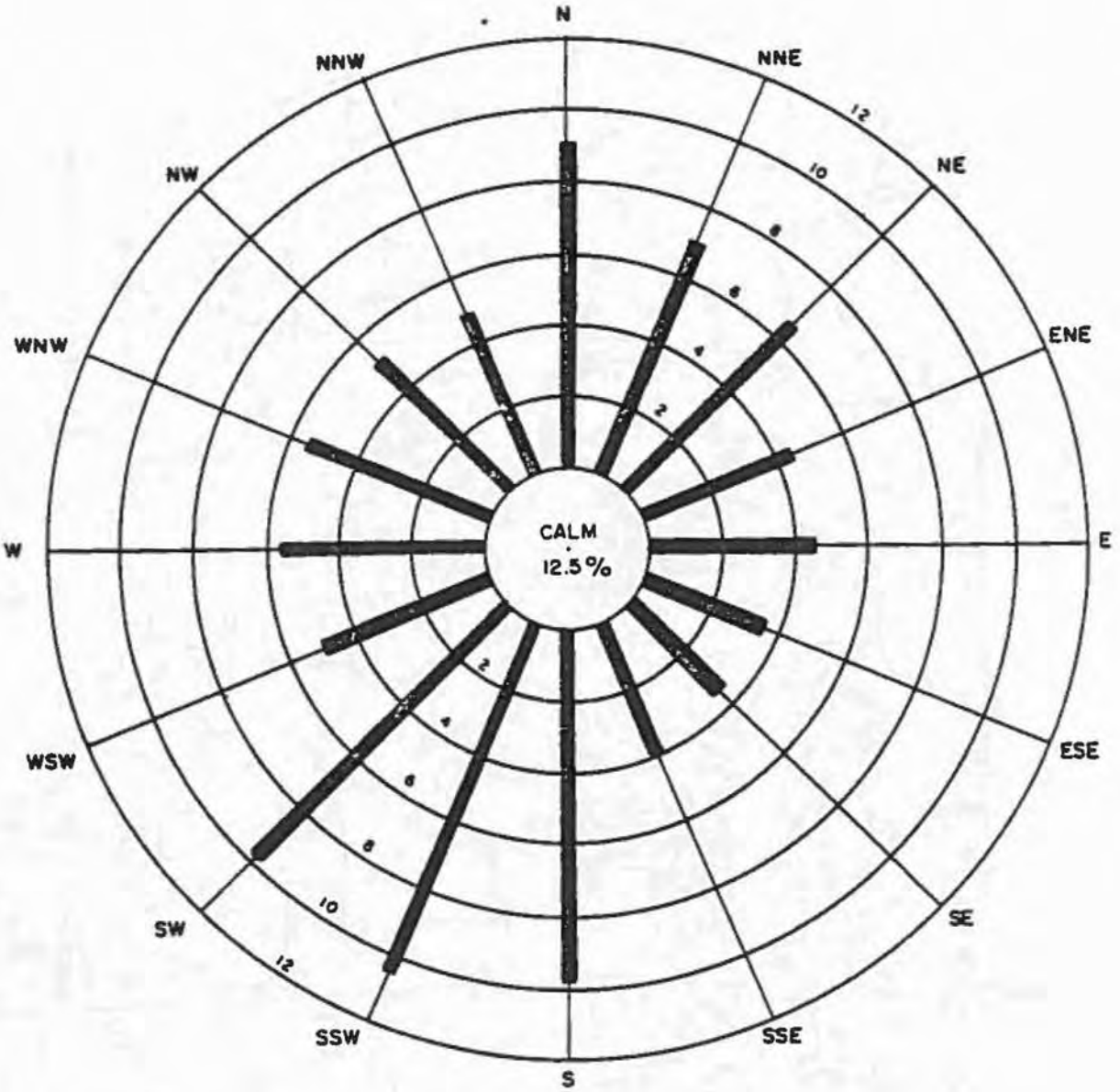

FIGURE 2.2-6 ANNUAL WIND ROSE – RDU AIRPORT 1955 – 1964

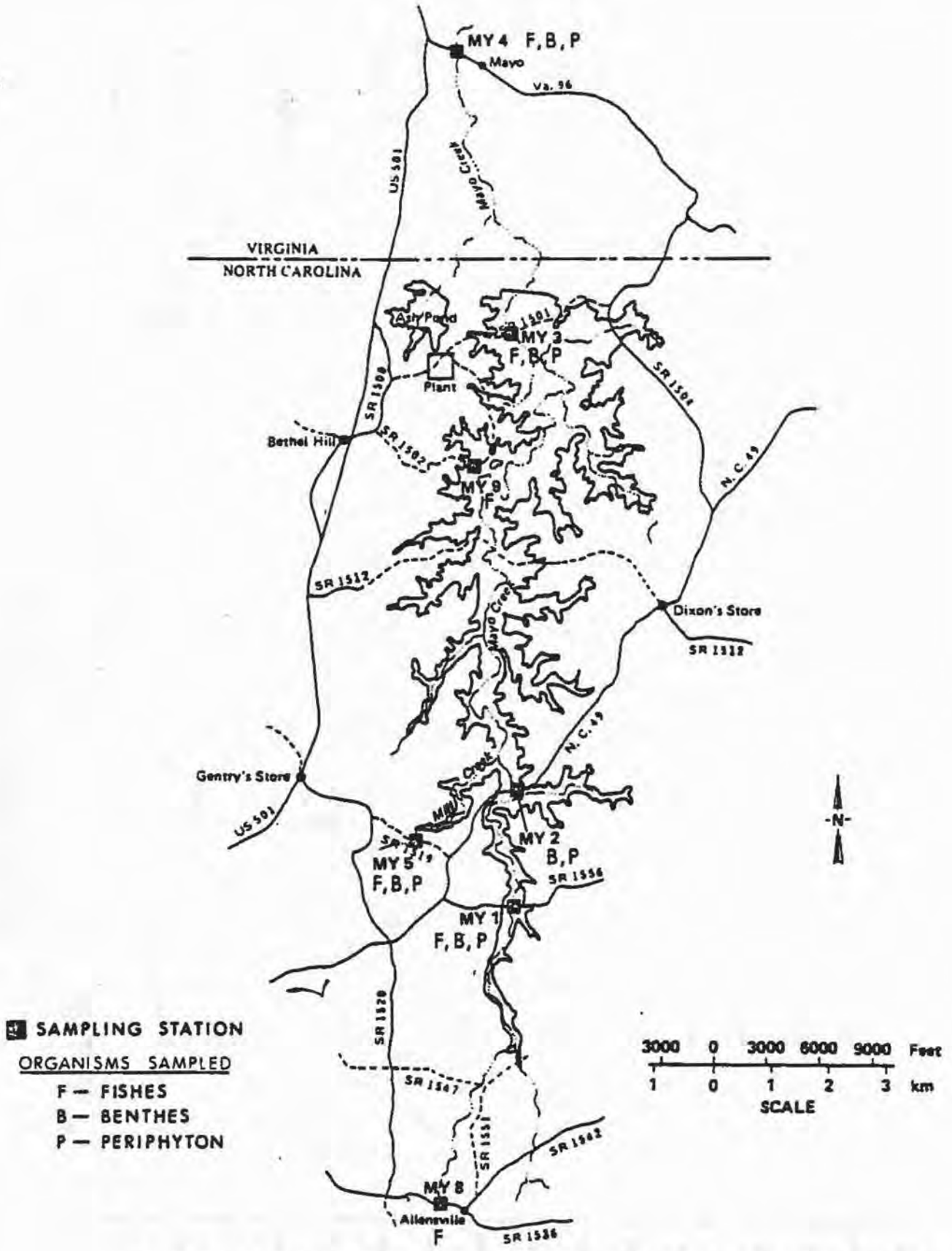

Figure 2.3–1 MAYO WATER QUALITY AND AQUATIC SAMPLING STATIONS 1976–1977

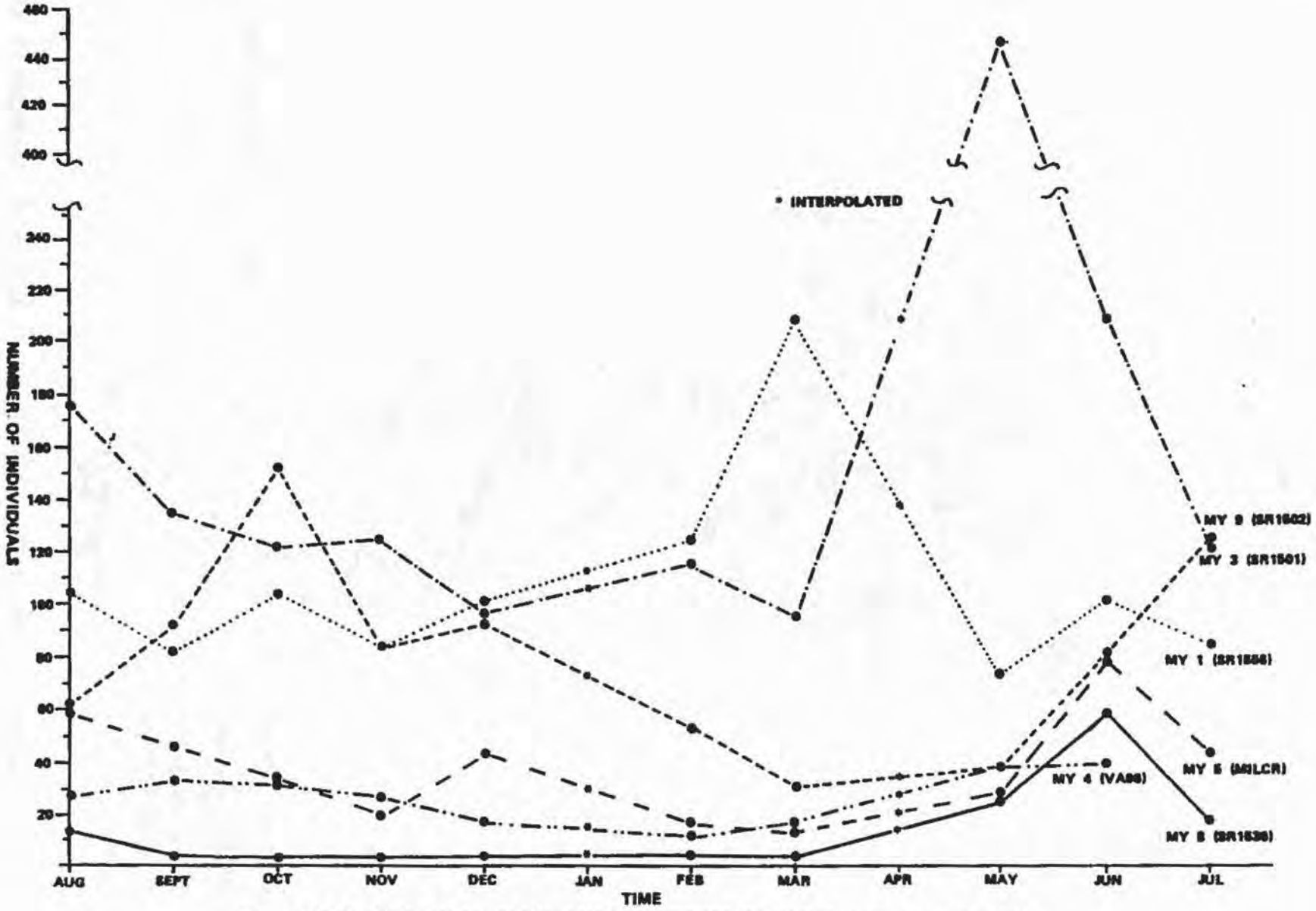

Figure 2.3-2 NUMERICAL ABUNDANCE OF FISHES OF MAYO AND MILL CREEKS AS BASED UPON TOTAL MONTHLY CATCHES AT EACH STATION FROM AUGUST 1976 TO JULY 1977.

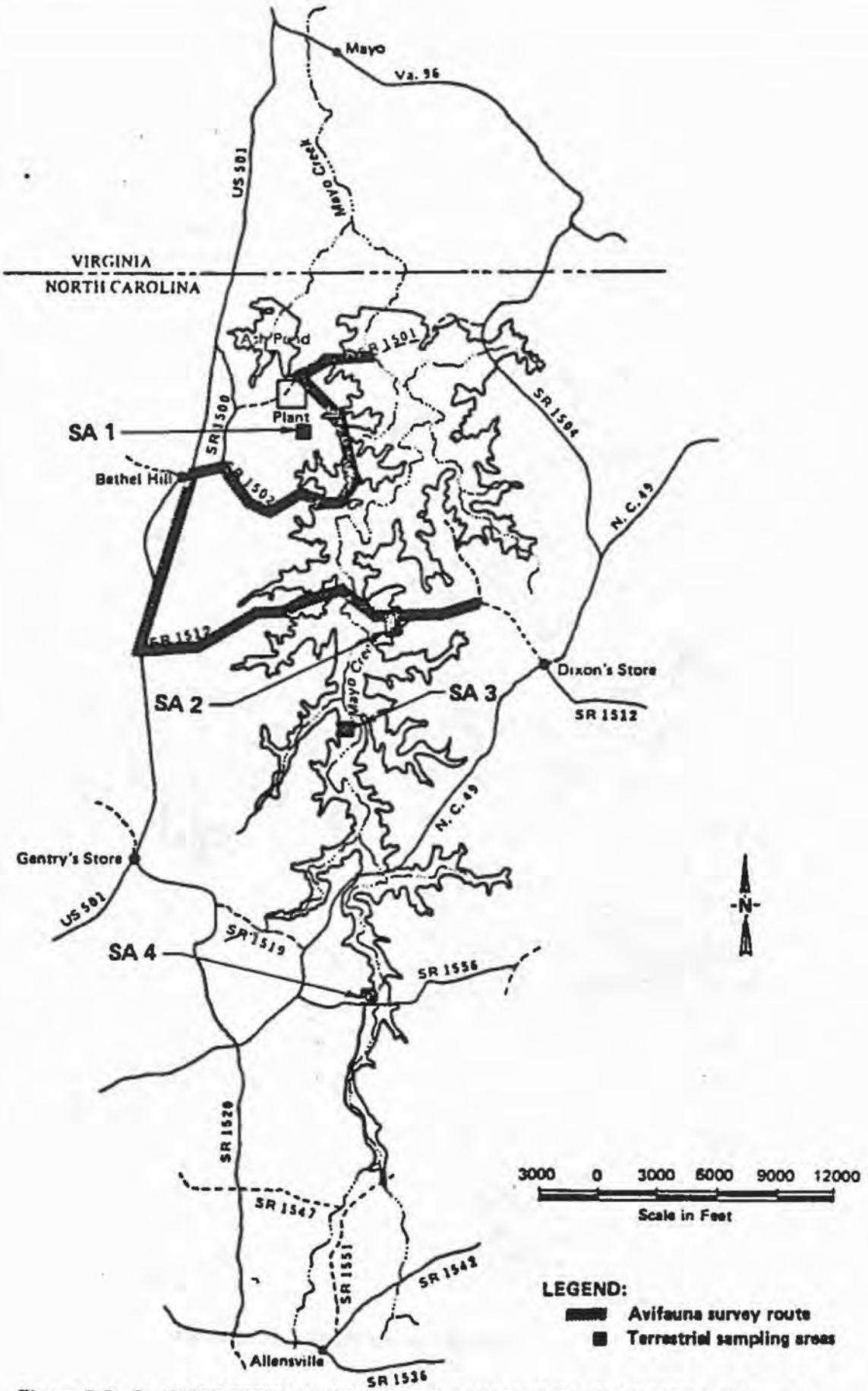

Figure 2.3–3 TERRESTRIAL SAMPLING AREAS AND AVIFAUNA SURVEY ROUTE AT THE MAYO SITE

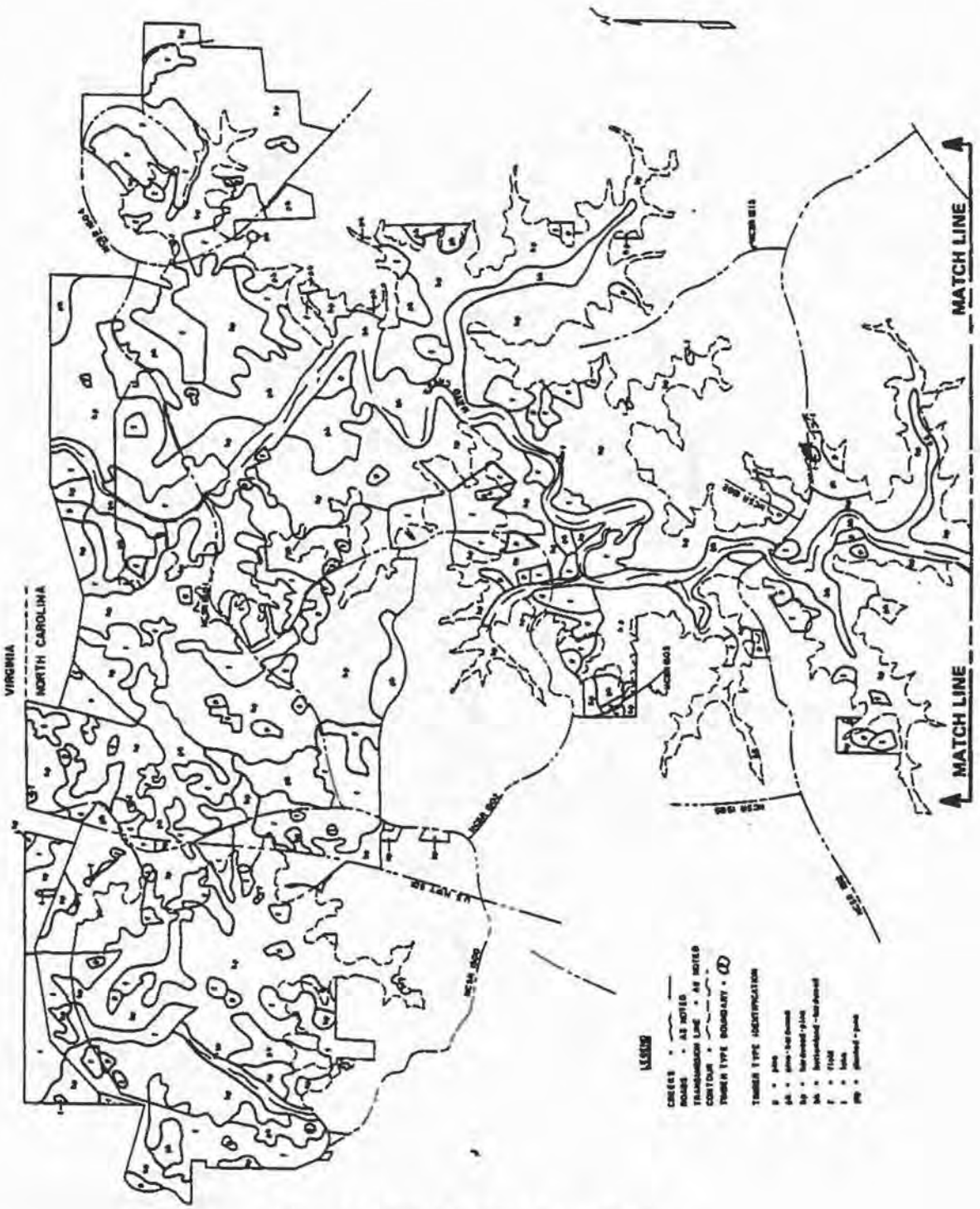

Figure 2.3–4 MAYO SITE TIMBER MAP

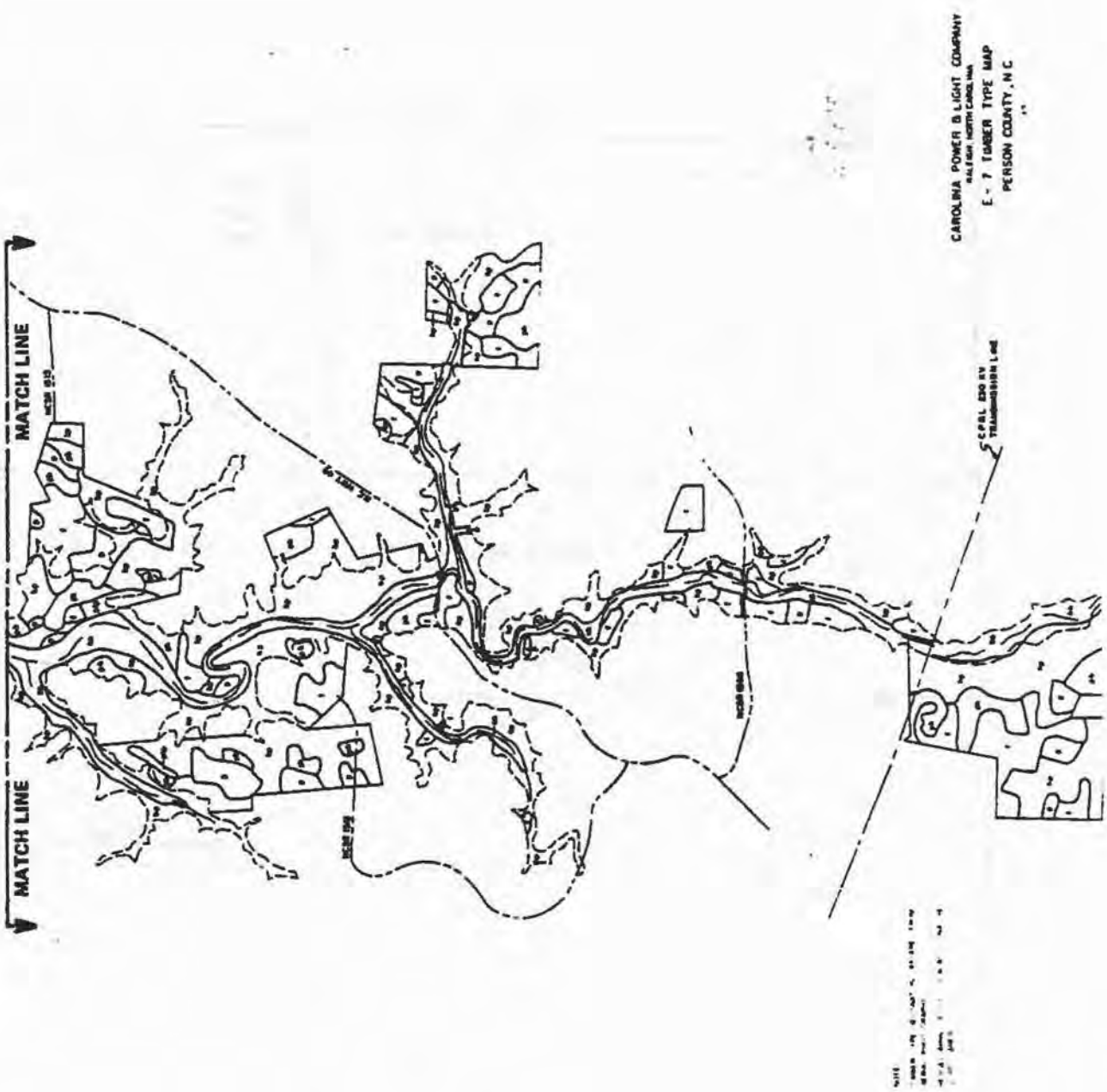

Figure 2.3– 4 (Continued)

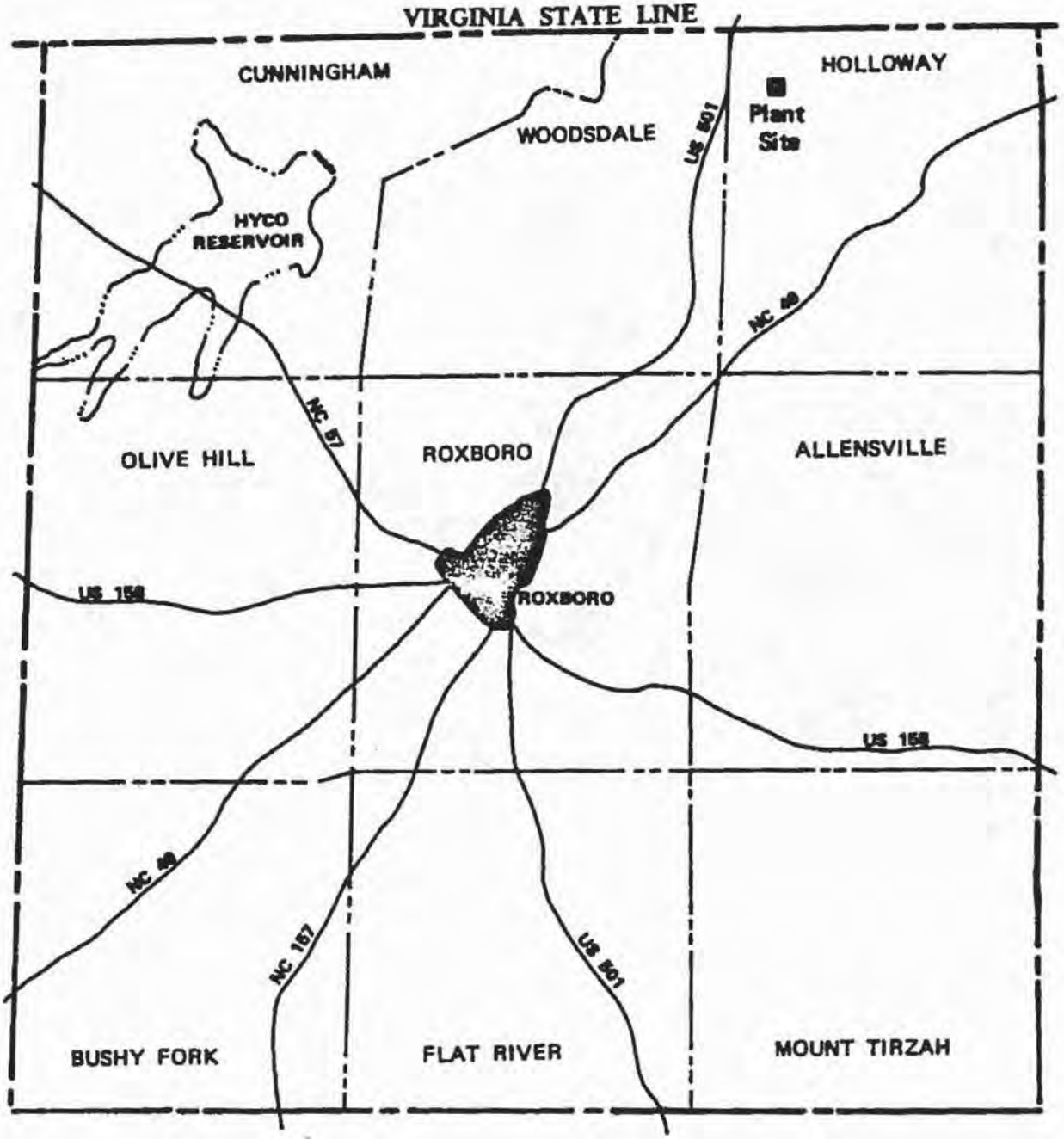

Figure 2.6-1 Person County North Carolina Townships

Section 3

3.0 RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS

A county zoning ordinance was proposed for Person County based upon a Sketch Land Development Plan (Berndt, 1975). Public meetings were held on the zoning ordinance but it was not adopted.

However, the Sketch Land Development Plan identifies the Mayo Creek watershed as an area for potential reservoir development.

The only land use restriction applicable in the area is the county wide septic tank permit program.

Section 4

4.0 PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

4.1 INTRODUCTION

As indicated in Section 1.1, only the filling activities in Mayo Creek and associated wetlands require a 404 permit. However, all significant impacts of the project both beneficial and adverse have to be considered and are discussed below.

4.2 Plant and Reservoir Construction

4.2.1 Impacts on Air and Water Environments

State approved programs for dust and erosion control will be utilized during all phases of construction, thereby minimizing impacts which might otherwise occur.

4.2.1.1 Air and Noise

According to CP&L, during construction activities, care will be taken to prevent adverse effects on air quality. Fugitive dust is being controlled by periodic spraying of water on dirt roads and other heavily traveled areas. All wastes are being disposed of in accordance with applicable state regulations and standards. Noise generated from construction activities is audible in certain areas near the site. Due to the rural nature of the area, there should be little, if any, effect from this noise.

4.2.1.2 Hydrology and Surface Water

Inundation of forest and agricultural lands will cause a biochemical oxygen demand (BOD) to be exerted on the overlying waters in the early stages of impoundment. This BOD demand will be subject to many variables such as the thermal regime, the rate of decomposition and siltation, and the amount of interchange between the surface and bottom waters. Initially, biotic production should be high due to leaching of nutrients and other inorganic/organic substances occurring after impoundment; however, a decline and stabilization of these nutrients would be expected over several years.

Some runoff and sedimentation/siltation from disturbed areas during the construction is occurring. Increased turbidity affects the water quality regime by increasing nutrients and other inorganic/organic salts, increasing oxygen demand, and elevating surface water temperatures while lowering the temperature of deeper waters.

The approved standard erosion and sediment control program is reducing the effects of surface water contamination by erosion. Dike construction, sediment traps, and revegetation of disturbed areas is being used to minimize erosion effects. The program being implemented was approved by the N.C. Department of Natural Resources and Community Development (Division of Earth Resources) in December 1977. See Appendix H for further information.

Downstream sediment and siltation effects resulting in restricted flow and high turbidity existed prior to construction. Construction efforts may result in some further increase in turbidity and total dissolved solids in this area. However, these effects should not be prolonged effects and once project construction is over, any short-term effects of the project activities on water quality should be eliminated.

According to the Halifax County, Virginia, Agricultural Extension Agency, and the District Conservationist, SCS, for Person County, Mayo Creek is not used for irrigation or livestock watering. However, according to Mr. John H. Merritt, (see letter Appendix D) he draws water from Crutchfield Branch below the proposed ash pond dam to water cattle on his farm. This source of water will be virtually eliminated following ash pond construction.

4.2.1.3 Groundwater

See Section 2.2.2

4.2.2 Impacts on Natural Systems

4.2.2.1 Aquatic Ecology

4.2.2.1.1 Impact of Conversion of Stream to Reservoir

4.2.2.1.1.1 Fisheries

The conversion of approximately 20 km (12 mi) of free flowing stream into a 1135 ha (2800 ac) reservoir will result in a shift in the species composition and relative abundances of fishes in Mayo Creek. Species well adapted for stream habitats will be replaced during impoundment by species better adapted for lake existence. The dominant species at Mayo Creek include the rosyside dace (Clinostomus funduloides), bluehead chub (Nocomis leptocephalus), rosefin shiner (Notropis ardens), crescent shiner (Notropis cerasinus), margined madtom (Noturus insignis), and fantail darter (Etheostoma flabellare). These dominant fishes prefer cooler, fast-flowing habitats in the Mayo Creek riffle-pool community and will be replaced by species capable of making the habitat adjustments. Of the 39 species of fishes present in Mayo Creek (Table C-1), several species, through natural flexibility in life history tactics, will become abundant in the new impoundment. Species expected to proliferate as a result of creation of new habitat will include the white sucker (Catostomus commersoni), golden redhorse (Moxostoma erythrurum), suckermouth redhorse (Moxostoma pappillosum), creek chubsucker (Erimyzon oblongus), green sunfish (Lepomis cyanellus), bluegill (Lepomis macrochirus), largemouth bass (Micropterus salmoides), satinfin shiner (Notropis analostamus), and golden shiner (Notemigonus chrysoleucas).

In the first several years after impoundment, it is expected that catfish and suckers, which are primarily detritus feeders, will become abundant. As benthic communities mature, food items favored by sunfish and bass will become more abundant providing food supplies for the expansion of these populations. Stocks of green sunfish, bluegill, and largemouth bass present in Mayo and Mill Creeks are expected to develop into a sport fishery as the impoundment ages.

4.2.2.1.1.2 Benthos

The major effect of construction on the benthos of Mayo Creek will involve conversion of a lotic area to a lentic one. Many of the forms present in Mayo Creek are restricted to or found mainly in fast-flowing waters. The simuliid species, blackflies, which made up 28% of the total fauna collected due to its high abundance in the winter, would be most affected. The unique feeding mechanism and physiological adaptation of this organism to rapid waters severely limit its distribution to fast currents, and so it would be eliminated in the area converted from a stream to a reservoir. Other species similarly affected include most of the dryopoid beetles, caddisflies, and stoneflies.

In contrast to the forms restricted to flowing waters, the organisms present in the pool samples are already adapted to the environment found in a lake and would be least affected by impoundment of Mayo Creek. The chironomids, midgeflies, which as a group were the most abundant organisms collected, are well known as the predominant insects of lake sediments, often present in large numbers feeding on the detritus in the bottom sediments (Mundie, 1957). The chironomids are the first organisms to colonize new areas because of their short life cycle and ability to adapt to a wide variety of habitats including those with low dissolved oxygen which is common on lake bottoms (Weiss, 1972).

In Mayo Creek, the Chironominae made up 90% of the total number of the chironomids. All species will likely increase in numbers with the large increase in bottom area that will result from impoundment. However, certain species would be expected to increase more than others. From the studies of Weiss (1974) on Lake Hyco, which is only a few miles (kilometers) from Mayo Creek, the important species in that lake were Chironomus, Procladius, Pseudochironomus, Chaoborus and oligochaetes. A similar community will probably be established here, with Chironomus and perhaps Microtendipes dominating the profundal zone along with the oligochaetes.

The second major group of pool organisms are the oligochaetes, segmented worms. Lumbriculids, naids, and tubificids were found in Mayo Creek in low numbers. The tubificids, identified as Limnodrilus hoffmeisteri, will probably become important in the benthic makeup of the new reservoir. L. hoffmeisteri and oligochaetes in general are ecologically important, both for their ability to withstand low dissovled oxygen conditions commonly found at lake bottoms, and for their value as fish food.

Biochemical analysis shows that oligochaeta are more valuable food for fish than other invertebrates (Popchenko, 1971), and their high abundance on lake bottoms increases their importance in the aquatic food web. The ability of L. hoffmeisteri to tolerate poor water quality and its highly adaptable life cycle allow it to flourish in new lakes where initial high organic loading and turbidity exclude many competitors and predators (Aston, 1973).

Finally, the two mayflies, Caenis and Hexagenia, though not very abundant in Mayo Creek, are very common in the littoral zone of lakes in North Carolina and may become so at this project. These also are often found in fish stomach analyses, indicating their utilization as fish food.

4.2.2.1.1.3 Periphyton

The major effect of construction on the periphton of Mayo Creek will involve conversion of a lotic habitat to a lentic one.

A species shift is expected with green algae replacing the original diatom-dominant community. From the studies of Weiss (1972 and 1974) on Lake Hyco, which is only a few kilometers from the proposed reservoir, it is clear that the truly planktonic diatoms (e.g. Asterionella formosa, Melosira italica var. alpigena and Cyclotella stelligera) and small green algae (e.g., Nannochloris sp., Selenastrum minutum, Chlorella sp. and Oocystis sp.) will be the most important in the reservoir. A similar community will probably be established here with the Chlorophyceae being the most important class by density with dominance generally in the warmer months, and the Bacillariophyceae the most important class by biovolume with dominance generally in the cooler months.

Another class of algae that will exist in the reservoir would be the blue-gree algae or the Cyanophyceae (Mxyophyceae). Since blue-green algae are present in nearby Lake Hyco, they can also be expected in Mayo Reservoir. Although under optimum conditions, their excessive growth ("blooms") interferes with the biology of a lake and results in objectionable conditions in limited areas; with the water quality parameters present in Mayo Creek and those expected in the reservoir, there should be no foreseeable problems.

4.2.2.1.1.4 Crutchfield Branch

The creation of the ash pond impoundment will eliminate all the aquatic organisms in the area. The purpose of the ash pond is not to create a reservoir but to provide a disposal area for coal ash wastes.

4.2.2.1.2 Sedimentation and Siltation

The use of diversions, temporary and/or permanent cover crops at selected locations and sediment traps basins is reducing the effects of sedimentation on fisheries resources downstream of the plant site. However, some increased silt loading of Mayo Creek as a result of clear-cutting, scraping, and construction activities, especially along areas of stream bank, has reduced the abundance of silt intolerant species. These species include redfin pickerel (Esox a. americanus), chain pickerel (Esox niger), rosyside dace (Clinostomus funduloides), rosefin shiner (Notropis ardens), mountain redbelly dace (Phoxinus oreas), and several species of darters (Etheostoma spp.). These fish were affected through suspended sediments, bedload sediments, and changes in thermal regime.

Turbidity, as a result of increased silt loading, is expected to have minimal effects on fish production in Mayo Reservoir subsequent to filling. Turbidity levels are expected to be below those considered detrimental to fisheries production (European Inland Fisheries Advisory Commission, 1965; Phillips, 1971). With the implementation of the approved sedimentation and erosion control plan, the effects of high turbidities in limiting fish production in the new impoundment should be minimal. See Appendix H.

These sediments will also have an effect on the benthos both while the material is in suspension in the water - interference with filter feeding organisms, restriction of vision - and after it settles to the bottom - loss of hard substrate, smothering of some forms.

However, as indicated above, this effect should only be evident during construction and of minimal impact with implementation of the erosion control plan.

The more turbid the water the less likely the growth of diatoms and phytoplankton. Patrick and Reimer (1966) state that in muddy rivers or streams, a very poor diatom flora is present. Also, due to erosion, a great variation in the dissolved nutrients available for growth may exist in many streams, thus limiting the species composition. However, any long term effects on the algae should be minimal.

4.2.2.1.3 The Impact of Changes in Water Characteristics

The benthic and algal makeup of Mayo Creek indicates that it is a clean water stream. The water quality data concur with this finding and also show that it is fairly low in nutrients. Filling of the reservoir will lead to an initial change in water characteristics. The usual occurrence is an initial organic loading due to breakdown of litter on the lake bottom and mineralization of trees, stumps, and branches left after clearing of the land. If poor oxygen conditions result from this, then an algal community and a benthic community (tubificids, chironomids) adapted to such a habitat will invade and dominate until the lake stabilizes and a more diverse fauna appears. The effects of sediment transport should also be reduced to minimal levels after stabilization occurs.

4.2.2.2 Terrestial Ecology

4.2.2.2.1 Flora

The primary terrestrial impact of the construction of the Mayo Electric Generating Plant, ash pond, and reservoir will be the irrevocable loss of vegetation and wildlife habitat as well as agricultural land. Total area required for the plant, ash pond, and allowed for the reservoir is

approximately 2,506 ha (6,200 ac). About half of this area, approximately 1,296 ha (3,200 ac) will be significantly altered. Most of the vegetation inhabiting the reservoir area and immediate plant site (see Section 2.3.2.1) was logged during late 1977 and the first half of 1978. As previously discussed, the flora of the site had for the most part been disturbed by agriculture and harvesting of previous timber crops, and was rather typical of the range of vegetation found throughout the northern piedmont of North Carolina. However, although the development of the Mayo Creek site did not involve destruction of unique flora, before construction began the site was an ecologically viable habitat area.

Large exposed areas of bare soil will be subject to erosion if heavy rains occur before revegetation can be accomplished. Increased run-off may deposit some silt on bottomland communities further down Mayo Creek during construction phases, although silt traps and sedimentation ponds have been utilized during construction to minimize this. The effects of any silt should be short lived. Erosion of barren soil could remove top soil and hinder revegetation of some areas, although according to CP&L, prompt erosion control has been initiated to stabilize areas as quickly as possible. In addition to this, unrevegetated disturbed land has been kept to a minimum. The erosion control plans were approved by the N.C. Department of Natural Resources and Community Development (Division of Earth Resources) in December 1977.

Slash removal following logging, clearing, and grubbing consisted of piling and burning by prescribed methods.

Clearing in the reservoir area will or has involved all vegetation below the 132 m (434 ft) contour. It is inevitable that some vegetation has been damaged above this elevation during the construction phase. Dust and compaction along haul roads has also impacted some areas near the plant site where equipment was operating.

Following the removal of the vegetation in the reservoir basin and Crutchfield Branch and during the filling of the reservoir, and ash pond, some plants which are early volunteers in succession will colonize the area (see description of fields in Section 2.3.2.1). The primary immediate construction effects for the entire site area center on the removal of the remaining vegetation from the reservoir basin, ash pond and plant site. Also, see Appendix F for mitigation agreements.

4.2.2.2.2 Fauna

The major impact of construction on terrestrial fauna will result from the completion of clearing the 1,296 ha (3,200 ac) of land required for the reservoir, plant, ash pond, and associated facilities. The clearing

process has generated unavoidable noise, dust, soil erosion, and traffic in and near the project area. These factors have led to both short and long term effects on the animals inhabiting the area.

The most obvious and most important effect of the construction has been the displacement of the individual animals occupying the areas cleared. The larger more mobile animals should have been able to avoid immediate destruction by moving into adjacent areas. However, additional competition for food and space has resulted for these animals. Ultimately, it can be expected that the animal populations in these areas will reach an equilibrium with each other and the habitat will reflect a loss approximately equal to the number of animals displaced from the areas that were cleared. The effect on the smaller less mobile animals was immediate. Some of these animals were eliminated as the clearing operations proceeded.

In areas where cleared land was revegetated naturally or by means of artificial seeding or planting, the habitat alteration resulting from construction has caused temporary changes in the species diversity and population levels. As such areas progress through the stages of plant (old field) succession, animals will repopulate the available habitat. In peripheral areas where animals were driven out or disturbed during construction, the return or recovery of those animal populations is expected.

4.2.2.2.3 Mitigation

As indicated in Section 1.5.8, CP&L plans to protect 2,905 acres of land along with the 2,800-acre reservoir from private development. This land consists of a 1,300 acre flood storage area around the reservoir and an 875-acre auxillary ash pond area. Also, 710 acres around the pland and related facilities and 20 acres of flooded timber will be protected. This land and water area will be managed in cooperation with the N.C. Wildlife Resources Commission. See Appendix F for mitigation agreements.

4.2.2.2.4 Endangered and Threatened Flora and Fauna

4.2.2.2.4.1 Flora

One species of plant, that was listed in the state's publication of Endangered and Threatened Plants and Animals of North Carolina (1977), the Virginia cowslip (Mertensia virginica), was located at the project. No plants on the Smithsonian list were found at the site.

During construction all the Virginia cowslip within the floodplain areas cleared have been destroyed. The cowslip will not be able to reestablish in these areas since the reservoir is to be filled and various construction activities initated in the other areas. Any other species that was not observed in the reservoir or other disturbed areas but could have been present have had a similar fate as the Virginia cowslip.

4.2.2.2.4.2 Fauna

One amphibian and 16 birds on the State's endangered and threatened list were observed at the site. During clearing of the floodplain areas of the reservoir, and road and transmission corridors, some four-toed salamanders were probably destroyed outright or were destroyed due to change in habitat. However, some of these salamanders may have been able to relocate in adjacent areas. The birds in the area were displaced to adjacent areas during construction.

Similar to the impacts on the cowslip, the salamander and 16 bird species will not be able to reestablish in the disturbed areas. Thus, the species that migrated to neighboring areas during construction may have vacated the entire project vicinity or perished due to various stress factors. Species that were present in the area but were not observed had a similar fate.

4.2.2.3 Historical and Archaeological Resources

According to Ward and Trinkley, 1977, "None of the prehistoric or historic sites inventoried were significant enough, in terms of adding new or additional information to the man's past record, to be considered worthy of further study prior to impact. Because of this absence of sites worthy of National Registry consideration, clearance for the project is recommended."

In addition, Mr. Larry E. Tise, State Historic Preservation Officer, on 29 November 1977, reports that "... CP&L contacted the Historic Preservation Fund of North Carolina, Inc., with the aim of interesting that organization in saving the Fontaine House. The excutive director of the Preservation Fund evaluated the structure and determined that his organization was not interested in purchasing the house. CP&L subsequently offered the house to the Person County Historical Society for relocating and adaptively using the structure according to the society's needs. The society showed no interest in saving the structure. Recently CP&L found a purchaser for the house and the house will be either moved or dismantled for salvaging worthwile materials. We feel CP&L has made every reasonable effort to afford interested parties the opportunity to save the Fontaine House." Since then, the Fontaine House has been destroyed.

Regarding the three cementery sites indicated in Section 2.5.2, Mr. Larry E. Tise, State Historic Preservation Officer, in a letter of 19 June 1978 indicated the following:

"According to North Carolina legal requirements, a licensed funeral director must be present during grave removal and reinterment. The Attorney General's office has informed the Archaeology Branch and CP&L that this requirement need not be in conflict with the archaeological investigations, as long as a balancing is reached between the parties involved. CP&L is now in the process of affecting such a balancing. The cemeteries are to be removed as archaeological burials, under the direction of Dr. Coe and Dr. Graham, while at the same time fulfilling all of the legal requirements of the funeral director. A report of the findings, as well as appropriate maps, is to be forwarded to the Archaeology Branch as soon as it is available."

Two of the cemeteries in the proposed project area were excavated and removed in the summer of 1978. The third cemetery in the proposed project area has yet to be excavated; however, an official with CP&L indicated that the excavation and removal of the third site should be completed in the near future. A final report on the excavation and removal of the cemeteries should be ready in October of 1978 by the Research Laboratories of Anthropology at U.N.C.

4.2.2.4 Aesthetics

Development of the Mayo site will convert a typical piedmont stream and its surrounding terrestrial areas into a reservoir. However, the aesthetic value of the site area is not unique to the region, as evidenced by the fact that none of the streams in the Mayo Creek watershed are candidates to the State's proposed Natural and Scenic Rivers System (letter dated 22 September 1976, from Steven E. Reed, N.C. Department of Natural and Economic Resources). The proposed impoundment will have aesthetic appeal of its own and will be accessible to a great number of people.

4.2.2.5 Elimination of Dam Site Habitat

Construction of the ash pond and reservoir dam will not only have effects upstream and downstream of the dams, but will eliminate all flora and some of the fauna within the dam alignments. Most of the fauna such as deer, squirrel, and birds will leave once construction starts but less mobile organisms like small mammals, amphibians, reptiles, stream benthos and some fishes will be destroyed by the dam fill.

On Crutchfield Branch approximately 465 m^2 (5,000 ft^2) of stream habitat will be filled along with approximately 8 ha (20 ac) total of wooded upland and old field habitat. On Mayo Creek approximately 0.4 ha (1 ac) of stream habitat will be filled along with approximately 10 acres of cultivated fields, 2 ha (5 ac) of wooded bottomland and some 2.4 ha (6 ac) of wooded upland. All these resource or habitat areas will be irrevocably lost.

4.2.2.6 Road Relocations

The relocation of NC 49 across Mayo Creek will alter approximately 5-10 acres of terrestrial habitat and 1 acre of wetlands habitat. NC 49 is to be relocated by elevating it above the proposed reservoir. Adjacent wetlands are to be filled to provide access causeways to the proposed relocation. Thus, the wetlands will either be altered due to the filling of the proposed reservoir or due to the relocation of NC 49.

The relocation of SR 1501 is to be below the dam and would alter land that would otherwise not be affected by the project. However, this work will be considered under separate application.

4.2.2.7 Railroad Alignment

The selection of the routing of the railroad spur from the project site to the main line is controlled by and will be made by the Norfolk and Western Railroad. The exact route has not been determined and as such the environmental impacts of the railroad line cannot yet be determined.

4.2.3 Impacts on Socioeconomic Conditions

4.2.3.1 Population

Based on the projected schedule for the Mayo Electric Generating plant, an average of 800 workers will be employed during the peak year of construction. This figure may vary somewhat due to the availability of craft personnel in the area and to the stage of completion of the project. Approximately 85-90% of these workers are anticipated to be residents of an area within 80 km (50 mi) of the plant site, and will commute daily from their homes. This area includes the cities of Roxboro, Raleigh, Durham, Chapel Hill, Burlington, Reidsville, and Henderson, North Carolina, and Danville and South Boston, Virginia. Because of the large area from which the construction workers will be drawn and because most will not change their residence, very little impact on the population of the area near the site is projected. Figures for the numbers of construction workers are given in Table 4.2-1.

4.2.3.2 Economy

The construction of the Mayo Electric Generating Plant will have a beneficial impact on the economy of the Person County area through the creation of new jobs, increased economic activities, and the increase to Person County's property tax base.

The majority of these effects of construction on employment and the economy are expected to occur in the Roxboro area, although some effects will extend over a much larger area as well.

The average hourly wage for construction workers for this project is expected to be about $7.25 (in 1977 dollars). With each worker spending approximately 2,000 hours per year on the job, the expected annual salary of the average worker will be about $14,500. Total wages for the construction phases of the Mayo project are given in Table 4.2-1.

The anticipated original cost increase in Person County attributable to the construction of the Mayo Plant is $808 million over a period beginning with calendar year 1976 and ending in 1985. This should increase CP&L assessed valuation in Person County by approximately $679 million over that period. Construction work in progress is subject to property tax in North Carolina, and assessed valuation will increase annually throughout the construction period.

It is impossible to predict what Person County will realize in future tax revenue as a result of anticipated increase in valuation without knowing how the Person County tax rate will fluctuate. The rate typically decreases after substantial increases in the total county tax base and increases to provide for increases in the county budget. However, at the 1977 rate, the annual property tax on Mayo Unit #1 in 1982 would be approximately $1,866,526 and the annual property tax on Mayo Unit #2 in 1985 would be approximately $1,597,900.

4.2.3.3 Public Services

Construction of the Mayo project should not cause a substantial impact to the public services of Person County nor to the City of Roxboro, since there should be no significant numbers of workers moving into the area. In addition, CP&L will provide security guards for the duration of construction and operation through a contract with a private security company. Ambulance service and fire protection will be provided by CP&L to meet the Occupational Safety and Health Administration regulations. These actions should reduce required service from the Person County Sheriff Department and the county's public ambulance service and fire departments.

4.2.3.4 Transportation

Handling and hauling of heavy equipment for the project will be accommodatec over traffic corridors rated for licensed ICC Regulations. The roads and structures that are to be utilized will not require upgrading for use by this project. Basically, four major routes will accommodate the traffic all connecting to U.S. 501 for access to the project (Figure 1.3-1). From the north and south, Interstate 85 will be the primary corridor. Secondary corridors from the north and south can be either U.S. 360 or U.S. 220. All westernly traffic will primarily have the use of Interstate 85 connecting to U.S. 501 for access to the project. All equipment in excess of highway limitations will be scheduled to be handled and hauled by railroad. Construction of the railroad spur is planned for early completion primarily for these deliveries. Personnel to staff the project will be recruited within an 80 km (50 mi) radius of the plant site, drawing labor primarily from the included North Carolina counties. Commuting and migrating workers will utilize existing roadways as access to the project.

4.2.3.5 Project Area Socioeconomic Impacts

All of the twenty-three families that resided in the project area have been relocated. Most of these people relocated in areas in relative proximity to the plant or in the Roxboro vicinity.

During the review of the Corps of Engineers public notice on this project, many of the homeowners and landowners in the project area commented by telephone, in writing, and in person on the project. These comments are summarized in Section 5.3. Comments on the Draft Environmental Impact Statement from individuals are found in Section 9.4.

Approximately 700 acres total of crop land and pasture land have been or will be taken from production due to the development of the plant area and creation of the reservoir. Also, as indicated in Section 2.6.3, there is a cattle farm below the ash pond dam that could be affected by the change in flow or water quality from the ash pond area. The N.C. Division of Environmental Management is aware of this situation and will investigate it prior to making a decision on the NPDES permit.

Types of crops planted in 1977 in the project area and approximate percentage of each included: corn - 64%, tobacco - 23%, wheat - 8%, and milo - 5%.

Estimated value of cropland and pasture land is $400,000. The timberland resources in the area were estimated at $150,000 to $200,000.

Due to the loss of these resources, the income of some of the displaced families and other landowners not living in the required area will be significantly affected. This situation will be somewhat offset since CP&L is paying or trading other lands for the required land. However, some of the individuals may have problems finding new jobs especially, if their main income was from farming and they did not trade for other lands.

4.3 Plant Operation

4.3.1 Impacts on Air and Water Resources

4.3.1.1 Impact on Air Resources

Low sulfur coal, particulate removal systems and the application of steam generator design technology are to be used to reduce the emission of particulate matter and gases into the atmosphere from the operation of the proposed Mayo Plant. Also, tall stacks and high exhaust velocities are to be used to increase dispersion of emissions.

The following section analyzes the effect of the Mayo project on air quality and presents the proposed methods of compliance with the existing emission and air quality regulations. Since the emissions will vary with the composition of the coal burned, the load on the steam generators and other operating parameters, this analysis primarily evaluates the projected impact with regard to maximum emission rates.

4.3.1.1.1 Air Quality Regulations - Emission Standards

Performance standards for new stationary air pollution sources have been promulgated by both the U.S. Environmental Protection Agency (40 CFR Part 60) and the North Carolina Division of Environmental Management (15 NCAC, Section 2D .0500). These standards limit the amount of particulates, sulfur dioxide and nitrogen oxides allowed to be emitted from new fossil fuel-fired steam generators. The standards for new power plants are summarized in Table B-5.

4.3.1.1.2 Air Quality Regulations - Ambient Air Quality Standards and Prevention of Significant Deterioration (PSD) New Source Review

National Primary and Secondary Ambient Air Quality Standards have been adopted by the U.S. Environmental Protection Agency (40 CFR Part 50) and the N.C. Division of Environmental Management, and are identical. The national primary air quality standards are the pollutant concentration limits required to protect the public health. The secondary standards are limits designed to protect the public welfare. The applicable ambient standards are presented in Table B-6.

In addition to these ambient air quality standards the U.S. Environmental Protection Agency has promulgated PSD regulations. The Federal guidelines require the state to designate all areas for growth potential by classes. A designation of Class I will permit very slight growth, Class II will permit limited growth, and Class III will allow for moderate growth. All areas of North Carolina are currently designated as Class II.

Areas designated as Class I or Class II are limited to the increase in pollutant concentrations over existing baseline air quality concentrations presented in Table B-6.

The Environmental Protection Agency (EPA) has determined that the Mayo units are subject to PSD regulations. CP&L's and the State's ambient air analysis show that the impact of operation of the proposed Mayo Creek plant would be within the emission limits derived from new source standards of performance and within the PSD guidelines. CP&L's analysis is presented in summary below. The State's analysis, permits, and EPA's Authority to Construct are presented in Appendix B. Table B-7 summarizes the State's and CP&L's projected maximum ground level concentrations. Both analyses indicate that the projected emissions are to be within existing standards.

4.3.1.1.3 CP&L's Projected Emission Rates

Particulate emissions generated by the burning of coal is to be a maximum of 0.1 pounds of fly ash per million Btu heat input to the boiler, at all loads. Fly ash emissions are to be reduced by equipping both Mayo Unit No. 1 and No. 2 with 99.6% efficient electrostatic precipitators.

For coal based on a maximum 25% ash content, a heat rate of 12,000 Btu per pound of coal and retention of 20% of the total ash as bottom ash, the particulate emission rate is approximately 0.07 pounds per million Btu heat input and is within the applicable particulate emission standard. Combustion of coal with a more typical ash content of 16% would result in an emission rate of 0.04 pounds per million Btu heat input.

Based upon a sulfur in coal content of 0.7% and heat content of 12,000 Btu per pound, the sulfur dioxide emission rate from Unit 1 and Unit 2 would be approximately 1.2 pounds per million Btu of heat input and is within the level of the standard. These calculations are based on the conservative assumption that no sulfur compounds remain in the ash and that all sulfur is emitted as sulfur dioxide.

Nitrogen oxide emission rates are not primarily dependent on fuel quality and are almost completely dependent upon the boiler and furnace design, and operating practices. According to CP&L the specifications for this equipment will be guaranteed to meet the Federal New Source Performance Standard of 0.7 pounds per million Btu heat input.

4.3.1.1.4 CP&L's Projected Ambient Air Quality

The significant deterioration Class II increments were changed as a result of the August 1977 Clean Air Act (CAA) Amendments. The references in this section are to the increments existing prior to passage of the CAA Amendments. Table B-7 compares the maximum concentration to the increments established by the August 1977 amendments. As discussed on page 1-22, the project has been reviewed pursuant to and permitted under the 1977 CAA.

4.3.1.1.4.1 Projected Ambient Particulate Levels

The maximum predicted ambient 24-hour particulate concentration due to the operation of the Mayo Plant is 3.3 ug/m^3 occurring 1.5 km (1 mi) to the north of the plant.

This maximum value represents 11% of the 24-hour significant deterioration guideline of 30 ug/m^3 for a Class II region. Summing the maximum monitored 24-hour values (computed for each site per year) of 99.7 ug/m^3 to this maximum estimated plant contribution will result in a total estimated ambient 24-hour concentration of 103, 60% of the National Ambient Air Quality Standard of 150 ug/m^3. Table B-7 presents the calculated maximum particulate ground level concentrations computed for the Mayo plant at continuous full load operation. These values compare favorably with the National Ambient Air Quality Standards and Class II PSD Guidelines.

4.3.1.1.4.2 Projected Ambient and PSD Sulfur Dioxide Levels

Projected maximum ground level sulfur dioxide concentrations have been calculated and are reported in a document prepared for CP&L by Environmental Research and Technology entitled The Impact of the Proposed Mayo Electric Generating Station on Compliance with Ambient Air Quality Standards for Sulfur Dioxide. This document is available upon request if additional information is desired beyond that presented below.

Background concentrations of sulfur dioxide were calculated by considering CP&L's Roxboro Steam Electric Plant which is located 16 km (10 mi) to the west of the Mayo plant as the only significant source of SO_2 within the impact area of the Mayo plant. The highest predicted 3 hour concentration resulting from operation of both the Roxboro and Mayo plant is 629 ug/m^3, occurs about 12.0 km (7.5 mi) to the west-southwest from the Mayo plant and is due entirely to the Roxboro plant. This value is 48% of the 3 hour air quality standard of 1300 ug/m^3.

The maximum predicted ambient 3 hour concentration resulting from operation of the Mayo plant is 193 ug/m^3 and occurs about 4.0 km (2.5 mi) to the east of the plant. This value represents 28% of the 3 hour significant deterioration Class II limitation of 700 ug/m^3.

The maximum estimated 24 hour sulfur dioxide concentration is 139 ug/m^3, occurs to the southwest of the Mayo plant and again is due to the Roxboro plant. Summing the maximum monitored 24 hour concentration of 117 ug/m^3 to this maximum plant contribution, the total ambient concentration is estimated to be 255.6 ug/m^3, which is 70% of the 24 hour standard.

The maximum 24 hour concentration due entirely to the Mayo plant is predicted to be 52.4 ug/m^3 occurring about 12 km (7.4 mi) to the south-southwest of the plant. This concentration represents 52% of the significant deterioration regulation of 100 ug/m^3.

The maximum annual concentration due to both plants is 12.1 ug/m^3 and occurs about 10.0 km (6 mi) to the west of the Mayo plant. The Mayo plant should contribute only 10% to this maximum concentration. The maximum annual monitored concentration of 9 ug/m^3 combined with the plants' maximum impact produces a total ambient concentration of 21.1 ug/m^3, 26% of the annual ambient air sulfur dioxide standard. The maximum annual average concentration produced entirely by the Mayo plant is 3.8 ug/m^3 which is 25% of the significant deterioration regulation. Both the short and long term averages are summarized in Table B-7.

4.3.1.1.4.3 Projected Ambient Nitrogen Dioxide Levels

PSD guidelines do not apply to NO_2 concentrations.

4.3.1.1.5 Effects of Cooling Tower Plume and Drift

Visible vapor plumes, ground fog, and icing from the cooling towers at the Mayo site were estimated for a configuration consisting of two

linear cooling towers with each tower having eight cells. Meteorological data was obtained from the Raleigh-Durham Airport and used in the calculations to represent site conditions at the Mayo Creek facility.

4.3.1.1.5.1 Visible Plume

The length of visible plumes from the towers at the Mayo Electric Generating Plant will vary greatly depending upon the meteorological conditions such as when the atmosphere is unable to hold much additional moisture. In cold weather (temperatures below freezing) and high relative humidities (greater than 80%), plumes can attain long lengths in stable air with little occurrence of ground fog. Such situations are most likely to occur during the winter between midnight and early morning. The mean length of the visible plume can change from about 2 km (approximately 1 mi) under unstable conditions to about 24 km (15 mi) under stable atmospheric conditions. The plume from typical mechanical draft towers is expected to rise approximately 30 - 60 m (100 - 200 ft) under stable conditions and to attain a width of 100 - 167 m (300 - 500 ft) before dissipating. The mean length under cold, humid neutral atmospheric conditions (most likely to occur during early morning hours of the winter months) would range from 4 to 9 km (2.5 to 5.6 mi) downwind of the cooling towers.

4.3.1.1.5.2 Potential Ground Fogging

Based on a cooling tower analysis, ground fog occurrence in all directions around the plant due to cooling tower operation is estimated to be 480 hours per year. The major point of environmental impact of ground fogging would be the increase of fog potential along U.S. Route 501 running north and south just to the west of the plant. It can be anticipated that a slight reduction in visibility due to fogging from cooling tower operation along Route 501 at those points nearest to the plant would occur.

4.3.1.1.5.3 Drift

The plume intersects fully at ground level when the ambient wind speed is equal to the exit velocity at a distance of about 43 to 107 m (141 to 352 ft) from the base of the tower (Overcamp, 1971). Wetting, however, occurs along a line extending from 32 to 117 m (105 to 384 ft). The major area of concern is the switchyard located 305 m (1,000 ft) to the southwest of the cooling towers. Although this area appears to be outside the affected area, a drift rate accumulation at ground level may approach 0.260 mm/hr (0.060 in/hr) for each tower when humidities exceed 90% and winds exceed 12 m/sec (26.8 mi/hr).

4.3.1.2 Hydrology and Surface Water

After the reservoir is filled, the flow of Mayo Creek below the dam site is expected to average about 680 1/s (24 cfs). CP&L proposes to release a minimum of 56.6 1/s (2 cfs) except during severe drought conditions. When these conditions persist, the 7-day, 10-year lowflow value of 0.1 cfs will be released. The downstream flow during March, April, and May is projected to exceed the minimum release, and should average about 1,700 1/s (60 cfs).

Storm runoff can produce natural peak flows at the dam site ranging from less than 1,000 cfs to more than 3,000 cfs. Flows over the spillway will generally follow this pattern, although the reservoir will result in some reduction of the peak flows due to spillway design.

Although this reservoir is not specifically designed for flood control, the proposed spillway arrangement will offer some flood control by reducing peak flows of naturally occurring floods. For example, the 100-year event should be reduced from about 565 m^3/s (20,000 cfs) to about 120 m^3/s (4,300 cfs). Larger floods including the probable maximum flood also will have reduced peak discharges. The probable maximum flood hydrograph would be reduced from 2,158 m^3/s (76,000 cfs) to 1,444 m^3/s (51,000 cfs), as the reservoir provides about 49 hm^3 (40,000 ac-ft) of storage for this size flood.

In order to augment the naturally occurring low flows in Mayo Creek, the company has stated that they intend to supplement natural low flow conditions with continuous releases of 2 cfs (900 gpm) through Howell Bunger valves located in the dam structure. Under severe drought conditions and unusual plant operating conditions, this supplementary flow may be reduced by the company to below 2 cfs as necessary to maintain reliable plant operation. The flow in Mayo Creek below the dam can be reduced to the 7-day 10-year low flow of 0.1 cfs. Under these conditions, the reduction of the supplementary flow from the reservoir should simulate the more severe downstream effects of naturally occurring drought conditions.

Any discharge from the ash pond into Crutchfield Branch is to be intermittent. Under normal low flow or drought conditions in the Mayo Creek watershed, the ash pond discharge will normally be returned to the Mayo impoundment. During periods of normal or high flows, there may be some discharge to Crutchfield Branch. Crutchfield Branch discharges into Mayo Creek approximately 8,000 feet downstream of the proposed Mayo dam.

The Mayo Creek drainage area makes up approximately 21.4% of the Hyco River flow on an average hydrological year. With a predicted discharge

of 24 cfs, the proposed ash pond and reservoir dam will reduce the Mayo Creek's contribution to the Hyco flow to about 12%. However, during drought flow the minimum of 2 cfs to be released from the Mayo impoundment will augment the flow of the Hyco River.

The reduced flow to the Hyco River will have some effect on the John H. Kerr, Gaston, and Roanoke Rapids hydroelectric facilities downstream. If a zero outflow is assumed during filling and it takes 2.35 years to fill the Mayo impoundment, the power losses to the hydrofacilities downstream would be about 21,000 megawatt-hours valued at about $100,000.

During operation, assuming an average discharge of 24 cfs, total losses to the downstream projects would be about 5000 megawatt-hours per year or around $20,000.

4.3.1.3 Groundwater

See Section 2.2.2

4.3.2 Impacts on Natural Systems

4.3.2.1 Aquatic Ecology

4.3.2.1.1 Water Quality

Changes in physical and chemical composition are certain to occur when changing from a flowing (lotic) to a nonflowing (lentic) condition. Therefore, water quality in the early years of the impoundment will be different than after several years of existence.

Formation and operation of the reservoir will cause some changes in surface water temperatures in that any large water body is subject to insolation which ultimately increases the temperature above that of natural flowing waters.

Typical of piedmont lakes and impoundments, oxygen depletion in the hypolimnion caused by summer stratification will result.

Downstream water quality in Mayo Creek can be expected to show physical-chemical similarities to the Hyco River below Lake Hyco, and to the Dan River, which is above Kerr Reservoir. Data collected by Weiss (1975)

from these tributaries offers some idea of what the downstream water quality from the proposed Mayo impoundment will be.

Downstream water quality will depend to a large extent upon the quantity of flow. Even though the minimum flow released from the dam will be cool and highly aerated with Howell-Bunger valves, this water will tend to warm due to isolation effects. Low D.O. and nutrient buildup will result during extended low flow periods. This is similar to conditions that occur during preimpoundment low flow conditions.

Drawdown effects on water quality in the impoundment should be negligible because the projected levels of drawdown on the average are minimal.

Some toxic substances will be released to the reservoir during operation The impacts of these releases are discussed in Section 4.3.2.1.2.2 below.

4.3.2.1.2 Fisheries

4.3.2.1.2.1 Cooling Tower Blowdown

Under normal conditions all of the cooling tower blowdown is to be used as the water source for ash sluicing. However, during summer months, the cooling tower blowdown may exceed sluice needs. In this case, the excess water will be discharged directly into the reservoir. This excess blowdown discharge will dilute rapidly upon mixing with reservoir waters. Concentrations of residual chlorine, metals, and cold-side blowdown temperatures are not expected to have any noticeable overall effects on fisheries production in the reservoir. Production is expected to be limited locally in the area of blowdown discharge.

In addition the concentration of chlorine in the ash pond effluent should be minimal due to the retention time of ash sluice water in the ash pond. Also, the temperature of the effluent should approximate the ambient level of the reservoir due to retention time in the ash pond.

Maximum instantaneous residual chlorine concentrations in blowdown water discharged directly to the reservoir are expected to be about 0.5 mg/l with a daily average of 0.2 mg/l. These discharge limitations are adequate for the protection of most fisheries resources. Chlorination of cooling waters and its subsequent discharge into the impoundment is expected to limit fisheries production in the immediate discharge area by reducing food supplies and by eliciting an avoidance response of fishes in the area. The avoidance responses of fishes to chlorine concentrations of 0.2 - 0.5 mg/l are well documented (Tsai, 1975).

Estimated monthly blowdown temperatures ranging from 23.9°C (75°F) in December to 32.2°C (90°F) in July (see Section 1.5.3) are not expected to have any adverse effects upon fisheries production. The small volume of heated discharge waters directed to the reservoir will rapidly dissipate upon mixing with reservoir waters and may act with other discharge pollutants to increase toxicity effects and avoidance response to fishes in the immediate area of the discharge. It is not expected that these pollutants will have any direct effects on either survival or production of fisheries resources in the impoundment.

4.3.2.1.2.2 Ash Pond Discharge

The fly ash caught by the electrostatic precipitator may be routed to the 160-acre ash pond. This fly ash contains several toxic substances that are released when dissolved in water. However, the only substance of noteworthy concentration coming from the ash pond effluent is selenium estimated to be 0.03 ppm. The highest projected concentration over a 20-year period is approximately .013 ppm. This would occur under drought conditions. (Section 1.5.4 and Appendix G)

Selenium, an essential micronutrient, is needed by man at a rate of 0.04 to 0.10 mg/kg of food while some animals require selenium at 0.01 to 0.10 mg/kg (USEPA, 1976). However, selenium is a bioaccumulator, i.e., it becomes more concentrated with each step in the food chain and accumulates in tissues. It may concentrate at a higher rate in certain organs such as reproductive organs than in muscle tissue. It is believed that selenium is incorporated in the food chain mainly through plankton, although it is also thought to concentrate in periphyton and benthos. Once selenium is incorporated into the sediments it takes on a stable insoluble form and is effectively removed from the food chain. At high enough concentrations, selenium can have sublethal and lethal effects on fish. The most noticeable sublethal effect is for selenium to accumulate in the reproductive organs which may inhibit successful spawns. However, the exact levels that cause lethal effects in fishes are not known.

Duke Power Company recently published a final report on the decline of fish populations in the reservoir of the Belews Creek coal-fired power plant. This plant also has an ash pond that discharges into a reservoir. Selenium was determined to be the factor that caused the serious drop in the number of fish in the lake. However, no determination was able to be made as to the exact concentration that caused the decline in population.

CP&L has also initiated a study on the concentration of selenium in their Roxboro/Hyco plant reservoir and in representative fish tissue samples taken from the reservoir.

N.C. Department of Natural Resources and Community Development, Division of Environmental Management will require a National Pollutant Discharge Elimination System (NPDES) permit under Section 402 of the Clean Water Act for the proposed ash pond discharge.

CP&L has applied for the NPDES permit and the Division of Environmental Management (DEM) is aware of the proposed selenium discharge and its potential effects. The Division has the authority to deny the permit or issue it with conditions if they feel this is required to protect water quality. DEM issued a 401 certification in May 1977 and it stated "that the discharge of wastewater from the Mayo Electric Generating Plant be conducted in accordance with the terms and conditions to be imposed in the State NPDES discharge permit." (Appendix E)

The concerns of the N.C. Wildlife Resources Commission and the U.S. Fish and Wildlife Service over the potential selenium problems that were expressed in this section of the DEIS have been resolved. See Appendix F.

4.3.2.1.2.3 Impingement and Entrainment

The operation of a closed-cycle cooling system is expected to minimize the effects of impingement and entrainment of adult, juvenile, and larval fishes. Makeup and service water requirements are estimated at approximately 991 l/s (35 cfs). This low volume cooling water requirement in association with low intake approach velocities (0.15 m/sec or 0.5 ft/sec is expected to produce negligible impingement and entrainment effects on fisheries resources.

Species most likely to be impinged include the bluegill (Lepomis macrochirus yellow perch (Perca flavescens), green sunfish (Lepomis cyanellus), and satinfin shiner (Notropis analostanus). The impingement rates of these fishes will depend upon their abundance in the vicinity of the intake, total body size, and swimming abilities under various thermal regimes. The use of concrete or other similar smooth material around the deep-water intake would minimize the attractiveness of the area to small fish.

The entrainment of organisms is expected to be minimal as a result of low volume water requirements, deep intake location, and lack of suitable spawning habitat in the vicinity of the intake structure. However, entrainment of organisms through the cooling water system will result in 100% mortality.

4.3.2.1.2.4 Drawdown

Schedules of predicted reservoir drawdown below the nominal pool level of 132 m (434 ft) range from 0.6 m (2 ft) under normal conditions to 3.6 m (12 ft) under 20-year drought conditions. Effects of drawdown vary among species, extent of drawdown, duration, and seasonal occurrence (Phillips, 1966; Jester, 1971).

The impact of drawdown on fisheries production in Mayo Reservoir will be most pronounced in shallow water coves and in the area from the N.C. Hwy. 49 bridge to the headwaters. Exceeding the projected 2-foot average annual drawdown is expected to decrease the abundance of small fish such as small bluegill (Lepomis macrochirus) and green sunfish (Lepomis cyanellus) by stranding them in isolated pools during drawdown and by exposing them to increased predation (Bennett, 1971). The overall effects of drawdown on fisheries production in Mayo Reservoir will be dependent upon the nature of annual drawdowns and the composition of the fishery that develops in the new impoundment. Because the projected drawdown of the Mayo reservoir is no greater than the drawdowns experienced at nearby Hyco and Kerr Reservoirs and these lakes support reasonable fish populations, the effects of drawdown are not expected to be critical at Mayo.

4.3.2.1.2.5 Effects on Fishery Stocks Downstream of the Reservoir and Ash Ponds

The affected area downstream of the main dam involves those waters extending from the Mayo dam to the confluence of Mayo Creek and Hyco River, a distance of approximately 6.5 km (4 mi). As discussed in Section 2.3.1.2.1, fisheries abundance in this area of Mayo Creek is lower than that of other areas of the creek and reflects the overall habitat degradation resulting from agricultural runoff and upstream logging operations. The construction of the Mayo main dam will limit upstream spawning migrations of suckers to the four miles of Mayo Creek below the main dam. These fishes include the silver redhorse, golden redhorse, suckermouth redhorse, and white sucker. These fish congregate in the gravel riffles of Mayo Creek for spawning purposes. Upstream spawning migrations from Hyco River occur in March and early April. The N.C. Wildlife Resources Commission reports that gigging for suckers is good to excellent during this spawning period (Fish, 1968). During normal operation, expected discharges averaging 60 cfs for March, April, and May should preclude any serious negative impacts on spawning sucker populations in Mayo Creek. However, most aquatic fauna downstream of the dam site on Mayo Creek will be eliminated when the stream is impounded since the water flow will cease during the 2½-4 years that the proposed reservoir is being filled. Some species may be able to reestablish themselves downstream of the dam site after the water flow in Mayo Creek is resumed.

Flows below 56.6 l/s (2 cfs) presently occur about 8% of the time at the Woodsdale, North Carolina, gaging station. Based on the limited Mayo Creek data available after construction of the dam periods of 56.6 l/s (2 cfs) flow may aggregate to roughly 50% of the time. It is expected that this flow rate will result in some further habitat and water quality degradation and a corresponding reduction of fisheries production downstream of the reservoir. Because the flow of 56.6 l/s (2 cfs) will occur approximately half the time, fishes not adaptable to pool habitat, low flow, increased temperatures and low D.O., will probably be eliminated from the area downstream of the dam to the confluence of Mayo Creek and Hyco River, a distance of approximately 6.5 km (4 mi). During extreme drought conditions, the flow may be decreased to 2.8 l/s (0.1 cfs), the 7-day, 10-year low flow. However, during those periods when low flows would occur naturally, the sustained release from the reservoir may reduce the drought effects.

The ecological value of this downstream resource has been discussed in Sections 2.3.1.2.1 and 2.3.1.2.2.

Construction of the ash pond dam on Crutchfield Branch will eliminate approximately one-half of the drainage area of the stream. In contrast to Mayo Creek no minimum flows are to be maintained even though there may be an intermittent discharge during periods of heavy rainfall. Thus, the stream will probably be dry most of the year except for a few pools.

A sport fishery does not exist on Crutchfield Branch due to its small size. The benthos and small non-sport fishes in the stream that cannot adapt to pool habitat will be eliminated.

The same effect would be created downstream of the auxiliary ash pond if it were created.

4.3.2.1.3 Benthos

Normal operation of the Mayo Creek plant should have minimal effect on the benthos of the reservoir. Some operational processes or structures which could have an effect are blowdown discharges, reservoir drawdown, and variations in flow downstream of the dam.

The discharge of blowdown may have some effect in a small area at the point of discharge to the reservoir. This effect results primarily from the discharge of chlorine, used to prevent biofouling, in the blowdown. Studies of chlorinated cooling tower blowdown show that the chlorine residual is generally reduced within a few hundred feet of discharge. In this area invertebrates have been killed, though never completely eliminated. This effect should be minimized since most of the blowdown is to be directed to the ash sluice system.

The synergistic effect of chlorine and heavy metals present in the blowdown could be responsible for some mortality of aquatic organisms (Dickson, et al., 1974; Brungs, 1976).

Another potential operational impact is related to reservoir drawdown. Since benthic organisms are relatively sedentary and many are burrowing forms, reduction in reservoir level would leave some stranded at higher levels and reduce the area available for habitation by the burrowing organisms (Benson and Hudson, 1975). However, with a predicted average annual drawdown of about .6 meters (2 ft), the surface areas affected will be small and any impact on the benthos could be counteracted by oviposition and larval migration when reservoir level returns to normal and also by the recently documented ability of many benthic forms to exist at depths as great as 50 cm (20 in) below the surface of the bottom sediment (Hynes, 1974).

Finally, there will be major changes in the benthic fauna of Mayo Creek and Crutchfield Branch below the dam due to the variation in the regulated flow from the dam site as described in Section 4.3.2.1.2.5. The deterioration of water quality, especially dissolved oxygen, likely to accompany these periods of low flow will also adversely affect the benthos.

4.3.2.1.4 Periphyton

Operation of the Mayo plant should have minimal effect on the algal community of the reservoir. The operation processes which could have an effect are blowdown discharges, reservoir drawdown, and flow variations downstream of the dam.

Cooling towers have been designed and located under NPDES guidelines on concentrations and duration of chlorine residuals to minimize potential effects on algal populations. Chlorine residual is rapidly dissipated within the area of the discharge and will not completely eliminate algal communities even within the limited area. Heavy metals present in blowdown could be responsible for the mortality of algal cells although lethal concentrations are not expected.

Another operational impact is reservoir drawdown. Drawdown could affect the establishment of a stable algal community. Temporary shallow water areas could result in some reduction of green algae with a corresponding increase in blue-green algae under "bloom" conditions. Benthic algae, primarily the Bacillariophyceae, could be subject to desiccation in areas of extreme drawdown. However, with a predicted average of about 0.6 m (2 ft) during the year, the surface area affected will be small and any impact on algae would be minimal.

With low flows of 56.1 l/sec (2 cfs) occurring more frequently below the dam, and intermittent flow below the ash pond dam, extreme variations in algal reproduction and populations and perhaps the increase of the Cyanophyceae can be expected. Benthic algal forms common in shallow water will be adversely affected by lowered dissolved oxygen levels which may occur during periods of reduced flow.

4.3.2.2 Terrestrial Ecology

4.3.2.2.1 Flora

After flooding of the reservoir, changes in the flora along the shoreline of the impoundment will occur. A community of emergent, submerged, and floating aquatic macrophytes will develop in appropriate habitats.

Vegetation within a few meters of the reservoir shoreline, which existed in that area prior to the filling of the reservoir, may shift toward a more moist or water tolerant type of flora.

Factors which most directly affect the rate of succession in a newly formed reservoir include dissolved oxygen, nutrient supplies, pH, light penetration, substrate texture, and water velocity (Sculthorpe, 1967). The shallow, most protected areas of the impoundment produce the best habitat for the development of an aquatic plant community. The steepness of the banks in many sections of the reservoir will yield a very narrow littoral zone and hence limit the development of aquatic plants. A study of the colonization by aquatic vegetation in Belews Lake, (Weiss, et al 1975) a cooling reservoir constructed by Duke Power Company 93 km (50 mi) west-southwest of the Mayo site, found aquatic species beginning to colonize the littoral zone during the second year following completion of filling of the reservoir. Some of the species most abundant included common cat-tail (Typha latifolia), peltandra (Peltandra virginica), various ludwigias (Ludwigia spp.), pondweed (Potamogeton diversifolius), and tag alder (Alnus serrulata). Similar gradual colonization by aquatic species is expected in suitable areas in the reservoir to be created at Mayo.

Along areas possessing very gradually sloping shorelines, the root systems of some of the vegetation, particularly trees with deep roots, will experience a change in the moisture regime. Depending on the magnitude of the change in water elevation relative to specific trees and the species involved, the effects will vary. Hosner (1960 and 1962), among others, has investigated various tolerances to water saturated soils among several forest trees. His studies indicate that silver maple (Acer saccharinum), box elder (A. negundo) and button bush (Cephalanthus occidentalis) are the most tolerant. Cottonwood (Populus deltoides),

green ash (Fraxinus pennsylvanica), and American elm (Ulmus americana) are slightly less tolerant, while hackberry (Celtis occidentalis), sweet gum (Liquidambar styraciflua), red maple (Acer rubrum) and sycamore (Platanus occidentalis) are the least tolerant of the species studied.

Reservoir drawdowns projected to occur could adversely affect the establishment of a stable community of aquatic macrophytes in the reservoir. These drawdowns are the result of the cooling tower make-up water requirements plus evaporation and releases at the dam which at times will exceed the flow into the reservoir by Mayo Creek and its tributaries. The duration of drawdown is the primary factor which will affect the magnitude of harm to aquatic plants. The trees found at the shoreline and other deep-rooted plants should be well able to survive drawdown influences. The submerged and floating macrophytes will be damaged by the desiccation of above ground portions and root systems.

The absolute effect on shoreline depends on the species composition and evaluation relationships in specific areas. The steepness of the slopes should prevent most trees from succumbing to water saturated soil in a large percentage of the shoreline area. Reservoir drawdown will have some impact on shoreline and aquatic macrophytes. These effects are discussed in Section 5.2.3.2.1.

The emissions from the plant site should not have a significant impact on the flora in the area since the plant must operate in compliance with the permits issued by the State (Appendix B).

4.3.2.2.2 Fauna

Once construction activities have been completed and plant operation begins, some areas of land previously committed to construction activities or other land use will be reforested or revegetated by seeding. As these areas progress through natural successional stages, both food and cover will be provided for a wide variety of wildlife.

The reservoir required for the operation of the Mayo facility should increase the value of the site as waterfowl and furbearer habitat. The approximate 526 ha (1300 ac) of company-owned land between the normal pool elevation at the 132 m (434 ft) contour and the project boundary at the 137 m (450 ft) contour will provide shoreline habitat to many game and non-game wildlife. Continued utilization of the reservoir for electrical generation is not expected to adversely affect the quality of the shoreline habitat.

Possible impacts to fauna related to the operation of the plant are associated with stack emissions, reservoir drawdown, and plant noise.

The Mayo Electric Generating Plant has been designed and must operate in compliance with State and Federal air quality standards. Therefore, negative effects of stack emissions are not anticipated.

During drought conditions and periods of low stream flow, the operation of the plant will necessitate drawdown of the reservoir. The magnitude of the impact of such drawdown on adjacent terrestrial communities depends primarily on the duration of that condition. Long term drawdown could alter shoreline vegetation and thereby negatively affect the associated fauna. Predicted flow conditions and operational requirements indicate that drawdown of sufficient duration to cause such effects would occur infrequently.

Because noise diminishes rapidly with increased distance from the source, noise associated with plant operations are expected to have little effect on fauna beyond the plant boundary. See Appendix F for mitigation agreements.

4.3.2.2.3 Impacts Downstream of the Reservoir and Ash Pond

The water flow downstream of the ash pond and Mayo dam will be significantly reduced. This will not only affect the aquatic organisms as indicated in Section 4.3.2.1 but also terrestrial organisms.

The dams will probably prevent any significant flooding that would normally occur in the wetlands adjacent to the stream. This lack of flooding could encourage farmers to clear the bottomlands adjacent to the streams for agricultural fields or other types of development.

The reduction of flooding in the bottomlands would probably create drier soil conditions allowing highland plant species to enter. The bottomland trees that are already present probably would not be significantly affected due to their extensive root systems enabling them to adapt to drier conditions. However, some of the understory species, especially the herbaceous species, will be eliminated.

Because of the possible changes mentioned above, a different faunal species diversity may be created at the site typical of a more highland area.

A source of water for the fauna should not be a limiting factor in Mayo Creek since a flow of at least 2 cfs will generally be maintained below the dam. However, the water supply in Crutchfield Branch will be reduced or eliminated. The fauna may have to search elsewhere for a dependable water supply.

4.3.2.3 Historical, Archaeological and Cultural Resources

None of the historic or prehistoric sites identified in the Mayo site are considered of significant enough value to warrant further study and are not under consideration for inclusion on the National Register of Historic Places. Therefore, plant operation will have little impact on historic, archaeological and cultural resources.

4.3.3 Impacts on Socioeconomic Conditions

The number of employees at the Mayo plant, when both units No. 1 and No. 2 are operational, is estimated to be 150. The average annual salary per employee should be about $14,990.

CP&L indicates that most of the employees are to be obtained from the local labor force. However, some employees will be transferred from existing CP&L plants to Mayo. When these sources are not sufficient to meet needs, recruitment efforts will expand to other areas including technical schools throughout North Carolina and colleges and universities throughout the southeast. Approximately 1/3 of total plant employees will relocate and start new homes. Based on a possibility of 50 new housing starts in the area, a population increase of approximately 180 persons could occur. However, there should be little or no impact on public services such as schools, police, medical, fire, etc.

In addition to the 150 permanent CP&L jobs to be established, several satellite jobs will probably be started in the community to meet the increased demands required for the plant and its employees. Also, the reservoir would increase water related recreational potential in Person and surrounding counties (See Section 1.5.8).

4.4 Impact of Construction and Maintenance of Transmission Facilities

4.4.1 Impact on Flora

The major long-term effect on the flora of the transmission corridors is the cutting of vegetation along the right-of-way. All forestland within the cleared areas will be irrevocably lost.

Only vegetation which interferes with construction and maintenance activities or poses a hazard to the operation of the line will be cut, and the remaining vegetation will be left to give the right-of-way a "feathered" effect, as described in Environmental Criteria for Electric Transmission Systems, published by the U.S. Department of Interior and the U.S. Department of Agriculture. Herbicides will not be used in clearing or maintaining the right-of-way.

Screens of natural vegetation will be maintained where feasible at all major highway and stream crossings. They will serve the dual purpose of screening the right-of-way from public view and reducing soil erosion from entering drainageways. Maintenance crews will trim screens, mow the right-of-way, and cut danger trees on a 3 to 5 year cycle.

There are no known endangered or threatened flora species within the proposed Mayo-Wake 500 kV, Mayo-Roxboro 500 kV, or the Mayo 230 kV Tap corridors.

4.4.2 Impact on Fauna

The proposed transmission lines for the Mayo Electric Generating Plant are expected to have a minimal impact on the area's fauna with the majority of impact to be short-term. The clearing and construction activities will disrupt normal wildlife movement patterns during the construction phase. However, once construction is completed, the displaced wildlife is expected to return to the area. It is expected that the "edge effect" created where the corridor passes through forested areas should partially offset the impact on wildlife by clearing of the corridor. The cut vegetation left in windrows along the right-of-way, as well as second growth vegetation in the right-of-way, should provide cover for many existing species of wildlife in the area.

The construction and maintenance activity is not expected to permanently disrupt wildlife reproduction or migratory patterns in the area. The minimum conductor separation is 5 m (18 ft) for 230 kV and 9 m (30 ft) for 500 kV. Therefore, because of the large conductor separation, there will be no electrocution of birds.

There are no known endangered or threatened fauna species within the proposed Mayo-Wake 500 kV, Mayo-Roxboro 500 kV, or the Mayo 230 kV Tap corridors.

4.4.3 Impact on Hydrology

The proposed transmission lines are expected to have a minimal impact on the area's water resources. CP&L indicates that at all water crossings, a buffer zone of not less than three meters (10 ft) on either side of

the waterway will be selectively cleared (hand cut) to reduce erosion. Heavy equipment will be permitted to cross streams only when necessary and only at one location. Cut vegetation will be placed in the stream and on the stream banks at such crossings to prevent erosion and will be removed from the stream after construction is completed. Ruts caused by heavy equipment around drainageways will be leveled and be seeded to reduce erosion.

4.4.4 Impact on Soils

CP&L indicates that impact on existing soils by transmission line construction and maintenance will be kept to a minimum. The majority of the soils to be traversed are classified by the U.S.D.A Soil Conservation Service as moderately erosive.

An Erosion Control Plan will be filed with the State of North Carolina in accordance with the rules and regulations of the Sedimentation Pollution Control Act of 1973. This plan will specify all protective measures to be taken in areas where a potential for significant soil erosion exists. Special emphasis is placed on steep slopes, severely erosive soils, and the crossings of all streams, rivers, ponds, and lakes. If soil erosion does occur, the soil will be stabilized by applying a suitable ground cover in accordance with recommendations of the U.S.D.A. Soil Conservation Service.

4.4.5 Impact on Aesthetics

The proposed transmission lines will be routed to minimize visual effects. Where possible, the lines will be routed away from existing and identifiable future population centers to the extent possible. Major highway, lake, and river crossings will be screened, where feasible, with natural vegetation. At the two crossings of the proposed Falls Lake Reservoir for the Mayo-Wake line, the shortest crossings of the flood zones were selected, thereby minimizing cost as well as public visibility.

While every attempt will be made to avoid population concentrations and utilize natural screening, there will be some visual effects due to the size of the 500 kV structures. The 230 kV line, however, will be constructed with low-profile wooden H-frame structures (Section 1.6.2.3) that should blend reasonably well into the surrounding rural landscape.

4.4.6 Impact on Archaeological and Historical Sites

The proposed transmission lines should not affect known archaeological sites. Various archaeological studies performed for the State of North Carolina have indicated a greater potential for archaeological finds around natural drainageways. However, a report prepared by the Research

Laboratories of Anthropology states that there is no evidence to indicate that such sites exist around small streams in the area of the proposed Mayo Electric Generating Plant. The report further concluded that the broader stream and river basins have a greater potential of yielding archaeological finds. The only major stream to be crossed, the Neuse River, is to be impounded to create the Falls Lake Reservoir. Therefore, the proposed Mayo-Wake corridor should have no impact on archaeological sites in the Neuse River basin.

All historical sites have been inventoried in cooperation with the N.C. Division of Archives and History. For the Mayo-Wake and Mayo Tap Lines, it has been determined that there should be no impact on designated historical sites.

For the Mayo-Roxboro line, appropriate steps have been taken to minimize the impacts on the John Rogers House indicated in Section 2.8.2. The John Rogers House is currently under study for inclusion in the National Register of Historic Sites. The House is located on SR 1326 approximately 5 miles from the proposed Mayo Electric Generating Plant. In order to minimize the impact on this structure from the proposed Mayo-Roxboro line, CP&L utilized the John Rogers House and another structure on the opposite side of the transmission line as a control in establishing the proposed transmission line route. CP&L will maintain a minimum distance of 721 feet from the centerline of the transmission line to the John Rogers House. In addition, a wooded area will exist between the John Rogers House and the transmission right-of-way.

4.4.7 Impact on Land Use

The lines are anticipated to cause no change in population patterns and a minimum change in land use in future years. No residences will be removed or affected. The only lands committed to the lines are the areas they will traverse. Ownership of the land is retained by the property owners who will be able to continue to use it for agricultural, recreational or other purposes not inconsistent with the operation of the lines. However, the timber resources within the cleared right-of-way will be irrevocably lost.

4.5 Dam Design

The Land Quality Section of the N.C. Division of Land Resources under the Department of Natural Resources and Community Development normally reviews the design of proposed dams that are 15 feet or more high or contain more than 10 acre feet. This review is done under authority of the N.C. Dam Safety Law of 1967 (GS 143-215.23).

However "... electric generating facilities to be constructed pursuant to a certificate of public convenience and necessity from the North Carolina Utilities Commission" are exempt from the regulatory authority of the Land Quality Section. Such is the case in the proposed Mayo Creek project.

The Utilities Commission does not have dam safety engineers on its staff, so the commission formally requested the Land Quality Section of the N. C. Division of Earth Resources to review the proposed dam design for the Utilities Commission. The Land Quality Section agreed.

Based on the Land Quality Sections letter of 14 April 1978, the N.C. Utilities Commission on 8 June 1978 indicated that the main reservoir dam plans were adequate except in four respects:

"1. There are no provisions for emergency drainage of the reservoir. If this dam were under the jurisdiction of the N.C. Dam Safety Law, we would require that a bottom drain be provided to allow lowering the reservoir. The detailed requirements for the drain would be determined by the design engineer and submitted to the state for review; in general terms we would be thinking that there should be emergency provision to lower the reservoir level from the maximum pool to within 10 to 20 feet of the foundation level over a period of 60 to 90 days.

2. There are no piezometers in the outer slope of the embankment. We would ask the design engineers to include these,and would expect the number of piezometers to be on the order of 10 to 20. (This is a relatively inexpensive way to confirm the flow net used for seepage and structural stability analyses the design). We would also ask the design engineer to consider installing settlement plates in the embankment for monitoring, though settlement plates would not necessarily be a requirement.

3. There is no underdrainage blanket provided for the service spillway north of Sta. 16+20. We would ask that the design engineer either provide justification or provide an underdrain blanket and collector system.

4. There are no final drawings showing the locations of borrow sources. We would ask the design engineer to document the borrow plans."

CP&L has agreed to these terms by letter of 23 June 1978.

The Land Quality Section plans to review the design of the ash pond dam when the plans are complete. The plans should be complete in early 1979.

4.6 404(b) Anaylsis

The following section is included in this statement in order to comply with Section 404(b) of the Clean Water Act. The EPA guidelines used in this 404(b) analysis were published in the Federal Register, Vol. 40, No. 173, Friday, September 5, 1975. The purpose of this analysis is to assess the impacts of the placement of fill materials for the dam and road realignments into waters of the United States - specifically Mayo Creek and its adjacent wetlands. The actual placement of fill materials in Mayo Creek and its adjacent wetlands is the only aspect of the entire project that requires a Department of the Army permit. These activities are considered to be the primary concern. All other impacts discussed in this FEIS are to be considered secondary.

The analysis presented below follows the paragraph procedure outlined in the EPA guidelines.

Paragraph 230.4-1

Physical and chemical-biological interactive effects and approaches for evaluation.

a. Physical Effects

(1) Destruction of Wetlands

If the proposed dam is completed as proposed, approximately 5 acres of wooded bottomland would be filled along with about 1 acre of stream habitat. Although the wooded bottomland is infrequently flooded, it does provide organic nutrients, and wildlife habitat. It also serves as a natural purifier by trapping sediments from farm runoff, and provides a flood plain during high flow periods.

Mayo Creek does not have a significant sport fishery, however, a good diversity of aquatic organisms is present.

Relocation of the road N.C. 49 through the wetlands adjacent to the Mayo Creek will have similar effects as the dam construction. Approximately 1 acre of wetlands will be filled in this process.

(2) Effects on Water Column

Some turbidities will be created during placement of the fill for the road relocation and dam. This impact should only be evident during construction since the disturbed areas are to be seeded when they are complete.

(3) Effects on Benthos

All benthic organisms within the alignment of the road and dam will be destroyed. However, similar populations may establish on the road banks and dam slope inundated in the main reservoir.

b. Chemical-Biological Interactive Effects

(1) Exclusions from Evaluation

The proposed fill materials do not meet any of the exclusions from testing outlined in the guidelines.

(2), (3) Water Column Effects and Effect on Benthos

The fill material for the proposed dam and road relocation are to be obtained from within the reservoir and ash pond limits. Since there are no known sources of pollution in the Mayo Creek watershed, the placement of this material into Mayo Creek is not anticipated to have any adverse chemical-biological interactive effects.

c. Procedure for Comparison of Sites

This procedure is for excavation and disposal sites when a hydraulic dredge is used and the material is disposed of in open water. This procedure is not applicable to the proposed project.

Paragraph 230.4-2: Water Quality Considerations:

No toxic substances are to be discharged in regard to the permitted action of the proposed project. Therefore, water quality standards should not be violated.

Paragraph 230.5

Selection of Disposal Sites and Conditioning of Discharges of Dredged or Fill Material. For a discussion of alternate dam sites see Section 6.1.

a. General Considerations and Objectives.

In general, the proposed discharges are not compatible with the guidelines of this section.

b. Considerations Relating to Degradation of Water Uses at Proposed Disposal Sites.

(1) Municipal Water Supply: None present.

(2) Shellfish: No anticipated adverse effects.

(3) Fisheries

All fisheries habitat within the alignment of the road and dam will be destroyed. Also, some fishes will be unable to avoid the filling area and will be destroyed.

(4) Wildlife

Most of the wildlife within the fill areas will be displaced as the habitat area is eliminated. However, some less mobile forms will be buried. The nutrient matter normally washed into Mayo Creek from the wetlands vegetation will be eliminated. See Appendix F for wildlife mitigation agreements.

(5) Recreation Activities

Recreational use of the area will increase due to the creation of a 2,800-acre reservoir.

(6) Threatened and Endangered Species: No anticipated adverse impact.

(7) Benthic Life

All benthic organisms within the alignment of the road and dam will be destroyed. However, similar populations may reestablish on the road bank and dam slope inundated by the main reservoir.

(8) Wetlands

If the dam and road relocation are completed as proposed, approximately 6 acres of infrequently flooded wetlands and 1 acre of stream habitat will be filled.

According to the guidelines, discharge of fill materials in wetlands shall not be permitted unless,

(a) "the activity associated with the fill must have direct access or proximity to or be located in the water resources in order to fulfill its basic purpose..." and

(b) "that the proposed fill and the activity associated with it will not cause a permanent unacceptable disruption to the beneficial water quality uses of the affected aquatic ecosystem..."

The proposed dam complies with item (a) since in order to create a large reservoir a dam has to be located in a stream.

The project also complies with item (b), but the connection is not as obvious as item (a). Water area will be destroyed by the dam but will be replaced by 2,800 acres of water habitat. The benefits derived from the 6 acres of wooded bottomland such as a source of nutrients, wildlife, habitat, natural purifier, and flood plain will be altered. However, the 2,800-acre reservoir will contain many more producers such as zooplankton, phytoplankton, benthos, and emergent marshes along the shoreline. There should be an increased use of the area by waterfowl due to greater surface area and increased furbearer habitat due to the increased miles of shoreline. The reservoir will act as a stilling basin allowing most of the suspended sediment in upland runoff to settle before it affects downstream areas. Also, the reservoir, due to its size, will reduce flood impacts downstream.

Thus, the water quality uses of the area will be altered but not necessarily create a permanent unacceptable disruption to the beneficial water quality uses.

(9) Submersed Vegetation: None present.

(10) Size of Disposal Site: Not applicable.

c., d. Contaminated Fill Material Restrictions: Not applicable.

e. Mixing Zone Determinations: Not applicable.

Table 4.2-1 Estimated Work Force for the Mayo Electric Generating Plant Construction

Year	Approximate Average Numer of Construction Force	Estimated Total Wages*
1978	0-200	$3,250,000
1979	300	$5,250,000
1980	700	$12,400,000
1981	750	$14,300,000
1982	300	$6,000,000
1983	500	$10,500,000
1984	525	$11,400,000
1985	50	$400,000
Year	**Approximate Number of Operational Force**	**Estimated Total Wages***
1986	150	$2,250,000

*Wages for future years have been escalated at the rate of 7% per year compounded.

LITERATURE CITED

APPENDIX B

Air Quality Data and Permits

APPENDIX B

Table of Contents

Table B-1

P A R T I C U L A T E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

AS OF APRIL 14, 1977

NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: AFTERBAY SITE
STATION CODE NO: 73-3140-AA
COUNTY: PERSON
SITE LOCATION: LAKE HYCO AFTERBAY OFF SR 1322.
STATION TYPE: OVERLOOKS LAKE - FAIRLY DESOLATE
COMMENTS: APPROXIMATELY 6.0 MILES NW OF STEAM PLANT.

		JAN 1975	FEB 1975	MAR 1975	APR 1975	MAY 1975	JUN 1975	JUL 1975	AUG 1975	SEP 1975	OCT 1975	NOV 1975	DEC 1975
	1	W	S	19 S	T	T	S	T	F	M	W	S	M
	2	T	S	S	W	F	M	W	S	T	T	53 S	53 T
	3	F	M	M	T	S	T	T	S	63 W	18 F	M	W
D	4	S	T	T	F	S	W	F	35 M	T	S	T	T
	5	S	15 W	W	S	M	66 T	48 S	T	F	S	W	F
A	6	M	T	T	26 S	69 T	F	S	W	S	M	T	S
	7	T	F	35 F	M	W	S	M	T	S	T	F	S
Y	8	W	S	S	T	T	S	T	F	M	W	20 S	12 M
	9	T	S	S	W	F	M	W	S	48 T	39 T	S	T
	10	F	M	M	T	S	T	T	56 S	W	F	M	W
O	11	S	43 T	T	F	S	38 W	44 F	M	T	S	T	T
	12	S	W	W	35 S	41 M	T	S	T	F	S	W	F
F	13	M	T	12 T	S	T	F	S	W	S	M	T	S
	14	T	F	F	M	W	S	M	T	S	T	13 F	39 S
	15	W	S	S	T	T	S	T	F	16 M	69 W	S	M
	16	T	S	S	W	F	M	W	49 S	T	T	S	T
M	17	F	19 M	M	T	S	73 T	26 T	S	W	F	M	W
	18	S	T	T	47 F	27 S	W	F	M	T	S	T	T
O	19	S	W	11 W	S	M	T	S	T	F	S	W	F
	20	M	T	T	S	T	F	S	W	S	M	49 T	26 S
N	21	T	F	F	M	W	S	M	T	24 S	43 T	F	S
	22	W	S	S	T	T	S	T	91 F	M	W	S	M
T	23	T	20 S	S	W	F	78 M	66 W	S	T	T	S	T
	24	28 F	M	M	66 T	56 S	T	T	S	W	F	M	W
H	25	S	T	29 T	F	S	W	F	M	T	S	T	T
	26	S	W	W	S	M	T	S	T	F	S	31 W	16 F
	27	M	T	T	S	T	F	S	W	41 S	23 M	T	S
	28	T	F	F	M	W	S	M	43 T	S	T	F	S
	29	W		S	T	T	29 S	101 T	F	M	W	S	M
	30	26 T		S	45 W	21 F	M	W	S	T	T	S	T
	31	F		23 M		S		T	S		F		W
NUMBER		2	4	6	5	5	5	5	5	5	5	5	5
MAXIMUM		28	43	35	66	69	78	101	91	63	69	53	53
GEO MEAN		26	22	19	41	38	52	51	51	34	34	29	25
# EXCEED		0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 57

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 150 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 260 MICROGRAMS PER CUBIC METER

RUNNING GEOMETRIC MEAN = 34 MICROGM/M**3
GEOMETRIC STANDARD DEVIATION = 1.73

N.C. ANNUAL STANDARD IS 60 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 75 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: HI-VOL (24-HOUR SAMPLE) ANALYSIS METHOD: GRAVIMETRIC

Table B-1 (Cont.)

AS OF APRIL 14, 1977

P A R T I C U L A T E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: DOUBLE CREEK SITE
STATION CODE NO: 73-3140-A8
COUNTY: PERSON
SITE LOCATION: SR 1166, 0.3 MILES SOUTH OF HIGHWAY 158.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 7.4 MILES SOUTH OF PLANT (SAMPLERS ADJACENT TO ROAD).

	JAN 1975	FEB 1975	MAR 1975	APR 1975	MAY 1975	JUN 1975	JUL 1975	AUG 1975	SEP 1975	OCT 1975	NOV 1975	DEC 1975
1	W	S	16 S	T	T	S	T	F	M	W	S	M
2	T	S	S	W	F	M	W	S	T	T	36 S	24 T
3	F	M	M	T	S	T	T	S	58 W	24 F	M	W
D 4	S	T	T	F	S	W	F	23 M	T	S	T	T
5	S	15 W	W	S	M	45 T	34 S	T	F	S	W	F
A 6	M	T	T	22 S	83 T	F	S	W	S	M	T	S
7	T	F	33 F	M	W	S	M	T	S	T	F	S
Y 8	W	S	S	T	T	S	T	F	M	W	11 S	16 M
9	T	S	S	W	F	M	W	S	53 T	43 T	S	T
10	F	M	M	T	S	T	T	S	W	F	M	W
O 11	S	42 T	T	F	S	36 W	35 F	M	T	S	T	T
12	S	W	W	S	47 M	T	S	T	F	S	W	F
F 13	M	T	11 T	S	T	F	S	W	S	M	T	S
14	T	F	F	M	W	S	M	T	S	T	9 F	35 S
15	W	S	S	T	T	S	T	F	18 M	49 W	S	M
16	T	S	S	W	F	M	W	40 S	T	T	S	T
M 17	F	18 M	M	T	S	47 T	15 T	S	W	F	M	W
18	S	T	T	F	27 S	W	F	M	T	S	T	T
O 19	S	W	11 W	S	M	T	S	T	F	S	W	F
20	M	T	T	S	T	F	S	W	S	M	40 T	25 S
N 21	T	F	F	M	W	S	M	T	21 S	37 T	F	S
22	W	S	S	T	T	S	T	67 F	M	W	S	M
T 23	T	22 S	S	W	F	41 M	40 W	S	T	T	S	T
24	28 F	M	M	T	64 S	T	T	S	W	F	M	W
M 25	S	T	29 T	F	S	W	F	M	T	S	T	T
26	S	W	W	S	M	T	S	T	F	S	35 W	9 F
27	M	T	T	S	T	F	S	W	43 S	36 M	T	S
28	T	F	F	M	W	S	M	42 T	S	T	F	S
29	W		S	T	T	29 S	61 T	F	M	W	S	M
30	29 T		S	46 W	25 F	M	W	S	T	T	S	T
31	F		18 M		S		T	S		F		W
NUMBER	2	4	6	2	5	5	5	4	5	5	5	5
MAXIMUM	29	42	33	46	83	47	61	67	58	49	40	35
GEO MEAN	28	22	17	31	44	39	33	40	34	36	21	19
# EXCEED	0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 53

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 150 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 260 MICROGRAMS PER CUBIC METER

RUNNING GEOMETRIC MEAN = 29 MICROGR/M**3
GEOMETRIC STANDARD DEVIATION = 1.69

N.C. ANNUAL STANDARD IS 60 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 75 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: HI-VOL (24-HOUR SAMPLE) ANALYSIS METHOD: GRAVIMETRIC

Table B-1 (Cont.)

AS OF APRIL 14, 1977

P A R T I C U L A T E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: E. RIDGEVILLE SITE
STATION CODE NO: 73-3140-AC
COUNTY: PERSON
SITE LOCATION: SR 1102, 0.15 MILES NORTH OF SR 1172.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 12.5 MILES SSW OF STEAM PLANT. (SAMPLERS ADJACENT TO ROAD).

		JAN 1975	FEB 1975	MAR 1975	APR 1975	MAY 1975	JUN 1975	JUL 1975	AUG 1975	SEP 1975	OCT 1975	NOV 1975	DEC 1975
	1	W	S	20 S	T	T	S	T	F	M	W	S	M
	2	T	S	S	W	F	M	W	S	T	T	34 S	24 T
	3	F	M	M	T	S	T	T	S	65 W	21 F	M	W
D	4	S	T	T	F	S	W	F	27 M	T	S	T	T
	5	S	17 W	W	S	M	54 T	32 S	T	F	S	W	F
A	6	M	T	T	23 S	73 T	F	S	W	S	M	T	S
	7	T	F	36 F	M	W	S	M	T	S	T	F	S
Y	8	W	S	S	T	T	S	T	F	M	W	12 S	23 M
	9	T	S	S	W	F	M	W	S	53 T	33 T	S	T
	10	F	M	M	T	S	T	T	51 S	W	F	M	W
O	11	S	46 T	T	F	S	34 W	36 F	M	T	S	T	T
	12	S	W	W	33 S	46 M	T	S	T	F	S	W	F
F	13	M	T	12 T	S	T	F	S	W	S	M	T	S
	14	T	F	F	M	W	S	M	T	S	T	10 F	36 S
	15	W	S	S	T	T	S	T	F	19 M	55 W	S	M
	16	T	S	S	W	F	M	W	S	T	T	S	T
M	17	F	18 M	M	T	S	45 T	16 T	S	W	F	M	W
	18	S	T	T	53 F	33 S	W	F	M	T	S	T	T
O	19	S	W	12 W	S	M	T	S	T	F	S	W	F
	20	M	T	T	S	T	F	S	W	S	M	41 T	24 S
N	21	T	F	F	M	W	S	M	T	25 S	32 T	F	S
	22	W	S	S	T	T	S	T	79 F	M	W	S	M
T	23	T	23 S	S	W	F	41 M	40 W	S	T	T	S	T
	24	99 F	M	M	71 T	106 S	T	T	S	W	F	M	W
H	25	S	T	32 T	F	S	W	F	M	T	S	T	T
	26	S	W	W	S	M	T	S	T	F	S	34 W	11 F
	27	M	T	T	S	T	F	S	W	42 S	39 M	T	S
	28	T	F	F	M	W	S	M	50 T	S	T	F	S
	29	W		S	T	T	30 S	62 T	F	M	W	S	M
	30	33 T		S	36 W	39 F	M	W	S	T	T	S	T
	31	F		21 M		S		T	S		F		W
NUMBER		2	4	6	5	5	5	5	4	5	5	5	5
MAXIMUM		99	46	36	71	106	54	62	79	65	55	41	36
GEO MEAN		57	23	20	40	53	39	34	48	36	34	22	22
# EXCEED		0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 56

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 150 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 260 MICROGRAMS PER CUBIC METER

RUNNING GEOMETRIC MEAN = 32 MICROGR/M**3
GEOMETRIC STANDARD DEVIATION = 1.71

N.C. ANNUAL STANDARD IS 60 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 75 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: HI-VOL (24-HOUR SAMPLE)

ANALYSIS METHOD: GRAVIMETRIC

B-3

Table B-1 (Cont.)

AS OF APRIL 14, 1977

P A R T I C U L A T E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: AFTERBAY SITE
STATION CODE NO: 73-3140-AA
COUNTY: PERSON
SITE LOCATION: LAKE HYCO AFTERBAY OFF SR 1322.
STATION TYPE: OVERLOOKS LAKE - FAIRLY DESOLATE
COMMENTS: APPROXIMATELY 6.0 MILES NW OF STEAM PLANT.

		JAN 1976	FEB 1976	MAR 1976	APR 1976	MAY 1976	JUN 1976	JUL 1976	AUG 1976	SEP 1976	OCT 1976	NOV 1976	DEC 1976
	1	8 T	S	56 M	T	S	T	T	S	W	F	M	W
	2	F	M	T	F	S	W	F	M	T	S	52 T	25 T
	3	S	T	W	S	M	T	S	T	43 F	14 S	W	F
D	4	S	W	T	S	T	F	S	35 W	S	M	T	S
	5	M	T	F	M	W	29 S	64 M	T	S	T	F	S
A	6	T	36 F	S	43 T	46 T	S	T	F	M	W	S	M
	7	W	S	24 S	W	F	M	W	S	T	T	S	T
Y	8	T	S	M	T	S	T	T	S	W	F	23 M	14 W
	9	F	M	T	F	S	W	F	M	62 T	18 S	T	T
	10	S	T	W	S	M	T	S	T	F	S	W	F
O	11	S	W	T	S	T	99 F	111 S	W	S	M	T	S
	12	M	32 T	F	44 M	53 W	S	M	T	S	T	F	S
F	13	22 T	F	28 S	T	T	S	T	F	M	W	S	M
	14	W	S	S	W	F	M	W	S	T	T	38 S	19 T
	15	T	S	M	T	S	T	T	S	16 W	32 F	M	W
	16	F	M	T	F	S	W	F	32 M	T	S	T	T
M	17	S	T	W	S	M	17 T	S	T	F	S	W	F
	18	S	45 W	T	96 S	42 T	F	S	W	S	M	T	S
O	19	51 M	T	37 F	M	W	S	M	T	S	T	F	S
	20	T	F	S	T	T	S	T	F	M	W	51 S	18 M
N	21	W	S	S	W	F	M	W	S	39 T	18 T	S	T
	22	T	S	M	T	S	T	T	16 S	W	F	M	W
T	23	F	M	T	F	S	23 W	68 F	M	T	S	T	T
	24	S	37 T	W	99 S	50 M	T	S	T	F	S	W	F
H	25	50 S	W	49 T	S	T	F	S	W	S	M	T	S
	26	M	T	F	M	W	S	M	T	S	T	35 F	17 S
	27	T	F	S	T	T	S	T	F	20 M	16 W	S	M
	28	W	S	S	W	F	M	W	71 S	T	T	S	T
	29	T	S	M	T	S	103 T	44 T	S	W	F	M	W
	30	F		T	47 F	28 S	W	F	M	T	S	T	T
	31	19 S		23 W		M		S	T		S		F
NUMBER		5	4	6	5	5	5	4	4	5	5	5	5
MAXIMUM		51	45	56	99	53	103	111	71	62	32	52	25
GEO MEAN		24	37	34	60	42	40	67	33	31	18	38	18
# EXCEED		0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 58

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 150 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 260 MICROGRAMS PER CUBIC METER

RUNNING GEOMETRIC MEAN = 34 MICROGR/M**3
GEOMETRIC STANDARD DEVIATION = 1.78

N.C. ANNUAL STANDARD IS 60 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 75 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: HI-VOL (24-HOUR SAMPLE) ANALYSIS METHOD: GRAVIMETRIC

Table B-1 (Cont.)

P A R T I C U L A T E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

AS OF APRIL 14, 1977 — NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: DOUBLE CREEK SITE
STATION CODE NO: 73-3140-AB
COUNTY: PERSON
SITE LOCATION: SR 1166, 0.3 MILES SOUTH OF HIGHWAY 158.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 7.4 MILES SOUTH OF PLANT (SAMPLERS ADJACENT TO ROAD).

		JAN 1976	FEB 1976	MAR 1976	APR 1976	MAY 1976	JUN 1976	JUL 1976	AUG 1976	SEP 1976	OCT 1976	NOV 1976	DEC 1976
	1	9 T	S	46 M	T	S	T	T	S	W	F	M	W
	2	F	M	T	F	S	W	F	M	T	S	25 T	26 T
	3	S	T	W	S	M	T	S	T	45 F	28 S	W	F
D	4	S	W	T	S	T	F	S	48 W	S	M	T	S
	5	M	T	F	M	W	25 S	56 M	T	S	T	F	S
A	6	T	20 F	S	44 T	38 T	S	T	F	M	W	S	M
	7	12 W	S	25 S	W	F	M	W	S	T	T	S	T
Y	8	T	S	M	T	S	T	T	S	W	F	28 M	16 W
	9	F	M	T	F	S	W	F	M	43 T	15 S	T	T
	10	S	T	W	S	M	T	S	48 T	F	S	W	F
O	11	S	W	T	S	T	81 F	66 S	W	S	M	T	S
	12	M	30 T	F	63 M	68 W	S	M	T	S	T	F	S
F	13	22 T	F	20 S	T	T	S	T	F	M	W	S	M
	14	W	S	S	W	F	M	W	S	T	T	32 S	T
	15	T	S	M	T	S	T	T	S	19 W	38 F	M	W
	16	F	M	T	F	S	W	F	36 M	T	S	T	T
M	17	S	T	W	S	M	15 T	34 S	T	F	S	W	F
	18	S	30 W	T	88 S	42 T	F	S	W	S	M	T	S
O	19	31 M	T	35 F	M	W	S	M	T	S	T	F	S
	20	T	F	S	T	T	S	T	F	M	W	59 S	M
N	21	W	S	S	W	F	M	W	S	38 T	19 T	S	T
	22	T	S	M	T	S	T	T	S	W	F	M	W
T	23	F	M	T	F	S	17 W	66 F	M	T	S	T	T
	24	S	24 T	W	63 S	52 M	T	S	T	F	S	W	F
H	25	39 S	W	28 T	S	T	F	S	W	S	M	T	S
	26	M	T	F	M	W	S	M	T	S	T	33 F	14 S
	27	T	F	S	T	T	S	T	F	19 M	20 W	S	M
	28	W	S	S	W	F	M	W	31 S	T	T	S	T
	29	T	S	M	T	S	36 T	44 T	S	W	F	M	W
	30	F		T	34 F	33 S	W	F	M	T	S	T	T
	31	18 S		20 W		M		S	T		S		F
NUMBER		6	4	6	5	5	5	5	4	5	5	5	3
MAXIMUM		39	30	46	88	68	81	66	48	45	38	59	26
GEO MEAN		19	25	27	55	45	28	51	40	30	22	33	17
# EXCEED		0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 58

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 150 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 260 MICROGRAMS PER CUBIC METER

RUNNING GEOMETRIC MEAN = 31 MICROGM/M**3
GEOMETRIC STANDARD DEVIATION = 1.65

N.C. ANNUAL STANDARD IS 60 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 75 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: HI-VOL (24-HOUR SAMPLE) ANALYSIS METHOD: GRAVIMETRIC

B-5

Table B-1 (Cont.)

AS OF APRIL 14, 1977

P A R T I C U L A T E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: E. RIDGEVILLE SITE
STATION CODE NO: 73-3140-AC
COUNTY: PERSON
SITE LOCATION: SR 1102, 0.15 MILES NORTH OF SR 1172.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 12.5 MILES SSW OF STEAM PLANT. (SAMPLERS ADJACENT TO ROAD).

		JAN 1976	FEB 1976	MAR 1976	APR 1976	MAY 1976	JUN 1976	JUL 1976	AUG 1976	SEP 1976	OCT 1976	NOV 1976	DEC 1976
	1	9 T	S	47 M	T	S	T	T	S	W	F	M	W
	2	F	M	T	F	S	W	F	M	T	S	25 T	37 T
	3	S	T	W	S	M	T	S	T	49 F	22 S	W	F
D	4	S	W	T	S	T	F	S	53 W	S	M	T	S
	5	M	T	F	M	W	30 S	51 M	T	S	T	F	S
A	6	T	28 F	S	39 T	41 T	S	T	F	M	W	S	M
	7	W	S	24 S	W	F	M	W	S	T	T	S	T
Y	8	T	S	M	T	S	T	T	S	W	F	30 M	18 W
	9	F	M	T	F	S	W	F	M	51 T	16 S	T	T
	10	S	T	W	S	M	T	S	41 T	F	S	W	F
O	11	S	W	T	S	T	135 F	69 S	W	S	M	T	S
	12	M	27 T	F	54 M	53 W	S	M	T	S	T	F	S
F	13	27 T	F	19 S	T	T	S	T	F	M	W	S	M
	14	W	S	S	W	F	M	W	S	T	T	37 S	27 T
	15	T	S	M	T	S	T	T	S	20 W	45 F	M	W
	16	F	M	T	F	S	W	F	34 M	T	S	T	T
M	17	S	T	W	S	M	17 T	34 S	T	F	S	W	F
	18	S	33 W	T	79 S	32 T	F	S	W	S	M	T	S
O	19	30 M	T	38 F	M	W	S	M	T	S	T	F	S
	20	T	F	S	T	T	S	T	F	M	W	62 S	M
N	21	W	S	S	W	F	M	W	S	51 T	21 T	S	T
	22	T	S	M	T	S	T	T	22 S	W	F	M	W
T	23	F	M	T	F	S	23 W	63 F	M	T	S	T	T
	24	S	T	W	67 S	58 M	T	S	T	F	S	W	F
H	25	40 S	W	28 T	S	T	F	S	W	S	M	T	S
	26	M	T	F	M	W	S	M	T	S	T	39 F	18 S
	27	T	F	S	T	T	S	T	F	24 M	18 W	S	M
	28	W	S	S	W	F	M	W	43 S	T	T	S	T
	29	T	S	M	T	S	43 T	53 T	S	W	F	M	W
	30	F		T	39 F	30 S	W	F	M	T	S	T	T
	31	21 S		21 W		M		S	T		S		F
NUMBER		5	3	6	5	5	5	5	5	5	5	5	4
MAXIMUM		40	33	47	79	58	135	69	53	51	45	62	37
GEO MEAN		22	29	27	53	41	36	52	37	36	22	36	23
# EXCEED		0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 58

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 150 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 260 MICROGRAMS PER CUBIC METER

RUNNING GEOMETRIC MEAN = 33 MICROGR/M**3
GEOMETRIC STANDARD DEVIATION = 1.61

N.C. ANNUAL STANDARD IS 60 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 75 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: HI-VOL (24-HOUR SAMPLE) ANALYSIS METHOD: GRAVIMETRIC

Table B-1 (Cont.)

P A R T I C U L A T E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

AS OF APRIL 14, 1977

NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: AFTERBAY SITE
STATION CODE NO: 73-3140-AA
COUNTY: PERSON
SITE LOCATION: LAKE HYCO AFTERBAY OFF SR 1322.
STATION TYPE: OVERLOOKS LAKE - FAIRLY DESOLATE
COMMENTS: APPROXIMATELY 6.0 MILES NW OF STEAM PLANT.

		JAN 1977	FEB 1977	MAR 1977	APR 1977	MAY 1977	JUN 1977	JUL 1977	AUG 1977	SEP 1977	OCT 1977	NOV 1977	DEC 1977
	1	23 S	T	T	F	S	W	F	M	T	S	T	T
	2	S	W	W	S	M	T	S	T	F	S	W	F
	3	M	T	T	S	T	F	S	W	S	M	T	S
D	4	T	F	F	M	W	S	M	T	S	T	F	S
	5	W	S	S	T	T	S	T	F	M	W	S	M
A	6	T	18 S	S	W	F	M	W	S	T	T	S	T
	7	15 F	M	M	T	S	T	T	S	W	F	M	W
Y	8	S	T	T	F	S	W	F	M	T	S	T	T
	9	S	W	W	S	M	T	S	T	F	S	W	F
	10	M	T	T	S	T	F	S	W	S	M	T	S
O	11	T	F	F	M	W	S	M	T	S	T	F	S
	12	W	55 S	S	T	T	S	T	F	M	W	S	M
F	13	21 T	S	S	W	F	M	W	S	T	T	S	T
	14	F	M	M	T	S	T	T	S	W	F	M	W
	15	S	T	T	F	S	W	F	M	T	S	T	T
	16	S	W	W	S	M	T	S	T	F	S	W	F
M	17	M	T	T	S	T	F	S	W	S	M	T	S
	18	T	37 F	F	M	W	S	M	T	S	T	F	S
O	19	W	S	S	T	T	S	T	F	M	W	S	M
	20	T	S	S	W	F	M	W	S	T	T	S	T
N	21	F	M	M	T	S	T	T	S	W	F	M	W
	22	S	T	T	F	S	W	F	M	T	S	T	T
T	23	S	W	W	S	M	T	S	T	F	S	W	F
	24	M	31 T	T	S	T	F	S	W	S	M	T	S
M	25	T	F	F	M	W	S	M	T	S	T	F	S
	26	W	S	S	T	T	S	T	F	M	W	S	M
	27	T	S	S	W	F	M	W	S	T	T	S	T
	28	F	M	M	T	S	T	T	S	W	F	M	W
	29	S		T	F	S	W	F	M	T	S	T	T
	30	S		W	S	M	T	S	T	F	S	W	F
	31	20 M		T		T		S	W		M		S

NUMBER	4	4	
MAXIMUM	23	55	
GEO MEAN	19	32	
# EXCEED	0	0	

TOTAL SAMPLES = 8

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 150 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 260 MICROGRAMS PER CUBIC METER

RUNNING GEOMETRIC MEAN = 26 MICROGR/M**3
GEOMETRIC STANDARD DEVIATION = 1.63

N.C. ANNUAL STANDARD IS 60 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 75 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: HI-VOL (24-HOUR SAMPLE) ANALYSIS METHOD: GRAVIMETRIC

Table B-1 (Cont.)

AS OF APRIL 14, 1977

PARTICULATE
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: DOUBLE CREEK SITE
STATION CODE NO: 73-3140-AB
COUNTY: PERSON
SITE LOCATION: SR 1166, 0.3 MILES SOUTH OF HIGHWAY 158.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 7.4 MILES SOUTH OF PLANT (SAMPLERS ADJACENT TO ROAD).

		JAN 1977	FEB 1977	MAR 1977	APR 1977	MAY 1977	JUN 1977	JUL 1977	AUG 1977	SEP 1977	OCT 1977	NOV 1977	DEC 1977
	1	19 S	T	T	F	S	W	F	M	T	S	T	T
	2	S	W	W	S	M	T	S	T	F	S	W	F
	3	M	T	T	S	T	F	S	W	S	M	T	S
D	4	T	F	F	M	W	S	M	T	S	T	F	S
	5	W	S	S	T	T	S	T	F	M	W	S	M
A	6	T	18 S	S	W	F	M	W	S	T	T	S	T
	7	17 F	M	M	T	S	T	T	S	W	F	M	W
Y	8	S	T	T	F	S	W	F	M	T	S	T	T
	9	S	W	W	S	M	T	S	T	F	S	W	F
	10	M	T	T	S	T	F	S	W	S	M	T	S
O	11	T	F	F	M	W	S	M	T	S	T	F	S
	12	W	60 S	S	T	T	S	T	F	M	W	S	M
F	13	29 T	S	S	W	F	M	W	S	T	T	S	T
	14	F	M	M	T	S	T	T	S	W	F	M	W
	15	S	T	T	F	S	W	F	M	T	S	T	T
	16	S	W	W	S	M	T	S	T	F	S	W	F
M	17	M	T	T	S	T	F	S	W	S	M	T	S
	18	T	49 F	F	M	W	S	M	T	S	T	F	S
O	19	W	S	S	T	T	S	T	F	M	W	S	M
	20	T	S	S	W	F	M	W	S	T	T	S	T
N	21	F	M	M	T	S	T	T	S	W	F	M	W
	22	S	T	T	F	S	W	F	M	T	S	T	T
T	23	S	W	W	S	M	T	S	T	F	S	W	F
	24	M	55 T	T	S	T	F	S	W	S	M	T	S
H	25	T	F	F	M	W	S	M	T	S	T	F	S
	26	W	S	S	T	T	S	T	F	M	W	S	M
	27	T	S	S	W	F	M	W	S	T	T	S	T
	28	F	M	M	T	S	T	T	S	W	F	M	W
	29	S		T	F	S	W	F	M	T	S	T	T
	30	S		W	S	M	T	S	T	F	S	W	F
	31	15 M		T		T		S	W		M		S

NUMBER		4	4										
MAXIMUM		29	60										
GEO MEAN		19	41										
# EXCEED		0	0										

TOTAL SAMPLES = 8

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 150 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 260 MICROGRAMS PER CUBIC METER

RUNNING GEOMETRIC MEAN = 28 MICROGR/M**3
GEOMETRIC STANDARD DEVIATION = 1.78

N.C. ANNUAL STANDARD IS 60 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 75 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: HI-VOL (24-HOUR SAMPLE) ANALYSIS METHOD: GRAVIMETRIC

Table B-1 (Cont.)

AS OF APRIL 14, 1977

P A R T I C U L A T E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: E. RIDGEVILLE SITE
STATION CODE NO: 73-3140-AC
COUNTY: PERSON
SITE LOCATION: SR 1102, 0.15 MILES NORTH OF SR 1172.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 12.5 MILES SSW OF STEAM PLANT. (SAMPLERS ADJACENT TO ROAD).

		JAN 1977	FEB 1977	MAR 1977	APR 1977	MAY 1977	JUN 1977	JUL 1977	AUG 1977	SEP 1977	OCT 1977	NOV 1977	DEC 1977
	1	22 S	T	T	F	S	W	F	M	T	S	T	T
	2	S	W	W	S	M	T	S	T	F	S	W	F
	3	M	T	T	S	T	F	S	W	S	M	T	S
D	4	T	F	F	M	W	S	M	T	S	T	F	S
	5	W	S	S	T	T	S	T	F	M	W	S	M
A	6	T	24 S	S	W	F	M	W	S	T	T	S	T
	7	23 F	M	M	T	S	T	T	S	W	F	M	W
Y	8	S	T	T	F	S	W	F	M	T	S	T	T
	9	S	W	W	S	M	T	S	T	F	S	W	F
	10	M	T	T	S	T	F	S	W	S	M	T	S
O	11	T	F	F	M	W	S	M	T	S	T	F	S
	12	W	80 S	S	T	T	S	T	F	M	W	S	M
F	13	T	S	S	W	F	M	W	S	T	T	S	T
	14	F	M	M	T	S	T	T	S	W	F	M	W
	15	S	T	T	F	S	W	F	M	T	S	T	T
	16	S	W	W	S	M	T	S	T	F	S	W	F
M	17	M	T	T	S	T	F	S	W	S	M	T	S
	18	T	60 F	F	M	W	S	M	T	S	T	F	S
O	19	W	S	S	*T	T	S	T	F	M	W	S	M
	20	T	S	S	W	F	M	W	S	T	T	S	T
N	21	F	M	M	T	S	T	T	S	W	F	M	W
	22	S	T	T	F	S	W	F	M	T	S	T	T
T	23	S	W	W	S	M	T	S	T	F	S	W	F
	24	M	88 T	T	S	T	F	S	W	S	M	T	S
H	25	T	F	F	M	W	S	M	T	S	T	F	S
	26	W	S	S	T	T	S	T	F	M	W	S	M
	27	T	S	S	W	F	M	W	S	T	T	S	T
	28	F	M	M	T	S	T	T	S	W	F	M	W
	29	S		T	F	S	W	F	M	T	S	T	T
	30	S		W	S	M	T	S	T	F	S	W	F
	31	22 M		T		T		S	W		M		S
NUMBER		3	4										
MAXIMUM		23	88										
GEO MEAN		22	56										
# EXCEED		0	0										

TOTAL SAMPLES = 7

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 150 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 260 MICROGRAMS PER CUBIC METER

RUNNING GEOMETRIC MEAN = 37 MICROGM/M**3
GEOMETRIC STANDARD DEVIATION = 1.91

N.C. ANNUAL STANDARD IS 60 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 75 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: HI-VOL (24-HOUR SAMPLE) ANALYSIS METHOD: GRAVIMETRIC

Table B-1 (Cont.)

AS OF APRIL 15, 1977

P A R T I C U L A T E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

NORTH CAROLINA

PLANT NAME: MAYO SEG SITE
STATION NAME: HAGERS MOUNT
STATION CODE NO: 00-MAYO-0X
COUNTY: PERSON
SITE LOCATION: S.R. 1326, 0.5 MILES SOUTH OF SR 1332
STATION TYPE: PASTURE LAND, SOME RESIDENTAL
COMMENTS: ABOUT 6.5 MILES SW OF MAYO PLANT SITE, LOCATED ABOUT 500 FEET FROM ROADSIDE.

		JAN 1977	FEB 1977	MAR 1977	APR 1977	MAY 1977	JUN 1977	JUL 1977	AUG 1977	SEP 1977	OCT 1977	NOV 1977	DEC 1977
	1	S	T	22 T	47 F	S	W	F	M	T	S	T	T
	2	S	W	W	S	M	T	S	T	F	S	W	F
	3	M	36 T	38 T	S	T	F	S	W	S	M	T	S
D	4	T	F	21 F	M	W	S	M	T	S	T	F	S
	5	W	S	54 S	T	T	S	T	F	M	W	S	M
A	6	T	S	S	W	F	M	W	S	T	T	S	T
	7	F	M	M	T	S	T	T	S	W	F	M	W
Y	8	S	4 T	32 T	F	S	W	F	M	T	S	T	T
	9	S	W	36 W	S	M	T	S	T	F	S	W	F
	10	M	T	T	S	T	F	S	W	S	M	T	S
O	11	T	F	F	M	W	S	M	T	S	T	F	S
	12	W	66 S	17 S	T	T	S	T	F	M	W	S	M
F	13	T	S	30 S	W	F	M	W	S	T	T	S	T
	14	F	M	M	T	S	T	T	S	W	F	M	W
	15	S	20 T	79 T	F	S	W	F	M	T	S	T	T
	16	S	W	W	S	M	T	S	T	F	S	W	F
M	17	M	34 T	47 T	S	T	F	S	W	S	M	T	S
	18	T	F	88 F	M	W	S	M	T	S	T	F	S
O	19	W	S	46 S	T	T	S	T	F	M	W	S	M
	20	T	S	S	W	F	M	W	S	T	T	S	T
N	21	F	M	M	T	S	T	T	S	W	F	M	W
	22	S	3 T	22 T	F	S	W	F	M	T	S	T	T
T	23	4 S	W	23 W	S	M	T	S	T	F	S	W	F
	24	M	T	T	S	T	F	S	W	S	M	T	S
H	25	30 T	F	F	M	W	S	M	T	S	T	F	S
	26	W	170*S	49 S	T	T	S	T	F	M	W	S	M
	27	T	S	47 S	W	F	M	W	S	T	T	S	T
	28	F	M	M	T	S	T	T	S	W	F	M	W
	29	6 S		T	F	S	W	F	M	T	S	T	T
	30	S		32 W	S	M	T	S	T	F	S	W	F
	31	M		T		T		S	W		M		S

NUMBER	3	7	17	1	
MAXIMUM	30	170	88	47	
GEO MEAN	8	22	36	46	
# EXCEED	0	1	0	0	

TOTAL SAMPLES = 28

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 150 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 260 MICROGRAMS PER CUBIC METER

RUNNING GEOMETRIC MEAN = 28 MICROGR/M**3
GEOMETRIC STANDARD DEVIATION = 2.66

N.C. ANNUAL STANDARD IS 60 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 75 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: HI-VOL (24-HOUR SAMPLE) ANALYSIS METHOD: GRAVIMETRIC

Table B-2 Maximum and Annual Particulate Values Measured at Each Site[1]

	Site	No. of Observations	Highest 24-hr. Value ($\mu g/m^3$)	12-Month Average Geometric Mean ($\mu g/m^3$)
1975	Afterbay	57	101	34
	Double Creek	53	83	29
	E. Ridgeville	56	106	32
1976	Afterbay	58	111	34
	Double Creek	58	88	31
	E. Ridgeville	58	135	33
1977	Afterbay	8	55	-
	Double Creek	8	60	-
	E. Ridgeville	7	88	-
	Hagers Mount	28	170	-

[1] Ambient air quality standards are listed in Table B-6 .

Table B-3

S U L F U R D I O X I D E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

AS OF APRIL 14, 1977 — NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: AFTERBAY SITE
STATION CODE NO: 73-3140-AA
COUNTY: PERSON
SITE LOCATION: LAKE HYCO AFTERBAY OFF SR 1322.
STATION TYPE: OVERLOOKS LAKE - FAIRLY DESOLATE
COMMENTS: APPROXIMATELY 6.0 MILES NW OF STEAM PLANT.

		JAN 1975	FEB 1975	MAR 1975	APR 1975	MAY 1975	JUN 1975	JUL 1975	AUG 1975	SEP 1975	OCT 1975	NOV 1975	DEC 1975
	1	W	S	0 S	T	T	S	T	F	M	W	S	M
	2	T	S	S	W	F	M	W	S	T	T	0 S	0 T
	3	F	M	M	T	S	T	T	S	0 W	0 F	M	W
D	4	S	T	T	F	S	W	F	0 M	T	S	T	T
	5	S	3 W	W	S	M	0 T	0 S	T	F	S	W	F
A	6	M	T	T	0 S	0 T	F	S	W	S	M	T	S
	7	T	F	2 F	M	W	S	M	T	S	T	F	S
Y	8	W	S	S	T	T	S	T	F	M	W	8 S	1 M
	9	T	S	S	W	F	M	W	S	0 T	2 T	S	T
	10	F	M	M	T	S	T	T	2 S	W	F	M	W
O	11	S	33 T	T	F	S	0 W	1 F	M	T	S	T	T
	12	S	W	W	3 S	0 M	T	S	T	F	S	W	F
F	13	M	T	0 T	S	T	F	S	W	S	M	T	S
	14	T	F	F	M	W	S	M	T	S	T	8 F	0 S
	15	W	S	S	T	T	S	T	F	7 M	1 W	S	M
	16	T	S	S	W	F	M	W	3 S	T	T	S	T
M	17	F	0 M	M	T	S	0 T	1 T	S	W	F	M	W
	18	S	T	T	0 F	0 S	W	F	M	T	S	T	T
O	19	S	W	10 W	S	M	T	S	T	F	S	W	F
	20	M	T	T	S	T	F	S	W	S	M	0 T	0 S
N	21	T	F	F	M	W	S	M	T	9 S	0 T	F	S
	22	W	S	S	T	T	S	T	9 F	M	W	S	M
T	23	T	0 S	S	W	F	0 M	9 W	S	T	T	S	T
	24	13 F	M	M	1 T	0 S	T	T	S	W	F	M	W
H	25	S	T	21 T	F	S	W	F	M	T	S	T	T
	26	S	W	W	S	M	T	S	T	F	S	1 W	0 F
	27	M	T	T	S	T	F	S	W	0 S	3 M	T	S
	28	T	F	F	M	W	S	M	0 T	S	T	F	S
	29	W		S	T	T	0 S	1 T	F	M	W	S	M
	30	7 T		S	3 W	0 F	M	W	S	T	T	S	T
	31	F		9 M		S		T	S		F		W
NUMBER		2	4	6	5	5	5	5	5	5	5	5	5
MAXIMUM		13	33	21	3	0	0	9	9	9	3	8	1
ARITH MEAN		10	9	7	1	0	0	2	3	3	1	3	0
# EXCEEDED		0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 57

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 386 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 365 MICROGRAMS PER CUBIC METER

RUNNING ARITHEMIC MEAN = 3 MICROGR/M**3
ARITHETIC STANDARD DEVIATION = 5

N.C. ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: GAS BUBBLER (24-HOUR SAMPLE) ANALYSIS METHOD: WEST-GAEKE SULFAMIC ACID

Table B-3 (Cont.)

S U L F U R D I O X I D E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

AS OF APRIL 14, 1977 — NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: DOUBLE CREEK SITE
STATION CODE NO: 73-3140-AB
COUNTY: PERSON
SITE LOCATION: SR 1166, 0.3 MILES SOUTH OF HIGHWAY 158.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 7.4 MILES SOUTH OF PLANT (SAMPLERS ADJACENT TO ROAD).

		JAN 1975	FEB 1975	MAR 1975	APR 1975	MAY 1975	JUN 1975	JUL 1975	AUG 1975	SEP 1975	OCT 1975	NOV 1975	DEC 1975
	1	W	S	0 S	T	T	S	T	F	M	W	S	M
	2	T	S	S	W	F	M	W	S	T	T	0 S	0 T
	3	F	M	M	T	S	T	T	S	0 W	14 F	M	W
D	4	S	T	T	F	S	W	F	0 M	T	S	T	T
	5	S	4 W	W	S	M	0 T	0 S	T	F	S	W	F
A	6	M	T	T	0 S	0 T	F	S	W	S	M	T	S
	7	T	F	20 F	M	W	S	M	T	S	T	F	S
Y	8	W	S	S	T	T	S	T	F	M	W	0 S	12 M
	9	T	S	S	W	F	M	W	S	6 T	T	S	T
	10	F	M	M	T	S	T	T	1 S	W	F	M	W
D	11	S	10 T	T	F	S	0 W	12 F	M	T	S	T	T
	12	S	W	W	S	0 M	T	S	T	F	S	W	F
F	13	M	T	0 T	S	T	F	S	W	S	M	T	S
	14	T	F	F	M	W	S	M	T	S	T	10 F	0 S
	15	W	S	S	T	T	S	T	F	0 M	0 W	S	M
	16	T	S	S	W	F	M	W	0 S	T	T	S	T
M	17	F	0 M	M	T	S	0 T	0 T	S	W	F	M	W
	18	S	T	T	F	0 S	W	F	M	T	S	T	T
O	19	S	W	8 W	S	M	T	S	T	F	S	W	F
	20	M	T	T	S	T	F	S	W	S	M	T	14 S
N	21	T	F	F	M	W	S	M	T	5 S	0 T	F	S
	22	W	S	S	T	T	S	T	6 F	M	W	S	M
T	23	T	0 S	S	W	F	0 M	0 W	S	T	T	S	T
	24	27 F	M	M	T	0 S	T	T	S	W	F	M	W
H	25	S	T	9 T	F	S	W	F	M	T	S	T	T
	26	S	W	W	S	M	T	S	T	F	S	2 W	0 F
	27	M	T	T	S	T	F	S	W	0 S	6 M	T	S
	28	T	F	F	M	W	S	M	0 T	S	T	F	S
	29	W		S	T	T	0 S	0 T	F	M	W	S	M
	30	26 T		S	2 W	0 F	M	W	S	T	T	S	T
	31	F		1 M		S		T	S		F		W
NUMBER		2	4	6	2	5	5	5	5	5	4	4	5
MAXIMUM		27	10	20	2	0	0	12	6	6	14	10	14
ARITH MEAN		27	4	6	1	0	0	2	1	2	5	3	5
# EXCEEDED		0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 52

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 365 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 365 MICROGRAMS PER CUBIC METER

RUNNING ARITHEMIC MEAN = 4 MICROGR/M**3
ARITHETIC STANDARD DEVIATION = 6

N.C. ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: GAS BUBBLER (24-HOUR SAMPLE) ANALYSIS METHOD: WEST-GAEKE SULFAMIC ACID

Table B-1 (Cont.)

AS OF APRIL 14, 1977

S U L F U R D I O X I D E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: E. RIDGEVILLE SITE
STATION CODE NO: 73-3140-AC
COUNTY: PERSON
SITE LOCATION: SR 1102, 0.15 MILES NORTH OF SR 1172.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 12.5 MILES SSW OF STEAM PLANT. (SAMPLERS ADJACENT TO ROAD).

		JAN 1975	FEB 1975	MAR 1975	APR 1975	MAY 1975	JUN 1975	JUL 1975	AUG 1975	SEP 1975	OCT 1975	NOV 1975	DEC 1975
	1	W	S	0 S	T	T	S	T	F	M	W	S	M
	2	T	S	S	W	F	M	W	S	T	T	2 S	0 T
	3	F	M	M	T	S	T	T	S	0 W	0 F	M	W
D	4	S	T	T	F	S	W	F	2 M	T	S	T	T
	5	S	5 W	W	S	M	0 T	0 S	T	F	S	W	F
A	6	M	T	T	2 S	0 T	F	S	W	S	M	T	S
	7	T	F	12 F	M	W	S	M	T	S	T	F	S
Y	8	W	S	S	T	T	S	T	F	M	W	0 S	32 M
	9	T	S	S	W	F	M	W	S	0 T	0 T	S	T
	10	F	M	M	T	S	T	T	2 S	W	F	M	W
O	11	S	15 T	T	F	S	0 W	9 F	M	T	S	T	T
	12	S	W	W	0 S	0 M	T	S	T	F	S	W	F
F	13	M	T	0 T	S	T	F	S	W	S	M	T	S
	14	T	F	F	M	W	S	M	T	S	T	6 F	0 S
	15	W	S	S	T	T	S	T	F	0 M	0 W	S	M
	16	T	S	S	W	F	M	W	0 S	T	T	S	T
M	17	F	0 M	M	T	S	0 T	2 T	S	W	F	M	W
	18	S	T	T	0 F	0 S	W	F	M	T	S	T	T
O	19	S	W	7 W	S	M	T	S	T	F	S	W	F
	20	M	T	T	S	T	F	S	W	S	M	0 T	21 S
N	21	T	F	F	M	W	S	M	T	2 S	0 T	F	S
	22	W	S	S	T	T	S	T	29 F	M	W	S	M
T	23	T	2 S	S	W	F	0 M	3 W	S	T	T	S	T
	24	5 F	M	M	0 T	0 S	T	T	S	W	F	M	W
H	25	S	T	17 T	F	S	W	F	M	T	S	T	T
	26	S	W	W	S	M	T	S	T	F	S	12 W	0 F
	27	M	T	T	S	T	F	S	W	0 S	35 M	T	S
	28	T	F	F	M	W	S	M	0 T	S	T	F	S
	29	W		S	T	T	0 S	0 T	F	M	W	S	M
	30	21 T		S	0 W	0 F	M	W	S	T	T	S	T
	31	F		0 M		S		T	S		F		W
NUMBER		2	4	6	5	5	5	5	5	5	5	5	5
MAXIMUM		21	15	17	2	0	0	9	29	2	35	12	32
ARITH MEAN		13	6	6	0	0	0	3	7	0	7	4	11
# EXCEEDED		0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 57

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 365 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 365 MICROGRAMS PER CUBIC METER

RUNNING ARITHEMIC MEAN = 4 MICROGR/M**3
ARITHETIC STANDARD DEVIATION = 8

N.C. ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: GAS BUBBLER (24-HOUR SAMPLE) ANALYSIS METHOD: WEST-GAEKE SULFAMIC ACID

Table B-3 (Cont.)

S U L F U R D I O X I D E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

AS OF APRIL 14, 1977 — NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: DOUBLE CREEK SITE
STATION CODE NO: 73-3140-AB
COUNTY: PERSON
SITE LOCATION: SR 1166, 0.3 MILES SOUTH OF HIGHWAY 158.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 7.4 MILES SOUTH OF PLANT (SAMPLERS ADJACENT TO ROAD).

		JAN 1976	FEB 1976	MAR 1976	APR 1976	MAY 1976	JUN 1976	JUL 1976	AUG 1976	SEP 1976	OCT 1976	NOV 1976	DEC 1976
	1	4 T	S	5 M	T	S	T	T	S	W	F	M	W
	2	F	M	T	F	S	W	F	M	T	S	3 T	5 T
	3	S	T	W	S	M	T	S	T	1 F	6 S	W	F
D	4	S	W	T	S	T	F	S	0 W	S	M	T	S
	5	M	T	F	M	W	4 S	9 M	T	S	T	F	S
A	6	T	0 F	S	1 T	0 T	S	T	F	M	W	S	M
	7,	0 W	S	0 S	W	F	M	W	S	T	T	S	T
Y	8	T	S	M	T	S	T	T	S	W	F	12 M	24 W
	9	F	M	T	F	S	W	F	M	2 T	0 S	T	T
	10	S	T	W	S	M	T	S	3 T	F	S	W	F
O	11	S	W	T	S	T	0 F	1 S	W	S	M	T	S
	12	M	4 T	F	6 M	0 W	S	M	T	S	T	F	S
F	13	1 T	F	0 S	T	T	S	T	F	M	W	S	M
	14	W	S	S	W	F	M	W	S	T	T	7 S	T
	15	T	S	M	T	S	T	T	S	5 W	0 F	M	W
	16	F	M	T	F	S	W	F	10 M	T	S	T	T
M	17	S	T	W	S	M	0 T	1 S	T	F	S	W	F
	18	S	0 W	T	0 S	0 T	F	S	W	S	M	T	S
O	19	11 M	T	15 F	M	W	S	M	T	S	T	F	S
	20	T	F	S	T	T	S	T	F	M	W	10 S	M
N	21	W	S	S	W	F	M	W	S	11 T	4 T	S	T
	22	T	S	M	T	S	T	T	5 S	W	F	M	W
T	23	F	M	T	F	S	6 W	12 F	M	T	S	T	T
	24	S	4 T	W	0 S	1 M	T	S	T	F	S	W	F
H	25	0 S	W	52 T	S	T	F	S	W	S	M	T	S
	26	M	T	F	M	W	S	M	T	S	T	3 F	0 S
	27	T	F	S	T	T	S	T	F	0 M	4 W	S	M
	28	W	S	S	W	F	M	W	22 S	T	T	S	T
	29	T	S	M	T	S	33 T	7 T	S	W	F	M	W
	30	F		T	0 F	1 S	W	F	M	T	S	T	T
	31	11 S		20 W		M		S	T		S		F
NUMBER		6	4	6	5	5	5	5	5	5	5	5	3
MAXIMUM		11	4	52	6	1	33	12	22	11	6	12	24
ARITH MEAN		5	2	15	1	0	9	6	8	4	3	7	10
# EXCEEDED		0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 59

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 365 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 365 MICROGRAMS PER CUBIC METER

RUNNING ARITHEMIC MEAN = 6 MICROGR/M**3
ARITHETIC STANDARD DEVIATION = 9

N.C. ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: GAS BUBBLER (24-HOUR SAMPLE)
ANALYSIS METHOD: WEST-GAEKE SULFANIC ACID

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Table B-3 (Cont.)

AS OF APRIL 14, 1977

S U L F U R D I O X I D E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: AFTERBAY SITE
STATION CODE NO: 73-3140-AA
COUNTY: PERSON
SITE LOCATION: LAKE HYCO AFTERBAY OFF SR 1322.
STATION TYPE: OVERLOOKS LAKE - FAIRLY DESOLATE
COMMENTS: APPROXIMATELY 6.0 MILES NW OF STEAM PLANT.

		JAN 1976	FEB 1976	MAR 1976	APR 1976	MAY 1976	JUN 1976	JUL 1976	AUG 1976	SEP 1976	OCT 1976	NOV 1976	DEC 1976
	1	0 T	S	0 M	T	S	T	T	S	W	F	M	W
	2	F	M	T	F	S	W	F	M	T	S	7 T	10 T
	3	S	T	W	S	M	T	S	T	0 F	0 S	W	F
D	4	S	W	T	S	T	F	S	0 W	S	M	T	S
	5	M	T	F	M	W	0 S	0 M	T	S	T	F	S
A	6	T	0 F	S	0 T	0 T	S	T	F	M	W	S	M
	7	0 W	S	0 S	W	F	M	W	S	T	T	S	T
Y	8	T	S	M	T	S	T	T	S	W	F	4 M	4 W
	9	F	M	T	F	S	W	F	M	0 T	2 S	T	T
	10	S	T	W	S	M	T	S	0 T	F	S	W	F
O	11	S	W	T	S	T	0 F	3 S	W	S	M	T	S
	12	M	0 T	F	0 M	0 W	S	M	T	S	T	F	S
F	13	0 T	F	0 S	T	T	S	T	F	M	W	S	M
	14	W	S	S	W	F	M	W	S	T	T	3 S	11 T
	15	T	S	M	T	S	T	T	S	2 W	1 F	M	W
	16	F	M	T	F	S	W	F	0 M	T	S	T	T
M	17	S	T	W	S	M	0 T	0 S	T	F	S	W	F
	18	S	0 W	T	0 S	0 T	F	S	W	S	M	T	S
O	19	22 M	T	0 F	M	W	S	M	T	S	T	F	S
	20	T	F	S	T	T	S	T	F	M	W	31 S	0 M
N	21	W	S	S	W	F	M	W	S	3 T	3 T	S	T
	22	T	S	M	T	S	T	T	3 S	W	F	M	W
T	23	F	M	T	F	S	0 W	4 F	M	T	S	T	T
	24	S	2 T	W	0 S	0 M	T	S	T	F	S	W	F
M	25	0 S	W	11 T	S	T	F	S	W	S	M	T	S
	26	M	T	F	M	W	S	M	T	S	T	4 F	4 S
	27	T	F	S	T	T	S	T	F	0 M	6 W	S	M
	28	W	S	S	W	F	M	W	15 S	T	T	S	T
	29	T	S	M	T	S	22 T	10 T	S	W	F	M	W
	30	F		T	0 F	0 S	W	F	M	T	S	T	T
	31	3 S		56 W		M		S	T		S		F
	NUMBER	6	4	6	5	5	5	5	5	5	5	5	5
	MAXIMUM	22	2	56	0	0	2	10	15	3	6	31	11
	ARITH MEAN	4	1	11	0	0	4	3	4	1	2	10	6
	# EXCEEDED	0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 61

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 365 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 365 MICROGRAMS PER CUBIC METER

RUNNING ARITHEMIC MEAN = 4 MICROGR/M**3
ARITHETIC STANDARD DEVIATION = 9

N.C. ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: GAS BUBBLER (24-HOUR SAMPLE)

ANALYSIS METHOD: WEST-GAEKE SULFAMIC ACID

Table B-3 (Cont.)

S U L F U R D I O X I D E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

AS OF APRIL 14, 1977 — NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: E. RIDGEVILLE SITE
STATION CODE NO: 73-3140-AC
COUNTY: PERSON
SITE LOCATION: SR 1102, 0.15 MILES NORTH OF SR 1172.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 12.5 MILES SSW OF STEAM PLANT. (SAMPLERS ADJACENT TO ROAD).

		JAN 1976	FEB 1976	MAR 1976	APR 1976	MAY 1976	JUN 1976	JUL 1976	AUG 1976	SEP 1976	OCT 1976	NOV 1976	DEC 1976
	1	0 T	S	0 M	T	S	T	T	S	W	F	M	W
	2	F	M	T	F	S	W	F	M	T	S	7 T	34 T
	3	S	T	W	S	M	T	S	T	F	0 S	W	F
D	4	S	W	T	S	T	F	S	1 W	S	M	T	S
	5	M	T	F	M	W	0 S	0 M	T	S	T	F	S
A	6	T	17 F	S	0 T	0 T	S	T	F	M	W	S	M
	7	0 W	S	0 S	W	F	M	W	S	T	T	S	T
Y	8	T	S	M	T	S	T	T	S	W	F	5 M	22 W
	9	F	M	T	F	S	W	F	M	2 T	4 S	T	T
	10	S	T	W	S	M	T	S	0 T	F	S	W	F
O	11	S	W	T	S	T	117 F	1 S	W	S	M	T	S
	12	M	3 T	F	2 M	0 W	S	M	T	S	T	F	S
F	13	6 T	F	4 S	T	T	S	T	F	M	W	S	M
	14	W	S	S	W	F	M	W	S	T	T	19 S	3 T
	15	T	S	M	T	S	T	T	S	W	3 F	M	W
	16	F	M	T	F	S	W	F	15 M	T	S	T	T
M	17	S	T	W	S	M	0 T	1 S	T	F	S	W	F
	18	S	0 W	T	0 S	0 T	F	S	W	S	M	T	S
O	19	0 M	T	5 F	M	W	S	M	T	S	T	F	S
	20	T	F	S	T	T	S	T	F	M	W	37 S	3 M
N	21	W	S	S	W	F	M	W	S	T	6 T	S	T
	22	T	S	M	T	S	T	T	2 S	W	F	M	W
T	23	F	M	T	F	S	0 W	4 F	M	T	S	T	T
	24	S	8 T	W	0 S	0 M	T	S	T	F	S	W	F
H	25	6 S	W	115 T	S	T	F	S	W	S	M	T	S
	26	M	T	F	M	W	S	M	T	S	T	0 F	0 S
	27	T	F	S	T	T	S	T	F	0 M	17 W	S	M
	28	W	S	S	W	F	M	W	S	T	T	S	T
	29	T	S	M	T	S	17 T	8 T	S	W	F	M	W
	30	F		T	0 F	0 S	W	F	M	T	S	T	T
	31	4 S		0 W		M		S	T		S		F
NUMBER		6	4	6	5	5	5	5	4	2	5	5	5
MAXIMUM		6	17	115	2	0	117	8	15	2	17	37	34
ARITH MEAN		3	7	21	0	0	27	3	5	1	6	14	12
# EXCEEDED		0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SAMPLES = 57

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 365 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 365 MICROGRAMS PER CUBIC METER

RUNNING ARITHEMIC MEAN = 9 MICROGR/M**3
ARITHETIC STANDARD DEVIATION = 22

N.C. ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: GAS BUBBLER (24-HOUR SAMPLE) ANALYSIS METHOD: WEST-GAEKE SULFAMIC ACID

Table D-3 (Cont.)

S U L F U R D I O X I D E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

AS OF APRIL 14, 1977 — NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: AFTERBAY SITE
STATION CODE NO: 73-3140-AA
COUNTY: PERSON
SITE LOCATION: LAKE HYCO AFTERBAY OFF SR 1322.
STATION TYPE: OVERLOOKS LAKE - FAIRLY DESOLATE
COMMENTS: APPROXIMATELY 6.0 MILES NW OF STEAM PLANT.

		JAN 1977	FEB 1977	MAR 1977	APR 1977	MAY 1977	JUN 1977	JUL 1977	AUG 1977	SEP 1977	OCT 1977	NOV 1977	DEC 1977
	1	17 S	T	T	F	S	W	F	M	T	S	T	T
	2	S	W	W	S	M	T	S	T	F	S	W	F
	3	M	T	T	S	T	F	S	W	S	M	T	S
D	4	T	F	F	M	W	S	M	T	S	T	F	S
	5	W	S	S	T	T	S	T	F	M	W	S	M
A	6	T	23 S	S	W	F	M	W	S	T	T	S	T
	7	36 F	M	M	T	S	T	T	S	W	F	M	W
Y	8	S	T	T	F	S	W	F	M	T	S	T	T
	9	S	W	W	S	M	T	S	T	F	S	W	F
	10	M	T	T	S	T	F	S	W	S	M	T	S
O	11	T	F	F	M	W	S	M	T	S	T	F	S
	12	W	75 S	S	T	T	S	T	F	M	W	S	M
F	13	T	S	S	W	F	M	W	S	T	T	S	T
	14	F	M	M	T	S	T	T	S	W	F	M	W
	15	S	T	T	F	S	W	F	M	T	S	T	T
	16	S	W	W	S	M	T	S	T	F	S	W	F
M	17	M	T	T	S	T	F	S	W	S	M	T	S
	18	T	5 F	F	M	W	S	M	T	S	T	F	S
O	19	W	S	S	T	T	S	T	F	M	W	S	M
	20	T	S	S	W	F	M	W	S	T	T	S	T
N	21	F	M	M	T	S	T	T	S	W	F	M	W
	22	S	T	T	F	S	W	F	M	T	S	T	T
T	23	S	W	W	S	M	T	S	T	F	S	W	F
	24	M	3 T	T	S	T	F	S	W	S	M	T	S
H	25	T	F	F	M	W	S	M	T	S	T	F	S
	26	W	S	S	T	T	S	T	F	M	W	S	M
	27	T	S	S	W	F	M	W	S	T	T	S	T
	28	F	M	M	T	S	T	T	S	W	F	M	W
	29	S		T	F	S	W	F	M	T	S	T	T
	30	S		W	S	M	T	S	T	F	S	W	F
	31	30 M		T		T		S	W		M		S
NUMBER		3	4										
MAXIMUM		36	75										
ARITH MEAN		28	27										
# EXCEEDED		0	0										

TOTAL SAMPLES = 7

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 365 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 365 MICROGRAMS PER CUBIC METER

RUNNING ARITHEMIC MEAN = 27 MICROGR/M**3
ARITHETIC STANDARD DEVIATION = 24

N.C. ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: GAS BUBBLER (24-HOUR SAMPLE) ANALYSIS METHOD: WEST-GAEKE SULFAMIC ACID

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Table B-3 (Cont.)

S U L F U R D I O X I D E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

AS OF APRIL 14, 1977 — NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: DOUBLE CREEK SITE
STATION CODE NO: 73-3140-AB
COUNTY: PERSON
SITE LOCATION: SR 1166, 0.3 MILES SOUTH OF HIGHWAY 158.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 7.4 MILES SOUTH OF PLANT (SAMPLERS ADJACENT TO ROAD).

		JAN 1977	FEB 1977	MAR 1977	APR 1977	MAY 1977	JUN 1977	JUL 1977	AUG 1977	SEP 1977	OCT 1977	NOV 1977	DEC 1977
	1	24 S	T	T	F	S	W	F	M	T	S	T	T
	2	S	W	W	S	M	T	S	T	F	S	W	F
	3	M	T	T	S	T	F	S	W	S	M	T	S
D	4	T	F	F	M	W	S	M	T	S	T	F	S
	5	W	S	S	T	T	S	T	F	M	W	S	M
A	6	T	7 S	S	W	F	M	W	S	T	T	S	T
	7	43 F	M	M	T	S	T	T	S	W	F	M	W
Y	8	S	T	T	F	S	W	F	M	T	S	T	T
	9	S	W	W	S	M	T	S	T	F	S	W	F
	10	M	T	T	S	T	F	S	W	S	M	T	S
O	11	T	F	F	M	W	S	M	T	S	T	F	S
	12	W	9 S	S	T	T	S	T	F	M	W	S	M
F	13	37 T	S	S	W	F	M	W	S	T	T	S	T
	14	F	M	M	T	S	T	T	S	W	F	M	W
	15	S	T	T	F	S	W	F	M	T	S	T	T
	16	S	W	W	S	M	T	S	T	F	S	W	F
M	17	M	T	T	S	T	F	S	W	S	M	T	S
	18	T	0 F	F	M	W	S	M	T	S	T	F	S
O	19	W	S	S	T	T	S	T	F	M	W	S	M
	20	T	S	S	W	F	M	W	S	T	T	S	T
N	21	F	M	M	T	S	T	T	S	W	F	M	W
	22	S	T	T	F	S	W	F	M	T	S	T	T
T	23	S	W	W	S	M	T	S	T	F	S	W	F
	24	M	9 T	T	S	T	F	S	W	S	M	T	S
H	25	T	F	F	M	W	S	M	T	S	T	F	S
	26	W	S	S	T	T	S	T		M	W	S	M
	27	T	S	S	W	F	M	W		T	T	S	T
	28	F	M	M	T	S	T	T		W	F	M	W
	29	S		T	F	S	W	F	M	T	S	T	T
	30	S		W	S	M	T	S	T	F	S	W	F
	31	41 M		T		T		S	W		M		S

NUMBER	4	4
MAXIMUM	43	9
ARITH MEAN	36	6
# EXCEEDED	0	0

TOTAL SAMPLES = 8

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 365 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 365 MICROGRAMS PER CUBIC METER

RUNNING ARITHEMIC MEAN = 21 MICROGR/M**3
ARITMETIC STANDARD DEVIATION = 17

N.C. ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: GAS BUBBLER (24-HOUR SAMPLE) ANALYSIS METHOD: WEST-GAEKE SULFAMIC ACID

Table B-3 (Cont.)

S U L F U R D I O X I D E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

AS OF APRIL 14, 1977 — NORTH CAROLINA

PLANT NAME: ROXBORO SEG PLANT
STATION NAME: E. RIDGEVILLE SITE
STATION CODE NO: 73-3140-AC
COUNTY: PERSON
SITE LOCATION: SR 1102, 0.15 MILES NORTH OF SR 1172.
STATION TYPE: RURAL - RESIDENTIAL AERA
COMMENTS: 12.5 MILES NW OF STEAM PLANT. (SAMPLERS ADJACENT TO ROAD).

		JAN 1977	FEB 1977	MAR 1977	APR 1977	MAY 1977	JUN 1977	JUL 1977	AUG 1977	SEP 1977	OCT 1977	NOV 1977	DEC 1977
	1	30 S	T	T	F	S	W	F	M	T	S	T	T
	2	S	W	W	S	M	T	S	T	F	S	W	F
	3	M	T	T	S	T	F	S	W	S	M	T	S
D	4	T	F	F	M	W	S	M	T	S	T	F	S
	5	W	S	S	T	T	S	T	F	M	W	S	M
A	6	T	0 S	S	W	F	M	W	S	T	T	S	T
	7	F	M	M	T	S	T	T	S	W	F	M	W
Y	8	S	T	T	F	S	W	F	M	T	S	T	T
	9	S	W	W	S	M	T	S	T	F	S	W	F
	10	M	T	T	S	T	F	S	W	S	M	T	S
O	11	T	F	F	M	W	S	M	T	S	T	F	S
	12	W	0 S	S	T	T	S	T	F	M	W	S	M
F	13	T	S	S	W	F	M	W	S	T	T	S	T
	14	F	M	M	T	S	T	T	S	W	F	M	W
	15	S	T	T	F	S	W	F	M	T	S	T	T
	16	S	W	W	S	M	T	S	T	F	S	W	F
M	17	M	T	T	S	T	F	S	W	S	M	T	S
	18	T	6 F	F	M	W	S	M	T	S	T	F	S
O	19	W	S	S	T	T	S	T	F	M	W	S	M
	20	T	S	S	W	F	M	W	S	T	T	S	T
N	21	F	M	M	T	S	T	T	S	W	F	M	W
	22	S	T	T	F	S	W	F	M	T	S	T	T
T	23	S	W	W	S	M	T	S	T	F	S	W	F
	24	M	8 T	T	S	T	F	S	W	S	M	T	S
H	25	T	F	F	M	W	S	M	T	S	T	F	S
	26	W	S	S	T	T	S	T	F	M	W	S	M
	27	T	S	S	W	F	M	W	S	T	T	S	T
	28	F	M	M	T	S	T	T	S	W	F	M	W
	29	S		T	F	S	W	F	M	T	S	T	T
	30	S		W	S	M	T	S	T	F	S	W	F
	31	51 M		T		T		S	W		M		S
NUMBER		2	4										
MAXIMUM		51	8										
ARITH MEAN		41	4										
# EXCEEDED		0	0										

TOTAL SAMPLES = 6

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 365 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 365 MICROGRAMS PER CUBIC METER

RUNNING ARITHEMIC MEAN = 18 MICROGR/M**3
ARITHETIC STANDARD DEVIATION = 20

N.C. ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: GAS BUBBLER (24-HOUR SAMPLE) ANALYSIS METHOD: WEST-GAEKE SULFAMIC ACID

Table B-3 (Cont.)

S U L F U R D I O X I D E
DAILY VALUES
CAROLINA POWER & LIGHT CO AEROMETRIC DATA BANK

AS OF APRIL 15, 1977 — NORTH CAROLINA

PLANT NAME: MAYO SEG SITE
STATION NAME: HAGERS MOUNT
STATION CODE NO: 00-MAYO-0X
COUNTY: PERSON
SITE LOCATION: S.R. 1326, 0.5 MILES SOUTH OF SR 1332
STATION TYPE: PASTURE LAND, SOME RESIDENTAL
COMMENTS: ABOUT 6.5 MILES SW OF MAYO PLANT SITE, LOCATED ABOUT 500 FEET FROM ROADSIDE.

	JAN 1977	FEB 1977	MAR 1977	APR 1977	MAY 1977	JUN 1977	JUL 1977	AUG 1977	SEP 1977	OCT 1977	NOV 1977	DEC 1977
1	S	T	9 T	0 F	S	W	F	M	T	S	T	T
2	S	W	W	S	M	T	S	T	F	S	W	F
3	M	0 T	6 T	S	T	F	S	W	S	M	T	S
D 4	T	F	M	W	S	M	T	S	T	F	S	
5	W	S	6 S	T	T	S	T	F	M	W	S	M
A 6	T	S	S	W	F	M	W	S	T	T	S	T
7	F	M	M	T	S	T	T	S	W	F	M	W
Y 8	S	0 T	18 T	F	S	W	F	M	T	S	T	T
9	S	W	W	S	M	T	S	T	F	S	W	F
10	M	T	T	S	T	F	S	W	S	M	T	S
O 11	T	F	F	M	W	S	M	T	S	T	F	S
12	W	S	0 S	T	T	S	T	F	M	W	S	M
F 13	T	S	S	W	F	M	W	S	T	T	S	T
14	F	M	M	T	S	T	T	S	W	F	M	W
15	S	26 T	9 T	F	S	W	F	M	T	S	T	T
16	S	W	W	S	M	T	S	T	F	S	W	F
M 17	M	24 T	11 T	S	T	F	S	W	S	M	T	S
18	T	F	F	M	W	S	M	T	S	T	F	S
O 19	W	S	4 S	T	T	S	T	F	M	W	S	M
20	T	S	S	W	F	M	W	S	T	T	S	T
N 21	F	M	M	T	S	T	T	S	W	F	M	W
22	S	0 T	12 T	F	S	W	F	M	T	S	T	T
T 23	S	W	5 W	S	M	T	S	T	F	S	W	F
24	M	T	T	S	T	F	S	W	S	M	T	S
M 25	0 T	F	F	M	W	S	M	T	S	T	F	S
26	W	13 S	5 S	T	T	S	T	F	M	W	S	M
27	T	S	0 S	W	F	M	W	S	T	T	S	T
28	F	M	M	T	S	T	T	S	W	F	M	W
29	0 S		T	F	S	W	F	M	T	S	T	T
30	S		0 W	S	M	T	S	T	F	S	W	F
31	M		T		T		S	W		M		S
NUMBER	2	6	13	1								
MAXIMUM	0	26	18	0								
ARITH MEAN	0	11	7	0								
# EXCEEDED	0	0	0	0								

TOTAL SAMPLES = 22

STARRED (*) ITEMS EXCEEDED THE N.C. 24-HOUR STANDARD OF 365 MICROGRAMS PER CUBIC METER
PLUSSED (+) ITEMS EXCEEDED THE NATIONAL PRIMARY STANDARD OF 365 MICROGRAMS PER CUBIC METER

RUNNING ARITHEMIC MEAN = 7 MICROGR/M**3
ARITHEMIC STANDARD DEVIATION = 7

N.C. ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER
NATIONAL ANNUAL STANDARD IS 80 MICROGRAMS PER CUBIC METER

COLLECTION METHOD: GAS BUBBLER (24-HOUR SAMPLE)
ANALYSIS METHOD: WEST-GAEKE SULFAMIC ACID

Table B-4 Maximum and Annual Sulfur Dioxide Levels Measured at Each Site[1]

	Site	No. of Observations	Highest 24-hr. Value ($\mu g/m^3$)	12-Month Average Geometric Mean ($\mu g/m^3$)
1975	Afterbay	57	33	3
	Double Creek	52	27	4
	E. Ridgeville	57	35	4
1976	Afterbay	61	56	4
	Double Creek	59	52	6
	E. Ridgeville	57	117	9
1977	Afterbay	7	75	-
	Double Creek	8	43	-
	E. Ridgeville	6	51	-
	Hagers Mount	22	26	-

The continuously monitored data measured at the Hagers Mount site between December 1976 and April 1977 resulted in the following data:

	Maximum Value ($\mu g/m^3$)[2]
1-hr. average	392.7
3-hr. average	157.1
24-hr. average	20.9

[1] Ambient air quality standards are listed in Table B-6

[2] Minimum detection limit is 13.1 $\mu g/m^3$.

Table B-5 Standards of Performance for New Stationary Sources for Coal Fired Power Plants

Pollutant	Federal Standards	North Carolina Standards
Particulate Matter		
Emission Rate - lb/MBtu	0.10[1]	0.10
Visible Emission - percent opacity	20	20
- two minute maximum/hr.	40	-
- five minute maximum/hr.	-	> 20
- twenty minute maximum/24 hr.	-	> 20
Sulfur Dioxide		
Emission Rate - lb/MBtu	1.2[1]	1.2
Equivalent sulfur content in fuel (%)	0.7	0.7
Nitrogen Oxides (as NO_2)		
Emission Rate - lb/MBtu	0.7[1]	0.7

[1] Maximum 2 hour average

Table B-6 North Carolina and National Ambient Air Standards and Nonsignificant Deterioration Limitations

Pollutant	National Primary ($\mu g/m^3$)	National Secondary ($\mu g/m^3$)	North Carolina ($\mu g/m^3$)	Nonsignificant Deterioration[1] Class I ($\mu g/m^3$)	Nonsignificant Deterioration[1] Class II ($\mu g/m^3$)
Particulate Matter					
Annual Geometric Mean	75	60[2]	60	5	19
24 Hour Maximum Concentration	260[2]	150[3]	150[3]	10	37
Sulfur Dioxide					
Annual Arithmetic Mean	80	-	80	2	20
24 Hour Maximum Concentration	365[3]	-	365[3]	5	91
3 Hour Maximum Concentration	-	1300[2]	1300[3]	25	512
Nitrogen Dioxide					
Annual Arithmetic Mean	100	100	100	Not Applicable	

[1]Class III increments are limited to the level of the National Ambient Air Quality Standards

[2]Guideline only, not a standard

[3]Not to be exceeded more than once per year

Table B-7. Summary of Maximum Predicted Ground Level Contaminant Concentration

CP&L's Projections

Parameter	Averaging Interval	Maximum[4] Predicted ug/m^3	Background Level Plus Max Predicted Value ug/m^3	Strictest Standard[1]	Percent of Standard	PSD[2] Standard	Percent of Standard
Particulate							
	24 hr	3.3	103[5]	150	69	37	9
	Annual	0.1	34[6]	60	57	19	0.5
Sulfur Dioxide							
	3 hr	193.3[3] (629)	786.1[7]	1300	60	512	38
	24 hr	52.4 (139)	256[8]	365	70	91	58
	Annual	3.8 (12.1)	21.1[6]	80	26	20	19

State's Projections

Particulate							
	24 hr	5.5	43.5[9]	150	44	37	15
	Annual	0.1	38.1[9]	60	64	19	0.5
Sulfur Dioxide							
	3 hr	302	-	1300	-	512	59
	24 hr	65.8	65.8[10]	365	18	91	72
	Annual	1.2	21.3	80	27	20	6

Table B-7 (Cont.)

1. Strictest ambient air quality standard, Federal or State
2. Significant deterioration guideline - Class II
3. A special fumigation analysis resulted in a maximum value of 617 ug/m^3
4. Values in parenthesis reflect levels resulting from combined influence of Roxboro and Mayo
5. Background from average of maximum values recorded at each site each year
6. Background from highest annual value recorded for all sites
7. Background from highest measured 3-hour value
8. Background from highest measured 24-hour value
9. Assumed 38 ug/m^3 background
10. Assumed no SO_2 background

Permit B-1 B-27

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30308

OCT 28 1977

Mr. M. A. McDuffie, Senior Vice-President
Engineering and Construction
Carolina Power and Light Company
P.O. Box 1551
Raleigh, North Carolina 27612

Dear Mr. McDuffie:

This letter is in reference to Carolina Power and Light's application of March 21, 1977, to the North Carolina Division of Environmental Management for a permit to construct two 720 MW electrical power generation facilities on Mayo Creek near Roxboro.

Based upon the application and other documentation submitted, the Division of Environmental Management performed an engineering review and air quality analysis of the proposed units in accordance with applicable state and federal regulations, including the regulations for PSD, 40 CFR 52.21 and 52.1778. The results of the Prevention of Significant Deterioration (PSD) new source review were documented by the Division of Environmental Management in a report "Pre-Construction Review and Preliminary Determination for the Mayo Creek Electrical Generation Facility of Carolina Power and Light Company to be Constructed near Roxboro, North Carolina". This report was submitted to our office May 26, 1977, by Mr. James McColman, Chief of the Air Quality Section, Division of Environmental Management.

The preliminary review and determination was the subject of a 30-day public comment period commencing May 25, 1977, although no public comments were received. On August 22, 1977, Mr. McColman submitted to EPA the "Pre-Construction Review and Final Determination for the Mayo Creek Electrical Generation Facility". On the basis of this review, EPA has determined, subject to the attached conditions of approval, that the operation of your proposed new units at the location specified in the application will not cause or exacerbate a violation of the NAAQS or of the Class II air quality deterioration increments for sulfur dioxide as required under the Clean Air Act (CAA) Amendments of 1977, (P.L. 95-95, August 7,1977) and will meet the federal regulatory requirements concerning the use of the best available control technology for sulfur dioxide

emissions. We have also reviewed your application in light of the new CAA Amendments relating to credit for stack heights and to mandatory Class I areas and have found your application consistent with these requirements.

Therefore, after consideration of the pertinent Federal statutes and regulations, this Authority to Construct is hereby issued for the facility described in your application to the North Carolina Division of Environmental Management subject to the attached Permit No. 3478R and Permit No. 3478 with the specified conditions and limitations contained therein. These conditions are specifically made a part of this Authority to Construct.

Please be advised that a violation of any condition issued as part of this approval, as well as any construction which proceeds at variance with material information submitted in the application, will be regarded as a violation of this Authority to Construct. Also, this Authority to Construct refers only to the prevention of significant air quality deterioration requirements of 40 CFR 52.21 and 52.1778, and the CAA Amendments of 1977. It does not apply to other federal, state, or local agency permitting requirements, including NPDES. Additionally, this Authority to Construct applies only to construction which commences within eighteen (18) months from the date of issuance.

Authority to Construct shall take effect immediately. The complete analysis which justifies this Authority to Construct has been fully documented for future reference, if needed. Any questions concerning this approval may be directed to G. T. Helms, Deputy Director of the Air and Hazardous Materials Division by telephone at 404/881-3043 or by letter to this office.

Sincerely yours,

by John A. Little, Deputy

John C. White
Regional Administrator

Enclosures

cc: James McColman

Permit B-2

North Carolina Department of Natural Resources & Community Development

James B. Hunt, Jr., Governor

Howard N. Lee, Secretary

August 10, 1977

Mr. M. A. McDuffie - Senior Vice President
Engineering & Construction
CAROLINA POWER AND LIGHT COMPANY
P. O. Box 1551
Raleigh, North Carolina 27602

Dear Mr. McDuffie:

Subject: Permit No. 3478R
Carolina Power and Light Company
Mayo Unit No. 1
Roxboro, North Carolina

In accordance with your application received July 20, 1977, we are forwarding herewith Permit No. 3478R to Carolina Power and Light Company, Mayo Unit No. 1, Roxboro, North Carolina for the construction and operation of air cleaning devices consisting of four electrostatic precipitators (collection plate area of 380,160 square feet each) and appurtenances installed two each on the exhausts from two coal-fired boilers (maximum heat input of 3939.6×10^6 BTU per hour each) to remove visible and particulate emissions, and for the discharge of associated stack gases into the outdoor atmosphere at its facility located near Roxboro, North Carolina, Person County.

This Permit shall be effective from the date of its issuance until July 1, 1982, is nontransferable to future owners and operators, and shall be subject to the conditions and limitations as specified therein.

Sincerely,

W. E. Knight
Director

Enclosures

NORTH CAROLINA

ENVIRONMENTAL MANAGEMENT COMMISSION

DEPARTMENT OF NATURAL RESOURCES & COMMUNITY DEVELOPMENT

Raleigh

P E R M I T

For the Discharge of Air Contaminants Into the Atmosphere

In accordance with the provisions of Article 21B of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules and Regulations,

PERMISSION IS HEREBY GRANTED TO

Carolina Power and Light Company
Mayo Unit No. 1
Roxboro, North Carolina

FOR THE

construction and operation of air cleaning devices consisting of four electrostatic precipitators (collection plate area of 380,160 square feet each) and appurtenances installed two each on the exhausts from two coal-fired boilers (maximum heat input of 3939.6 x 10^6 BTU per hour each) to remove visible and particulate emissions, and for the discharge of associated stack gases into the outdoor atmosphere at its facility located near Roxboro, North Carolina, Person County,

in accordance with the application received July 20, 1977, and in conformity with the plans, specifications, and other supporting data, all of which are filed with the Department of Natural Resources and Community Development and are incorporated as part of this Permit.

This Permit shall be effective from the date of its issuance until July 1, 1982, is nontransferable to future owners and operators, and shall be subject to the following specified conditions and limitations:

1. The facilities shall be properly operated and maintained at all times in such a manner as to effect an overall reduction in air pollution in keeping with the application and otherwise to reduce air contamination to the extent necessary to comply with applicable Environmental Management Commission Regulations, including 15 NCAC 2D .0503, .0516, .0521, .0524, the monitoring requirements of 15 NCAC 2D Section .0600 and 40 CFR 60, and in no case shall the sulfur dioxide emissions from the boilers exceed 1.2 pounds per million BTU input, the particulate emissions from the boilers exceed 0.10 pounds per million BTU heat input, and the nitrogen oxides emissions, expressed as nitrogen dioxide, from the boilers exceed 0.70 pounds per million BTU heat input.

2. This Permit does not replace, set aside, or otherwise relieve the company of any obligation to the Environmental Protection Agency as set out in the Federal Prevention of Significant Deterioration of Air Quality, 40 CFR 52.21.

3. The facilities shall comply with all provisions, including notification and testing requirements, contained in Environmental Management Commission Standard 15 NCAC 2D .0524 "New Source Performance Standards" as promulgated in 40 CFR 60. This Permit shall become voidable, with proper notice to the company, if the results of the tests indicate that the facilities do not meet applicable laws, rules, and regulations.

4. Reports on the operation and maintenance of the facilities shall be submitted to the Division of Environmental Management at such intervals and in such form and detail as may be required by the Division. Information required in such reports may include, but is not limited to, process weight rates, firing rates, hours of operation, and preventive maintenance schedules.

5. A violation of any term or condition of this Permit shall subject the Permittee to enforcement procedures contained in North Carolina General Statutes 143-215. 114, including assessment of civil penalties.

6. When particulate or visible emissions, due to a malfunction of the process or control equipment, are or may be in excess of Environmental Management Commission Regulations, the Air Quality Section of the Division of Environmental Management shall be notified as promptly as possible but in no case later than twelve (12) hours following the start of such malfunction. Such notice shall specify the nature and cause of the malfunction, the time when such malfunction was first observed, the expected duration, and an estimate of the rate of emission. The term malfunction shall not be construed to include start-up or shut-down periods when particulate, visible, or odorous emissions exceed Environmental Management Commission Regulations when the duration of such period is less than one hour. Furthermore, any period of duration one hour or greater when particulate, visible, or odorous emissions exceed Environmental Management Commission Regulations shall be construed as a malfunction.

Permit issued this the 10th day of August, 1977.

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

W. E. Knight, Director
Division of Environmental Management
By Authority of the Secretary of the Department
of Natural Resources and Community Development

Permit No. 3478R

North Carolina Department of Natural Resources & Community Development
James B. Hunt, Jr., Governor
Howard N. Lee, Secretary

August 10, 1977

Mr. M. A. McDuffie - Senior Vice President
Engineering & Construction
CAROLINA POWER AND LIGHT COMPNAY
P. O. Box 1551
Raleigh, North Carolina 27602

Dear Mr. McDuffie:

Subject: Permit No. 3487
Carolina Power and Light Company
Mayo Unit No. 2
Roxboro, North Carolina

In accordance with your application received July 20, 1977, we are forwarding herewith Permit No. 3487 to Carolina Power and Light Company, Mayo Unit No. 2, Roxboro, North Carolina for the construction and operation of air cleaning devices consisting of four electrostatic precipitators (collection plate area of 380,160 square feet each) and appurtenances installed two each on the exhausts from two coal-fired boilers (maximum heat input of 3939.6 x 10^6 BTU per hour each) to remove visible and particulate emissions, and for the discharge of associated stack gases into the outdoor atmosphere at its facility located near Roxboro, North Carolina, Person County.

This Permit shall be effective from the date of its issuance until July 1, 1982, is nontransferable to future owners and operators, and shall be subject to the conditions and limitations as specified therein.

Sincerely,

W. E. Knight
Director

Enclosure

DIVISION OF ENVIRONMENTAL MANAGEMENT
Air Quality Section
P. O. Box 27687 Raleigh, North Carolina 27611
An Equal Opportunity Affirmative Action Employer

NORTH CAROLINA

ENVIRONMENTAL MANAGEMENT COMMISSION

DEPARTMENT OF NATURAL RESOURCES & COMMUNITY DEVELOPMENT

Raleigh

P E R M I T

For the Discharge of Air Contaminants Into the Atmosphere

In accordance with the provisions of Article 21B of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules and Regulations,

PERMISSION IS HEREBY GRANTED TO

Carolina Power and Light Company
Mayo Unit No. 2
Roxboro, North Carolina

FOR THE

construction and operation of air cleaning devices consisting of four electrostatic precipitators (collection plate area of 380,160 square feet each) and appurtenances installed two each on the exhausts from two coal-fired boilers (maximum heat input of 3939.6 x 10^6 BTU per hour each) to remove visible and particulate emissions, and for the discharge of associated stack gases into the outdoor atmosphere at its facility located near Roxboro, North Carolina, Person County,

in accordance with the application received July 20, 1977, and in conformity with the plans, specifications, and other supporting data, all of which are filed with the Department of Natural Resources and Community Development and are incorporated as part of this Permit.

This Permit shall be effective from the date of its issuance until July 1, 1982, is nontransferable to future owners and operators, and shall be subject to the following specified conditions and limitations:

1. The facilities shall be properly operated and maintained at all times in such a manner as to effect an overall reduction in air pollution in keeping with the application and otherwise to reduce air contamination to the extent necessary to comply with applicable Environmental Management Commission Regulations, including 15 NCAC 2D .0503, .0516, .0521, .0524, the monitoring requirements of 15 NCAC 2D Section .0600 and 40 CFR 60, and in no case shall the sulfur dioxide emissions from the boilers exceed 1.2 pounds per million BTU input, the particulate emissions from the boilers exceed 0.10 pounds per million BTU heat input, and the nitrogen oxides emissions, expressed as nitrogen dioxide, from the boilers exceed 0.70 pounds per million BTU heat input.

2. This Permit does not replace, set aside, or otherwise relieve the company of any obligation to the Environmental Protection Agency as set out in the Federal Prevention of Significant Deterioration of Air Quality, 40 CFR 52.21.

3. The facilities shall comply with all provisions, including notification and testing requirements, contained in Environmental Management Commission Standard 15 NCAC 2D .0524 "New Source Performance Standards" as promulgated in 40 CFR 60. This Permit shall become voidable, with proper notice to the company, if the results of the tests indicate that the facilities do not meet applicable laws, rules, and regulations.

4. Reports on the operation and maintenance of the facilities shall be submitted to the Division of Environmental Management at such intervals and in such form and detail as may be required by the Division. Information required in such reports may include, but is not limited to, process weight rates, firing rates, hours of operation, and preventive maintenance schedules.

5. A violation of any term or condition of this Permit shall subject the Permittee to enforcement procedures contained in North Carolina General Statutes 143-215. 114, including assessment of civil penalties.

6. When particulate or visible emissions, due to a malfunction of the process or control equipment, are or may be in excess of Environmental Management Commission Regulations, the Air Quality Section of the Division of Environmental Management shall be notified as promptly as possible but in no case later than twelve (12) hours following the start of such malfunction. Such notice shall specify the nature and cause of the malfunction, the time when such malfunction was first observed, the expected duration, and an estimate of the rate of emission. The term malfunction shall not be construed to include start-up or shut-down periods when particulate, visible, or odorous emissions exceed Environmental Management Commission Regulations when the duration of such period is less than one hour. Furthermore, any period of duration one hour or greater when particulate, visible, or odorous emissions exceed Environmental Management Commission Regulations shall be construed as a malfunction.

Permit issued this the 10th day of August, 1977.

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

W. E. Knight, Director
Division of Environmental Management
By Authority of the Secretary of the Department
of Natural Resources and Community Development

Permit No. 3487

North Carolina Department of Natural & Economic Resources

JAMES B. HUNT, JR., GOVERNOR . HOWARD N. LEE, SECRETARY

DIVISION OF ENVIRONMENTAL MANAGEMENT

BOX 27687, RALEIGH 27611
TELEPHONE 919 733-4740

JUL 27 1977

July 20, 1977

Mr. M. A. McDuffie - Senior Vice President
Engineering & Construction
CAROLINA POWER AND LIGHT COMPANY
P. O. Box 1551
Raleigh, North Carolina 27602

Dear Mr. McDuffie:

Subject: Permit No. 3478
Carolina Power and Light Company
Mayo Unit No. 1 and Unit No. 2
Roxboro, North Carolina

In accordance with your application received April 25, 1977, we are forwarding herewith Permit No. 3478 to Carolina Power and Light Company, Mayo Unit No. 1 and Unit No. 2, Roxboro, North Carolina for the construction and operation of air cleaning devices consisting of eight electrostatic precipitators (collection plate area of 380,160 square feet each) and appurtenances installed two each on the exhausts from four coal-fired boilers (maximum heat input of 3939.6×10^6 BTU per hour each) to remove visible and particulate emissions, and for the discharge of associated stack gases into the outdoor atmosphere at its facility located near Roxboro, North Carolina, Person County.

This Permit shall be effective from the date of its issuance until July 1, 1982, is nontransferable to future owners and operators, and shall be subject to the conditions and limitations as specified therein.

Sincerely,

W. E. Knight
Director

Enclosures

NORTH CAROLINA

ENVIRONMENTAL MANAGEMENT COMMISSION

DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES

Raleigh

P E R M I T

For the Discharge of Air Contaminants Into the Atmosphere

In accordance with the provisions of Article 21B of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules and Regulations,

PERMISSION IS HEREBY GRANTED TO

Carolina Power and Light Company
Mayo Unit No. 1 and Unit No. 2
Roxboro, North Carolina

FOR THE

construction and operation of air cleaning devices consisting of eight electrostatic precipitators (collection plate area of 380,160 square feet each) and appurtenances installed two each on the exhausts from four coal-fired boilers (maximum heat input of 3939.6×10^6 BTU per hour each) to remove visible and particulate emissions, and for the discharge of associated stack gases into the outdoor atmosphere at its facility located near Roxboro, North Carolina, Person County,

in accordance with the application received April 25, 1977, and in conformity with the plans, specifications, and other supporting data, all of which are filed with the Department of Natural and Economic Resources and are incorporated as part of this Permit.

This Permit shall be effective from the date of its issuance until July 1, 1982, is nontransferable to future owners and operators, and shall be subject to the following specified conditions and limitations:

1. The facilities shall be properly operated and maintained at all times in such a manner as to effect an overall reduction in air pollution in keeping with the application and otherwise to reduce air contamination to the extent necessary to comply with applicable Environmental Management Commission Regulations, including 15 NCAC 2D .0503, .0516, .0521, .0524 and the monitoring requirements of 15 NCAC 2D Section .0600 and 40 CFR 60.

2. This Permit does not replace, set aside, or otherwise relieve the company of any obligation to the Environmental Protection Agency as set out in the Federal Prevention of Significant Deterioration of Air Quality, 40 CFR 52.21.

3. The facilities shall comply with all provisions, including notification and testing requirements, contained in Environmental Management Commission Standard 15 NCAC 2D .0524 "New Source Performance Standards" as promulgated in 40 CFR 60. This Permit shall become voidable, with proper notice to the company, if the results of the tests indicate that the facilities do not meet applicable laws, rules, and regulations.

4. Reports on the operation and maintenance of the facilities shall be submitted to the Division of Environmental Management at such intervals and in such form and detail as may be required by the Division. Information required in such reports may include, but is not limited to, process weight rates, firing rates, hours of operation, and preventive maintenance schedules.

5. A violation of any term or condition of this Permit shall subject the Permittee to enforcement procedures contained in North Carolina General Statutes 143-215. 114, including assessment of civil penalties.

Permit issued this the 20th day of July, 1977.

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

W. E. Knight, Director
Division of Environmental Management
By Authority of the Secretary of the Department
of Natural and Economic Resources

Permit No. 3478

PRE-CONSTRUCTION REVIEW AND FINAL DETERMINATION FOR THE MAYO CREEK ELECTRICAL GENERATION FACILITY OF CAROLINA POWER AND LIGHT COMPANY TO BE CONSTRUCTED NEAR ROXBORO, NORTH CAROLINA

This review was performed by the North Carolina Air Quality Section, Division of Environmental Management, Department of Natural and Economic Resources, in accordance with Federal Regulations for Prevention of Significant Deterioration of Air Quality and North Carolina Regulation 15 NCAC 2H .0600

July 1977

PRELIMINARY DETERMINATION REGARDING APPROVAL OF AN APPLICATION SUBMITTED UNDER THE FEDERAL "REGULATIONS FOR THE PREVENTION OF SIGNIFICANT DETERIORATION OF AIR QUALITY"

Carolina Power and Light Company has applied to the North Carolina Deptment of Natural and Economic Resources, Division of Environmental Management, for approval to construct two (2) 720 Mw electrical power generation facilities on the Mayo Creek near Roxboro, North Carolina. The proposed boilers are subject to review under Federal "Regulations for the Prevention of Significant Deterioration of Air Quality" (Federal Register, December 5, 1974, pp. 42510 ff.), and North Carolina Administrative Code Title 15, Subchapter 2H, Section .0603(e), and have been reviewed by the Division of Environmental Management, Air Quality Section staff in Raleigh, North Carolina, to ascertain conformity with the regulations. A preliminary determination has been made that this construction can be approved if certain conditions are met. A copy of the application forms submitted by Carolina Power and Light Company and other materials used by the Air Quality Section in making this preliminary determination are available for public inspection during normal business hours at the following locations:

Air Quality Section
North Carolina Department of Natural and Economic Resources
216 West Jones Street
Raleigh, North Carolina 27611

Air Quality Section
North Carolina Department of Natural and Economic Resources
3800 Barrett Drive
Raleigh, North Carolina 27611

Interested persons are invited to review these materials and to submit written comments on the proposed construction. To be considered, comments must be postmarked within 30 days of the date of this Notice and should be addressed to Mr. J. A. McColman, Chief, Air Quality Section, North Carolina Department of Natural and Economic Resources, Post Office Box 27687, Raleigh, North Carolina 27611, Attention: Technical Services. After weighing relevant comments received and other available information on the facilities, the Division of Environmental Management will act on the application of Carolina Power and Light Company.

W E Knight

W. E. Knight, Director
Division of Environmental Management

May 19, 1977

THE RALEIGH NEWS & OBSERVER
Post Office Box 191
Raleigh, North Carolina 27602

Attention: Sylvia Allen

Dear Sir:

Reference: PRELIMINARY DETERMINATION REGARDING APPROVAL OF AN APPLICATION SUBMITTED UNDER THE FEDERAL "REGULATIONS FOR THE PREVENTION OF SIGNIFICANT DETERIORATION OF AIR QUALITY"

Carolina Power and Light Company
Mayo Creek near Roxboro,
North Carolina

Please publish the attached Notice in your newspaper on or before May 25, 1977.

Publication charges for the Notice will be paid by this Office upon receipt of your invoice and affidavit of publication. Please send the invoice and affidavit, in triplicate, to the undersigned.

Sincerely,

James A. McColman

James A. McColman, Chief
Air Quality Section

/sdg

Attachment (1)

cc: Jack Ravan - EPA Atlanta
Portia Rochelle✓

A copy of the public notice was also sent to Roy Lowe, Person County Manager, Roxboro, North Carolina, and J. Don Everett, Director, Kerr-Tar Regional Council of Governments, Henderson, North Carolina.

Copies of the Preliminary Determination were sent to the Envrironmental Protection Agency, Region IV, Atlanta, Georgia; Carolina Power and Light Company, Raleigh, North Carolina; State Air Pollution Control Board, Commonwealth of Virginia, Richmond, Virginia; and to the offices noted in the Public Notice.

TABLE OF CONTENTS

1. INTRODUCTION AND FINAL DETERMINATION

On December 5, 1974, the Environmental Protection Agency (EPA) issued regulations for Prevention of Significant Deterioration of Air Quality (PSD) (40 CFR 52.21). These regulations were amended on June 12 and September 10, 1975. Under these regulations, any source included in one of 19 source categories must be reviewed for PSD prior to construction. Authority for the technical and administrative review of sources under the e regulations was delegated to the North Carolina Department of Natural and Economic Resources, Division of Environmental Management (DEM), on November 24, 1976 (41 FR 56886).

Under the PSD regulation a source must pass two tests in order to be approved. The first is that Best Available Control Technology (BACT) must be used on all emission points of sulfur oxides (SO_2) and particulate matter within the facility. The second test is that increases in the ambient concentration of SO_2 and particulates beyond levels existing on January 1, 1975, (adjusted for previously permitted but not yet operating sources) must not exceed certain increments. All areas of North Carolina are presently classified as Class II under the PSD regulations.

Allowable ambient air quality deterioration increments in Class II areas are as follows:

Pollutant	$\mu g/m^3$
Particulate Matter	
Annual Geometric Mean	10
24-Hour Maximum	30
Sulfur Dioxide	
Annual Arithmetic Mean	15
24-Hour Maximum	100
3-Hour Maximum	700

Changes in ambient air quality resulting from the emissions of the source are evaluated using diffusion models developed by EPA.

Carolina Power and Light Company submitted an Application to construct two 720 Mw electrical power generation facilities on the Mayo Creek near Roxboro, North Carolina, Person County. These facilities are subject to the Federal New Source Performance Standard (40 CFR 60.40) and may be subject to the PSD regulations. The North Carolina Air Quality Section reviewed these applications and made a supposition that the facilities are subject to PSD regulations and a preliminary determination that, in accordance with 40 CFR 52.21 (d) (2) (ii), this construction will be approved with certain permit conditions.

CP&L submitted an opinion with their application that the facilities would not be subject to PSD regulations. (See Attachment A of CP&L application.) EPA made the final determination on applicability--that the facilities were subject to PSD regulations. (See Appendix G.) On May 25, 1977, public notice of the Preliminary Determination was published in the Raleigh News and Observer. This notice allowed thirty days for the public to inspect and comment on the Preliminary Determination. No public comments were received. Therefore, the construction of this facility is approved in accordance with 40 CFR 52.21 (d) (2) (ii) with these permit conditions.

2. CONDITIONS OF APPROVAL

The following are the proposed conditions on the operation of the units.

A. Emission Limitations

Each unit must meet emission rates, as measured under Part B, as follows:

i. Particulate matter emitted from each unit shall not exceed 0.18 grams per million calories heat input (0.10 lb per million BTU)

derived from fossil fuel.

ii. Visible emissions from each unit shall not exceed 20 percent opacity, except that a maximum of 40 percent opacity shall be permissible for not more than 2 minutes in any hour. Where the presence of uncombined water is the only reason for failure to meet the requirements of this paragraph, such failure will not be a violation of this section.

iii. Sulfur dioxide emitted from each unit shall not exceed 2.2 grams per million calories heat input (1.2 lb per million BTU heat input) derived from solid fossil fuel.

iv. Nitrogen oxides, expressed as NO_2, emitted from each unit shall not exceed 1.26 grams per million calories heat input (0.70 lb per million BTU heat input) derived from solid fossil fuel.

B. Emission Testing

i. Within 60 days after achieving the maximum production rate at which the facility will be operated, but no later than 180 days after initial startup, the owner or operator shall conduct performance tests and furnish the State a written report of the results of such performance tests.

ii. Performance tests shall be conducted and data reduced in accordance with methods and procedures specified by the State.

iii. Performance tests shall be conducted under such conditions as the State shall specify based on representative performance of the facility. The owner or operator shall make available to the State such records as may be necessary to determine the conditions of the performance tests.

iv. The owner or operator shall provide the State 30 days prior notice of the performance tests to afford the opportunity to have an observer present.

v. The owner or operator shall provide or cause to be provided, performance testing facilities as follows:

a. Sampling ports adequate for test methods applicable to the facility.

b. Safe sampling platform(s).

c. Safe access to sampling platform(s).

d. Utilities for sampling and testing equipment.

vi. Each performance test shall consist of three separate runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified by the State. For the purpose of determining compliance with emission limitations, the arithmetic mean of results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances, beyond the owner or operator's control, compliance may, upon the approval of the State, be determined using the arithmetic mean of the results of the other two runs.

vii. For these units performance tests will be required to determine the compliance status with regard to particulate emissions, sulfur dioxide emissions and nitrogen oxide emissions.

C. Emission and Fuel Monitoring

i. There shall be installed, calibrated, maintained, and operated in each of the fossil fuel-fired steam generating units emission monitoring instruments as follows.

a. An opacity monitoring instrument and recorder in accordance with 40 CFR 60.

b. An instrument for continuously monitoring and recording emissions of nitrogen oxides in accordance with 40 CFR 60 unless it is demonstrated during the performance test that the nitrogen oxide emissions are at levels 30 percent or more below the applicable standard of 0.70 lbs $NO_x/10^6$ BTU input.

c. A continuous monitoring system for measuring sulfur dioxide emissions in accordance with 40 CFR 60 unless low sulfur fuels are used to achieve compliance with the SO_2 emission standard and where fuel analyses in accordance with 40 CFR 60 are conducted.

d. An instrument for continuously monitoring and recording either oxygen or carbon dioxide in the flue gases in accordance with 40 CFR 60 unless continuous monitoring and recording of both sulfur dioxide and nitrogen oxides emissions are not required.

3. DETERMINATION OF BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

BACT is any control device or technique which is capable of limiting emissions to the levels specified in the Federal New Source Performance Standards (NSPS) (40 CFR 60). CP&L proposes different methods for meeting BACT for SO_2 and particulates.

BACT for Sulfur Dioxide

Sulfur dioxide is limited by 40 CFR 60.43 to an emission rate of 1.2 lbs. per million BTU heat input when solid fossil fuel (coal) is burned. CP&L proposes to meet this limit by burning coal with a low sulfur content (.7%) and a heat content of 12,000 BTU per pound. The company stated that they presently have contracts to supply coal of this quality for 5 to 8 years of operation of the Mayo units.

BACT for Particulates

Particulate emission is limited by 40 CFR 60.42 to not more than 0.10 lb. per million BTU heat input. To meet this emission standard, CP&L has proposed electrostatic precipitators. An analysis of the design of the design of these precipitators indicates that they should be able to meet this emission limitation. (See Section 4.)

4. EMISSIONS AND CONTROL EQUIPMENT ANALYSIS

The following is a review for permit approval purposes of particulate, sulfur dioxide and nitrogen oxide emissions from the four coal-fired boilers of Mayo Units 1 and 2. A permit is required for these sources as per 15 NCAC 2H .0601.

Both units are identical in that each contains two identical boilers exhausting to a common stack.

A. Particulate Emissions Calculations (per stack)

Maximum heat input at the source (total from Units 1 and 2) = 15,758.4 x 10^6 BTU/hour.

Allowable emissions (as per New Source Performance Standards) = .10 lbs/10^6 BTU input per stack. It should be noted that for this particular case the New Source Performance Standard and State standard (15 NCAC 2D .0503) are equal.

Therefore, the allowable emissions per stack, (.10 lbs/10^6 BTU input) (7,879.2 x 10^6 BTU input/hour) = 787.9 lbs/hour.

Estimated uncontrolled emissions (per stack) using the ash content of the coal as 7-25%:

$$\{16\ (7)\ \frac{\text{lbs. particulates}}{\text{ton coal}}\}\ \{328.3\ \frac{\text{tons coal}}{\text{hour}}\} = 36{,}769\ \frac{\text{lbs. particulates}}{\text{hour}}$$

$$\{16\ (25)\ \frac{\text{lbs. particulates}}{\text{ton coal}}\}\ \{328.3\ \frac{\text{tons coal}}{\text{hour}}\} = 131{,}320\ \frac{\text{lbs. particulates}}{\text{hour}}$$

(Reference: Compilation of Air Pollutant Emission Factors, 2nd edition, (AQ-42), page 1.1-1.3)

Assuming the worst case (ash content of 25%), the control efficiency required to meet the New Source Performance Standard will be,

$$\frac{131{,}320 \text{ lbs/hr} - 787.9 \text{ lbs/hr}}{131{,}320 \text{ lbs/hr}} \times 100 = 99.40\%$$

Control Equipment

There are a total of four Belco Model No. 30 (9999) 4X44-32 electrostatic precipitators installed per unit (two installed per boiler) all of which exhaust to a common stack. Each electrostatic precipitator is designed to handle 1,069,500 ACFM @ 713 ^{o}F as per the permit application.

Collection plate area per 100 cfm for each precipitator,

$$\frac{380{,}160 \text{ ft}^2}{1{,}069.5 \times 10^3 \text{ cfm}} = 355.4 \text{ ft}^2/1000 \text{ cfm}$$

From Figure 6.4 of Guide to Engineering Permit Processing (APTD-1164), the precipitator rate parameter (migration velocity) for 0.7% sulfur content is approximately .25 feet per second.

The Deutsch-Anderson equation provides an indication as to the efficiency to be expected under laboratory type conditions:

$E = 1 - \exp\left(\frac{-AW}{v}\right) \times 100\%$, where W = .25 ft/sec., A = 380,160 ft^2, and v = 1,069,500 cfm.

$$E = \left\{1 - 1/\exp\left(\frac{.25 \text{ ft/sec} \times 380{,}160 \text{ ft}^2 \times 60 \text{ sec/min}}{1{,}069{,}500 \text{ ft}^3/\text{min}}\right)\right\} \times 100\% = 99.51\%$$

Therefore, it appears the electrostatic precipitators will be adequate control for compliance with the New Source Performance Standard.

B. SO_2 Considerations

The allowable sulfur dioxide emissions as per the New Source Performance Standards will be 1.2 lbs $SO_2/10^6$ BTU input.

Heat input (per boiler) =

(164.15 tons coal/hour)(2000 lbs/ton)(12,000 BTU's/lb coal) =

$3{,}939 \times 10^6$ BTU/hour

Estimated SO_2 emissions (per boiler) -- Maximum sulfur content of the coal is 0.7% as per the permit application

(164.15 tons coal/hour)(2000 lbs/ton)(.007)(2 lbs SO_2/lb sulfur burned) = 4,596.2 lbs SO_2/hour.

$$\frac{4{,}596.2 \text{ lbs } SO_2/\text{hour}}{3{,}939 \times 10^6 \text{ BTU/hour}} = 1.16 \text{ lbs } SO_2/10^6 \text{ BTU input}$$

As per the permit application, Carolina Power and Light Company plans to maintain compliance by burning low sulfur coal.

C. NO_x Considerations

The allowable NO_x (expressed as NO_2) emissions as per the Federal New Source Performance Standards will be 0.70 lbs $NO_x/10^6$ BTU input.

The allowable NO_2 emissions as per 15 NCAC 2D .0519 are 1.3 lbs $NO_2/10^6$ BTU input.

Estimated uncontrolled NO_x emissions (Reference: AP-42),

(18 lbs NO_x/ton coal)(164.15 tons coal/hour) = 2954.7 lbs NO_x/hour

$$\frac{2954.7 \text{ lbs } NO_x/\text{hour}}{3{,}939 \times 10^6 \text{ BTU/hour}} = 0.75 \text{ lbs } NO_x/10^6 \text{ BTU input}$$

The estimated figure is above the allowable figure, however, as per Carolina Power and Light Company's "Summary Assessment of Environmental Data and Programs,"[1] the boiler design incorporates overfire air ports which allow for substoichiometric or near sub-stoichiometric combustion in the primary combustion areas thus creating a reducing atmosphere and controlling the production of oxides of nitrogen.

Control efficiency required for compliance

$$\frac{0.75 \text{ lbs } NO_x/10^6 \text{ BTU} - 0.70 \text{ lbs } NO_x/10^6 \text{ BTU}}{0.75 \text{ lbs } NO_x/10^6 \text{ BTU}} \times 100 = 6.6\%$$

As per AP-67, Control Techniques for Nitrogen Oxide Emissions from Stationary Sources, an NO_x reduction of approximately 25% can

[1] Carolina Power & Light Company, Mayo Electric Generating Plant, "Summary Assessment of Environmental Data and Programs," April 1977, page VII-2.

be obtained by using low excess air combustion as specified above. Therefore, the source should not have any major difficulty complying with the standard.

D. Testing, Monitoring and Reporting Requirements

The Permit must be issued with the stipulation that the units be tested and equipped for emission monitoring and recording as required by 15 NCAC 2D .0524 and 15 NCAC 2D .0603.

5. AIR QUALITY ANALYSIS

Introduction

The purpose of this section is to present the results of a diffusion analysis, using EPA's air quality models, to predict the maximum concentration for sulfur dioxide (SO_2) and particulates for various averaging periods. The modeling analysis was conducted by the North Carolina Division of Environmental Management, Air Quality Section, with the assistance of EPA in Atlanta for the CRS computer run. The methodology and the results of the analysis are presented in the next section of this report.

Methodology and Results

The impact of the proposed boilers upon local ambient air quality was evaluated by means of mathematical models which simulate the process of transport and diffusion of stack effluents in the atmosphere. The models employed for this purpose are Gaussian plume models developed by the Meteorological Laboratory of the EPA. Inputs include physical dimensions and emission characteristics of the source as well as hourly values of those meteorological parameters affecting plume behavior.

The emission rates used for modeling the proposed boilers were emission rates based on the design parameters of the units.

The models used and brief summaries of each model are given below:

PTMAX - A single source model which calculates the maximum concentration and downwind distance to point of maximum concentration as a function of stability class and a given set of wind speed categories.

CRS - A point source model which is designed to calculate maximum one-hour, maximum 24-hour, and annual average concentrations at concentric sets of receptors for a full year of actual hourly meteorological data.

PTMTP - A multiple source model which is designed to calculate maximum and the average concentrations for several hours as a function of specified meteorological conditions at specified receptors.

AQDM - A multiple source model which calculates the annual arithmetic average concentration from regional source emission and meteorological data.

When the AQDM model was utilized, all major sources of emission of SO_2 and particulates in the surrounding area are included to determine the total air quality impact in a specific area.

Data on these sources were obtained from the Virginia State Air Pollution Control Board and North Carolina National Emission Data System (NEDS) file. The input data for the AQDM run is shown in Appendix E. The contribution of all of the sources except the Mayo units are considered to be the January 1, 1975, baseline.

After inputting the data for the Mayo units stack into the PT-MAX to determine the general range where the maximum concentration would occur, CRS was run by EPA in Atlanta to find the "worst day" meteorological conditions. These meteorological conditions were used in the PT-MTP model

to determine the highest 24-hour concentrations. The 3-hour maximum SO_2 concentration was found by using the procedure for fumigation given in Guidelines for Air Quality Maintenance Planning and Analysis, Volume 10: Reviewing New Stationary Sources (EPA-450/4-74-011), (Appendix B).

AQDM was run twice, once to obtain the expected ambient concentrations and a second time with the Mayo units as the only source to find the impact to compare with the PSD increment.

Below is a summary of the predicted maximum impact on the ambient concentrations resulting from the proposed power plant.

	Air Quality Deterioration Resulting From Mayo's Contribution ($\mu g/m^3$)	Allowable Increment Under PSD Class II ($\mu g/m^3$)	Ambient Standard ($\mu g/m^3$)	Calculated Maximum Ambient Level ($\mu g/m^3$)
Particulate				
Annual Geometric Mean	.1	10	60	38.1*
24-Hour Maximum	5.5	30	150	43.5*
Sulfur Dioxide				
Annual Arithmetic Mean	1.2	15	80	21.3
24-Hour Maximum	65.8	100	365	65.8**
3-Hour Maximum	302	700	1300	--

*assumed 38 $\mu g/m^3$ background

**assumed no SO_2 background

Environmental Research & Technology, Inc. (ERT) has performed dispersion modeling for CP&L of projected ambient sulfur dioxide concentrations from the proposed Mayo electric generating facility

in Person County, North Carolina.[2] This analysis did not include particulate concentrations resulting from the Mayo facility which is required under new source review procedures. The sulfur dioxide analysis was performed using modeling techniques which differ from modeling techniques currently used by the Environmental Protection Agency and the State of North Carolina. ERT modeling procedures have produced sulfur dioxide ambient concentrations in close agreement with the State of North Carolina with the major difference resulting in the 3-hour fumigation concentration. ERT modeling results are presented below.

The results of the ERT modeling were 3.8, 52.4 and 193.3 micrograms per cubic meter for the Mayo SO_2 maximum contribution to the ambient levels for annual, 24-hour, and 3-hour periods.

The AQDM model has been modified by the State of North Carolina to model more appropriately the dispersion characteristics of a rural environment and sources which operate on a less than continuous basis. A wind adjustment factor for stack height has also been included in this updated version of the AQDM. The model was run using 5-year average wind conditions for the area, and the resulting SO_2 annual isopleths are displayed in Figure I. Figure II represents the isopleth pattern from the previously existing AQDM. Both figures include emissions from the new Mayo facility and other contributing sources in the area.

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[2]Robert M. Iwanchuk, Robert C. McCann, "The Impact of The Proposed Mayo Electric Generating Station on Compliance with Ambient Air Quality Standards for Sulfur Dioxide," Environmental Research & Technology, Inc., Concord, Mass., October 1976.

The modified AQDM generally produced lower concentrations at receptor points as can be noted by the decrease of the area of maximum concentration from 21 $\mu g/m^3$ to 15 $\mu g/m^3$. However, a new "hot spot" did develop to the southwest of the Roxboro CP&L Plant.

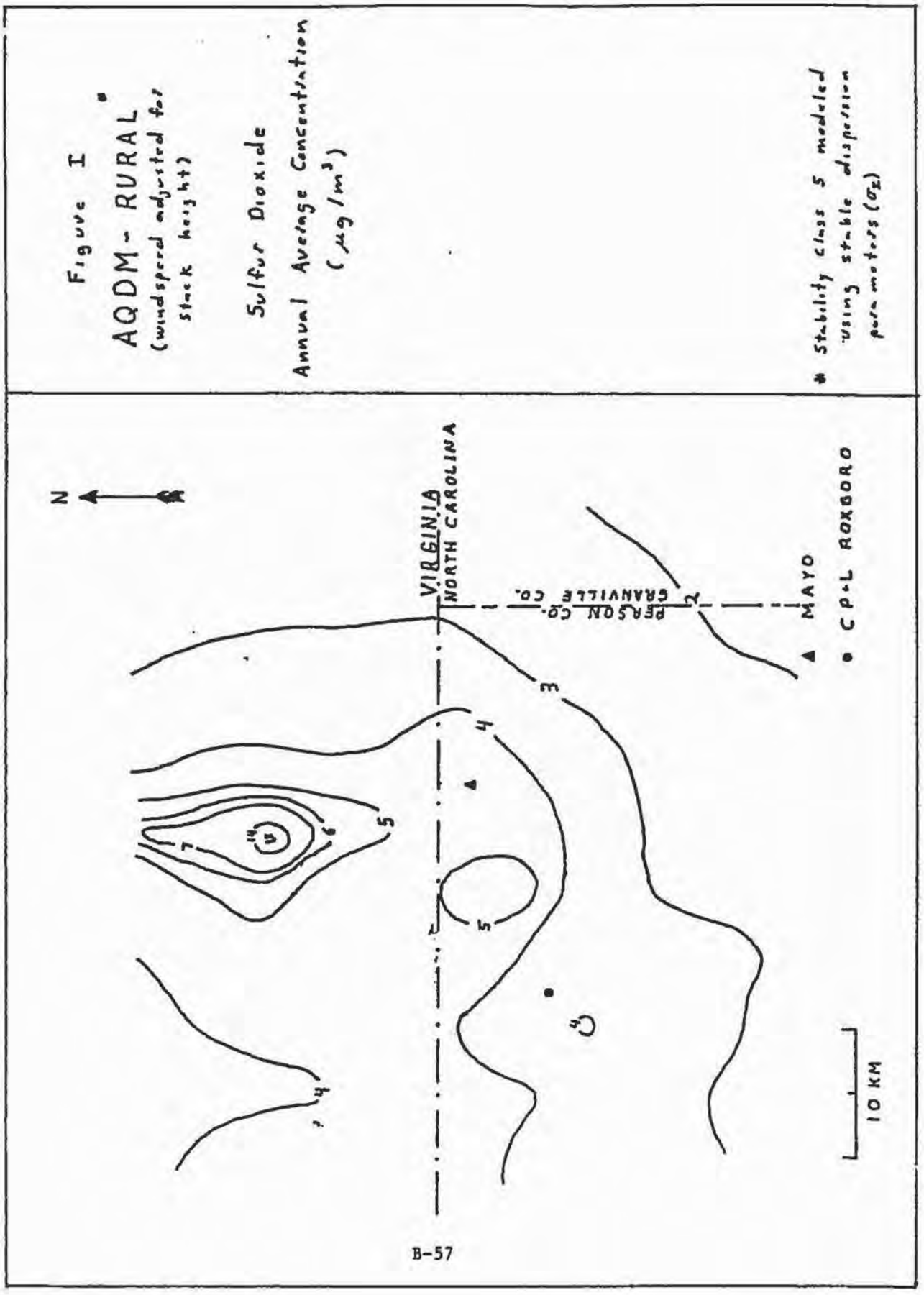


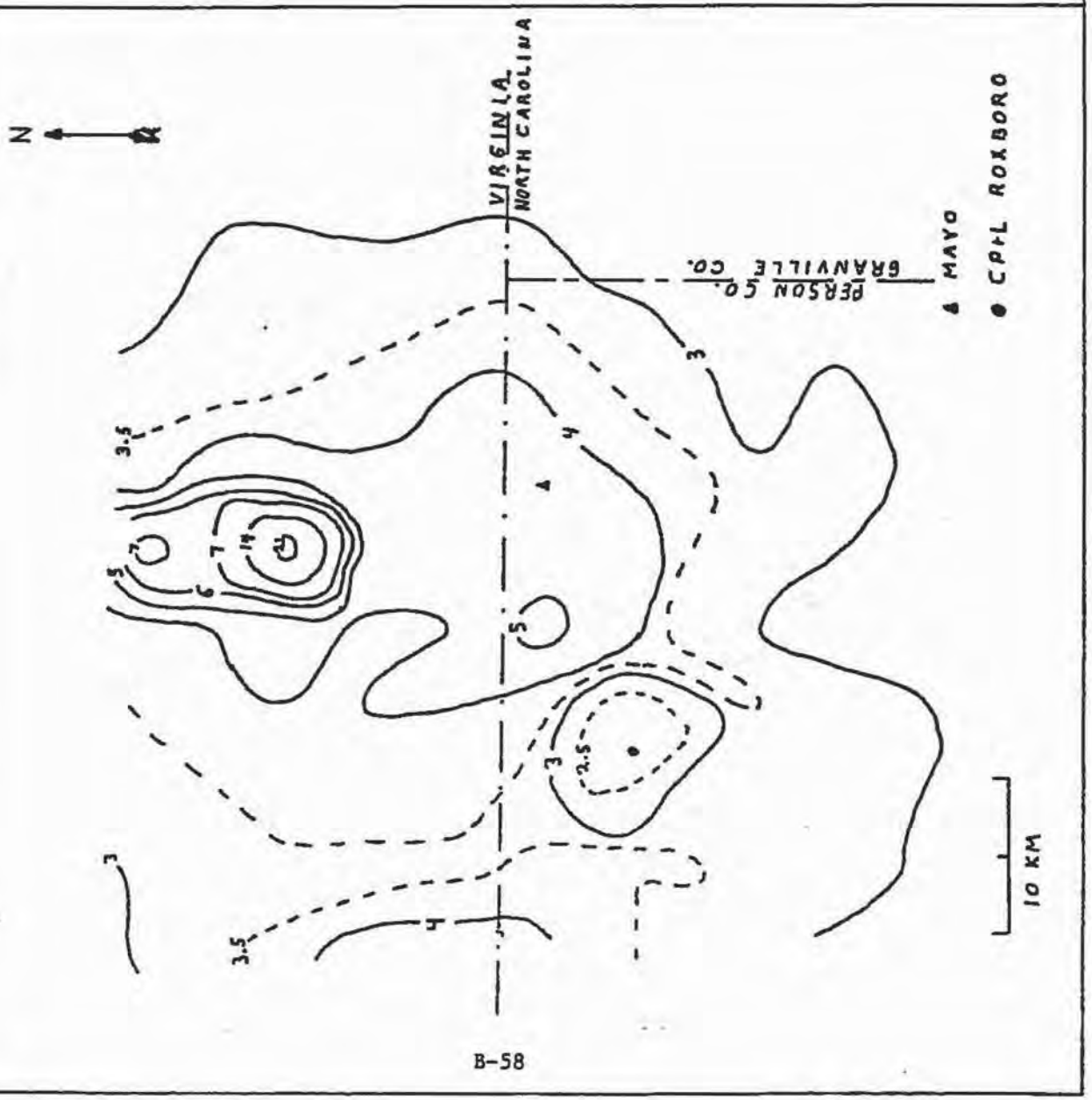
Figure I
AQDM - RURAL
(windspeed adjusted for stack height)
Sulfur Dioxide
Annual Average Concentration
(μg/m³)
* Stability class 5 modeled using stable dispersion parameters (σ_z)
N
VIRGINIA
NORTH CAROLINA
PERSON CO.
GRANVILLE CO.
MAYO
C P&L ROXBORO
10 KM
B-57

Figure II

Current AQDM

Sulfur Dioxide

Annual Average Concentration
($\mu g/m^3$)



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Determination

Based on the results of the modeling the following conclusions may be drawn regarding the proposed Mayo Creek facilities:

A. The impact of the units' proposed operation will be in compliance with the federal regulations for the Prevention of Significant Air Quality Deterioration (40 CFR 52.21) as promulgated in the Federal Register on December 5, 1974, and as amended on June 12 and September 10, 1975, and delegated to the State of North Carolina on November 24, 1976.

B. The ground-level concentrations of SO_2 and particulates due to the operation of the proposed Mayo Creek units will not contravene any applicable State or federal ambient air quality standard.

C. The ground-level increases in concentrations of SO_2 and particulates since January 1, 1975, will not exceed the Class II increments.

APPENDIX C

Biological Reference Tables

APPENDIX C

Table of Contents

Table C-1 Common and Scientific Names of Fishes Collected from Mayo and Mill Creeks, Person County, North Carolina

Scientific Name	Common Name
Amiidae	
1. *Amia calva*	Bowfin
Esocidae	
2. *Esox a. americanus*	Redfin Pickerel
3. *E. niger*	Chain Pickerel
Cyprinidae	
4. *Clinostomus funduloides*	Rosyside Dace
5. *Hybognathus nuchalis*	Silvery Minnow
6. *Nocomis leptocephalus*	Bluehead Chub
7. *Notemigonus chrysoleucas*	Golden Shiner
8. *Notropis altipinnis*	Highfin Shiner
9. *N. amoenus*	Comely Shiner
10. *N. analostanus*	Satinfin Shiner
11. *N. ardens*	Rosefin Shiner
12. *N. cerasinus*	Crescent Shiner
13. *N. niveus*	Whitefin Shiner
14. *N. procne*	Swallowtail Shiner
15. *Phoxinus oreas*	Mountain Redbelly Dace
16. *Semotilus atromaculatus*	Creek chub
Catostomidae	
17. *Catostomus commersoni*	White Sucker
18. *Erimyzon oblongus*	Creek Chubsucker
19. *Moxostoma anisurum*	Silver Redhorse
20. *M. erythrurum*	Golden Redhorse
21. *M. pappillosum*	Suckermouth Redhorse
Ictaluridae	
22. *Ictalurus brunneus*	Snail Bullhead
23. *I. catus*	White Catfish
24. *I. natalis*	Yellow Bullhead
25. *I. nebulosus*	Brown Bullhead
26. *I. punctatus*	Channel Catfish
27. *Noturus insignis*	Margined Madtom
Aphredoderidae	
28. *Aphredoderus sayanus*	Pirate Perch
Centrarchidae	
29. *Centrarchus macropterus*	Flier
30. *Lepomis auritus*	Redbreast Sunfish
31. *L. cyanellus*	Green Sunfish
32. *L. gibbosus*	Pumpkinseed
33. *L. gulosus*	Warmouth

Table C-1 (cont'd)

	Scientific Name	Common Name
Centrarchidae (cont'd)		
34.	L. macrochirus	Bluegill
35.	Lepomis sp.	Sunfish Hybrid
36.	Micropterus salmoides	Largemouth Bass
Percidae		
37.	Etheostoma flabellare	Fantail Darter
38.	E. nigrum	Johnny Darter
39.	E. olmstedi	Tesselated Darter
40.	Perca flavescens	Yellow Perch

Table C-2 Species Composition of Fishes Taken by Electrofishing in Mayo and Mills Creeks, Person County, North Carolina from August, 1976 to July, 1977. Numerically Dominant Species are Marked with an Asterisk(*)

	Station					
	MY8	MY1	MY9	MY3	MY4	MY5
Amia calva				1		
Esox a americanus	11*	10	3	6	3	16
E. niger			2	3	1	
Clinostomus funduloides	12*	158*	54*	38		19*
Hybognathus nuchalis					2	
Nocomis leptocephalus	19*	319*	203*	342*	47*	72*
Notemigonus chrysoleucas	5					
Notropis altipinnis				1		
N. amoenus		1				
N. analostanus		1	3	90*	70*	
N. ardens		9	36	60	1	6
N. cerasinus	12*	118*	92*	169*	42*	83*
N. niveus						1
N. procne		3	21	297*	24*	2
Phoxinus oreas		20	27	12		
Semotilus atromaculatus		2	10	14	2	
Catostomus commersoni	9*	7	11	13		14
Erimyzon oblongus	7		2	2	1	
Moxostoma anisurum	1		2	3	1	
M. erythrurum		6	15	6	2	1
M. pappillosum	1	5	4	33	5	1
Ictalurus brunneus	2		1			
I. catus	1					
I. natalis	4		5	1		3
I. nebulosus	4				1	
I. punctatus				1		
Noturus insignis	3	24	62*	105*	1	26*
Aphredoderus sayanus		3				
Centrarchidae hybrid	1					
Centrarchus macropterus					1	
Lepomis auritus		8	21	20	14*	27*
L. cyanellus	27*	14	3	13	19*	55*
L. gibbosus	7	8				1
L. gulosus		1				
L. macrochirus	42*	18	32	53	15*	9
Micropterus salmoides		2		1		1
Etheostoma flabellare	1	312*	188*	280*	4	28*
E. nigrum				1		
E. olmstedi	2	19	21	69	8	17
Perca flavescens				3	1	
Total Numbers	171	1068	818	1637	265	382
Species	20	23	23	28	22	19

Common names for these species of fish are given on Table C-1

Table C-3 Mayo Creek Fisheries Data as Based Upon North Carolina Wildlife Resource Commission Rotenone Samples (Carnes, 1965)

	Species	Common Name	Number	Weight(gms)
1.	Lepomis macrochirus	Bluegill	2	118
2.	Lepomis auritus	Redbreast sunfish	1	84
3.	Lepomis cyanellus	Green sunfish	1	32
4.	Nocomis leptocephalus	Bluehead chub	204	730
5.	Notropis cerasinus	Crescent shiner	62	130
6.	Etheostoma flabellare	Fantail darter	21	36
7.	Phoxinus oreas	Mountain redbelly dace	15	24
8.	Noturus insignis	Margined madtom	14	152
9.	Clinostomus funduloides	Rosyside dace	12	28
10.	Notropis amoenus	Comely shiner	7	12
11.	Notropis niveus	Whitefin shiner	3	7
12.	Notropis procne	Swallowtail shiner	2	4
13.	Semotilus atromaculatus	Creek chub	2	11
14.	Moxostoma spp.	Suckers	2	24
15.	Ictalurus punctatus	Channel catfish	2	318
16.	Dorosoma cepedianum	Gizzard shad	1	57

Table C-4 Numbers, Total Lengths (mm) and Weights (gms) of Sport Fishes Collected in Mayo and Mill Creeks

Mayo Creek Sport Fishes

Species	No.	Total Length		Weight	
		Range	Mean	Range	Mean
Esox a. americanus	33	55-250	119.6	0.8-125.0	17.6
Esox niger	5	48-212	117.4	0.7-45.0	18.9
Ictalurus catus	2	200-247	223.5	105.0-287.0	196.0
Ictalurus natalis	10	35-209	84.5	0.6-114.0	19.4
Ictalurus nebulosus	3	65-224	153.7	3.8-163.0	75.7
Ictalurus punctatus	1	---	---	310.0-310.0	310.0
Lepomis auritus	60	31-196	105.0	0.4-227.0	38.1
Lepomis cyanellus	75	33-157	76.3	0.5-71.0	10.9
Lepomis gibbosus	15	43-103	71.1	1.5-22.0	8.7
Lepomis gulosus	1	112-112	112.0	27.8-27.8	27.8
Lepomis macrochirus	162	12-175	46.0	0.1-100.0	6.4
Micropterus salmoides	3	83-157	129.3	7.8-48.0	29.9
Perca flavescens	3	124-180	148.0	20.0-63.0	37.1

Mill Creek Sport Fishes

Esox a. americanus	15	62-257	144.9	1.1-150.0	48.8
Ictalurus natalis	3	62-238	178.0	3.1-204.0	121.7
Lepomis auritus	27	31-186	140.5	0.4-131.0	74.1
Lepomis cyanellus	55	35-171	86.8	0.8-90.0	22.5
Lepomis gibbosus	1	94-94	94.0	18.0-18.0	18.0
Lepomis macrochirus	9	18-140	47.4	0.1-55.0	9.4
Micropterus salmoides	1	38-38	38.0	0.4-0.4	0.4

Common names for these species of fish are shown on Table C-1

Table C-5 Mayo Creek Benthic Species List (Organisms Collected During August and November, 1976, and February and May, 1977)

Taxa

Porifera
  Spongilla
Coelenterata
  Hydrozoa
    Hydra
Platyhelminthes - flatworms
  Turbellaria
    Planariidae
      Dugesia
Nematoda
Annelida - segmented worms
    Oligochaeta
      Unidentified oligochaeta
    Lumbriculidae
      Unidentified lumbriculidae
    Naididae
      Peloscolex
      Pristina
    Tubificidae
      Limnodrilus hoffmeisteri
      immature Tubificidae
    Haplotaxidae
      Haplotaxa?
  Hirudinea
    Glossiphonidae
      Placobdella
Insecta
  Collembola
  Ephemeroptera - mayflies
    Ephemeridae
      Hexagenia
    Caenidae
      Caenis
      Brachycercus
    Ephemerellidae
      Ephemerella sp A
      Ephemerella sp B
    Heptageniidae
      Stenonema
    Siphlonuriidae
      Isonychia
    Baetidae
      Baetis
      Pseudocloeon
      Unidentified Baetidae
Trichoptera - caddisflies
  Hydropsychidae
    Hydropsyche spp.
    Cheumatopsyche
  Psychomyiidae
    Phylocentropus
    Polycentropus
    Cyrnellus
    Neureclipsis
  Philoptamidae
    Chimarra
  Leptoceridae
    Oecetis
    Unidentified Leptoceridae
  Limnephilidae
    Neophylax
    Pycnopsyche
  Rhyacophilidae
    Rhyacophila
Plecoptera - stoneflies
    Perlidae
      Perlesta
    Perlodidae
      Isoperla / Diploperla
    Taeniopterygidae
      Taeniopteryx
      Brachyptera
    Nemouridae
      Nemoura
    Capniidae
      Allocapnia
Odonata
  Anisoptera - dragonflies
    Macromiidae
      Macromia
      Didymops
    Gomphidae
      Dromogomphus
      Hagenius
Coleoptera - beetles
    Hydrophilidae
      Unidentified Hydrophilidae
    Elmidae
      Stenelmis
      Macronychus glabratus
      Dubiraphia vittata

Table C-5 (continued)

Taxa

- Coleoptera - beetles (continued)
  - Dubiraphia sp.
  - Oulimnius latiusculus
  - Promoresia
  - Optioservus
  - Psephenidae
    - Psephenus herricki
    - Ectopria
  - Dryopidae
    - Helichus
  - Helodidae
    - Anchytarsus
- Megaloptera
  - Sialidae
    - Sialis
  - Corydalidae
    - Corydalus
    - Nigronia
- Hemiptera
  - Veliidae
    - Microvelia
    - Rhagovelia
- Diptera
  - Ceratopogonidae
    - Bezzia/Probezzia
  - Empididae
    - Hemerodromia
    - Unidentified Empididae
  - Tipulidae
    - Tipula
    - Pseudolimnephilia
    - Antocha
  - Tabanidae
    - Tabanus
  - Culicidae
    - Culex
  - Simuliidae - blackflies
    - Simulium
    - Prosimulium (mixtum)
  - Chironomidae - midge flies
  - Tanypodinae
    - Ablabesmyia
    - Conchapelopia
    - Pentaneura
    - Procladius
    - Tanypus
    - Unidentified pentaneurini
  - Orthocladiinae
    - Brillia par
    - Corynoneura
    - Cricotopus
    - Hydrobaenus
    - Stenochironomus
    - Thienemaniella
    - Trichocladius
    - Unidentified orthoclad B
    - Unidentified orthoclad C
    - Unidentified orthoclad D
    - Unidentified orthoclad E
  - Diamesinae
    - Prodiamesa olivacea
    - Potthastia longimanus
  - Chironominae
    - Chironomus
    - Cladotanytarsus
    - Cryptochironomus
    - Cryptotendipes
    - Dicrotendipes
    - Endochironomus
    - Glyptotendipes
    - Kiefferulus
    - Lauterborniella
    - Microtendipes
    - Parachironomus
    - Paratendipes
    - Polypedilum
    - Pseudochironomus
    - Rheotanytarsus
    - Tanytarsus
    - Tribelos
    - Pagastiella
- Mollusca
  - Gastropoda
    - Physidae
      - Physa
    - Ancylidae
      - Laevipex?
    - Viviparidae
      - Campeloma
      - Unidentified Viviparidae A
      - Unidentified Viviparidae B
- Pelecypoda
  - Unidentified pelecypoda A
    - Sphaeriidae
      - Sphaerium
      - Pisidium