ER Chapter 3 References

Reference #	Reference	Copyrighted Information (Yes/No)	Will be provided to NRC (Yes/No)
Section 3.1	None	N/A	N/A
Section 3.2	None	N/A	N/A
Section 3.3	Westinghouse 2007, Westinghouse Electric Company, AP1000 Design Control Document, APP-GW-GL-700, Revision 16, 2007.	Yes	No
Section 3.4	Westinghouse 2007, Westinghouse Electric Company, AP1000 Design Control Document, APP-GW-GL-700, Revision 16, 2007.	Yes	No
Section 3.5	Westinghouse 2007, Westinghouse Electric Company, AP1000 Design Control Document, APP-GW-GL-700, Revision 16, 2007.	Yes	No
Section 3.6			
1.	SCDHEC (South Carolina Department of Health and Environmental Control) 2007, National Pollutant Discharge Elimination System. Permit to Discharges to Surface Waters, Water Facilities Permitting Division, Columbia, South Carolina, June 13, 2007.	No	Yes
2.	SCE&G Undated, Solid Waste Management and Waste Minimization Plan for Virgil C. Summer Nuclear Station, Rev. 1.	No	Yes
3.	Westinghouse 2003, AP1000 Siting Guide: Site Information for an Early Site Permit, APP-0000-X1-001, Revision 3, April 24, 2003.	Yes	No
Section 3.7	None	N/A	N/A
Section 3.8	None	N/A	N/A
Section 3.9	Westinghouse 2007, Westinghouse Electric Company, AP1000 Design Control Document, APP-GW-GL-700, Revision 16, 2007.	Yes	No
Section 3.10	U.S. DOE (U.S. Department of Energy) 2004, Study of Construction Technologies and Schedules, O&M Staffing and Cost, Decommissioning Costs and Funding Requirements for Advanced Reactor Designs. Volume 1 – MPR-2627. Prepared under Cooperative Agreement DE-FC07-03ID14492, Prepared by Dominion Energy, Inc., Bechtel Power Corporation, TLG, Inc., and MPR Associates, May 27, 2004.	Yes	No

Sect. 3.1 None
Sect. 3.2 None

Section 3.3 References

1. Westinghouse 2007, Westinghouse Electric Company, *AP1000 Design Control Document,* APP-GW-GL-700, Revision 16, 2007.

Section 3.4 References

1. Westinghouse 2007, Westinghouse Electric Company, *AP1000 Design Control Document,* APP-GW-GL-700, Revision 16, 2007.

Section 3.5 References

1. Westinghouse 2007, *AP1000 Design Control Document*, Revision 16, AP1000 Document APP-GW-GL-700, May 26, 2007.

Section 3.6 References

1. SCDHEC (South Carolina Department of Health and Environmental Control) 2007, National Pollutant Discharge Elimination System. Permit to Discharges to Surface Waters, Water Facilities Permitting Division, Columbia, South Carolina, June 13, 2007.

2. SCE&G Undated, *Solid Waste Management and Waste Minimization Plan for Virgil C. Summer Nuclear Station*, Rev. 1.

3. Westinghouse 2003, *AP1000 Siting Guide: Site Information for an Early Site Permit*, APP-0000-X1-001, Revision 3, April 24, 2003.

Rec 3.6 Reg 1

(SCDHEC 2003)

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FACT SHEET

APPLICATION FOR
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT TO DISCHARGE TREATED WASTEWATER
TO STATE WATERS

Application No. SC0030856
Date: March 13, 2003

A. SYNOPSIS OF APPLICATION

1. Name and Address of Applicant

   SCE&G/VC Summer Nuclear Station
   Hwy 215
   Jenkinsville, SC 29065

2. Description of Applicant's Operation

   Generation of electricity by nuclear reactor

3. Production Capacity of Facility

   See Rationale

4. Applicant's Receiving Waters

   The facility has discharges to Monticello Reservoir and Broad River

5. Description of Existing Pollution Abatement Facilities

   See rationale.

6. Description of Discharges (as reported by applicant)

   See rationale.

B. PROPOSED EFFLUENT LIMITATIONS

See rationale and limitations pages for each covered outfall.

C. MONITORING REQUIREMENTS

The applicant will be required to monitor regularly for flow and those parameters limited with sufficient frequency to ensure compliance with the permit conditions. Frequency, methods of sampling, and reporting dates will be specified in the final permit.

D. PROPOSED COMPLIANCE SCHEDULE FOR ATTAINING EFFLUENT LIMITATIONS

see Part IV of the permit

E. PROPOSED SPECIAL CONDITIONS WHICH WILL HAVE A SIGNIFICANT IMPACT ON THE DISCHARGE

See Part V of the permit

F. WATER QUALITY STANDARDS AND EFFLUENT STANDARDS APPLIED TO THE DISCHARGE

See Rationale

G. PROCEDURES FOR THE FORMULATION OF FINAL DETERMINATIONS

1. Comment Period

The Department of Health and Environmental Control proposes to issue an NPDES permit to this applicant subject to the effluent limitations and special conditions outlined above. These determinations are tentative.

Interested persons are invited to submit written comments on the permit application or on DHEC's proposed determinations to the following address:

South Carolina Department of Health and Environmental Control
Bureau of Water/NPDES Administration
2600 Bull Street
Columbia, South Carolina 29201

All comments received prior to N/A will be considered in the formulation of final determinations with regard to this application.

2. Public Hearing

The Department of Health and Environmental Control (DHEC) may hold a public hearing if there is a significant degree of public interest in a proposed permit or group of permits. Public notice of such a hearing will be circulated in newspapers in the geographical area of the discharge and to those on the DHEC mailing list at least thirty days prior to the hearing.

Following the public hearing, DHEC may make such modifications in the terms and conditions of the proposed permit as may be appropriate and shall issue or deny the permit. Notice of issuance or denial will be circulated to those who participated in the hearing and to appropriate persons on the DHEC mailing list.

If the permit is issued, it will become effective the first of the month at least 15 days following date of issuance, and will be the final action of DHEC unless an adjudicatory hearing is granted.

3. Adjudicatory Hearings

Any person may submit a request for an administrative adjudicatory hearing to consider the final permit and its conditions. If you wish to request an administrative adjudicatory hearing, you must do so in accordance with Regulation 61-72, Volume 25, S.C. Code of Laws, 1976, as amended, and the Rules of the Administrative Law Judge Division. The request must be filed with the Clerk of the South Carolina Board of Health and Environmental Control, 2600 Bull Street, Columbia, South Carolina 29201, within fifteen (15) days following issuance of the permit. Service may be effected by personal delivery or by first class mail, but the request must be received by the Clerk on or before the fifteenth day.

The following information, at a minimum, must be included in the request:

a. the name of the party or parties requesting the hearing and the issue(s) for which the hearing is requested;

b. the caption or other information sufficient to identify the permit decision being appealed; and

c. the relief requested.

In addition, the Administrative Law Judge Division requires that a person requesting a contested case hearing must file a copy of the request and a filing fee in the amount of $70.00 with the Administrative Law Judge Division at the following address:

Clerk, Administrative Law Judge Division
1205 Pendleton Street, Suite 224
P.O. Box 11667
Columbia, SC 29211

A petition for review of a decision to issue a new permit stays all actions for which the permit is a prerequisite. A petition for review of a decision to reissue a permit stays the contested provisions of the permit; they will not become effective until the administrative review process is complete and the conditions of the expiring permit remain in effect until the appeal is resolved. All uncontested provisions of the permit will be considered issued and effective on

the effective date set out in the permit and must be complied with by the facility. Information pertaining to adjudicatory matters may be obtained by contacting the Legal Office of the Department of Health and Environmental Control, 2600 Bull Street, Columbia, South Carolina or by calling 803/898-3350.

4. Issuance of the Permit when no Hearings are Held

If no public hearing or adjudicatory hearing is held, and, after review of the comments received, DHEC's determinations are substantially unchanged, the permit will be issued and become effective the first of the month following date of issue. This will be the final action of the Department of Health and Environmental Control.

If no hearings are held, but there have been substantial changes, public notice of DHEC's revised determination will be made. Following a 15-day comment period, the permit will be issued and become effective the first of the month following termination of the 15-day comment period and will be the final action of Department of Health and Environmental Control, unless a public or adjudicatory hearing is granted.

RATIONALE

Permitting Engineer: Christina H. Lewis

August 28, 2003

Name of Facility: VC Summer Nuclear Station
NPDES Permit No.:SC0030856
Facility Rating: Major ☒ (EPA review required)
Minor ☐ (EPA review may be required; see below)

Facility Location: Jenkinsville, South Carolina.
County: Fairfield County
Watershed: Basin 05 (Broad River Basin)

Permit based on NPDES Permit Application: 2C & 2E
Application Received Date: 4/17/2002

Issuance (New) ☐ Reissuance ☒ Modification ☐

If this application is for a new or expansion of an existing facility, an antidegradation review may be required per the requirements of R.61-68.D.

acility Description (include SIC code): This facility is a nuclear power plant. Discharges consist of process wastewater through Outfalls 003 & 014 and internal outfalls 004, 06A, 06B, 007, & 008. Outfall 001 discharges once-through non-contact cooling water and 005 is sanitary wastewater. SIC Code is 4911

→Is any discharge subject to any of the Primary Industry Categories identified in R.61-9.122, Appendix A as listed at right? Yes (If yes, EPA review required.)
Indicate category(ies) applicable and Regulations governing the discharge: Steam Electric Guidelines

Primary Industry Categories
Adhesives and sealants
Aluminum forming
Auto and other laundries
Battery manufacturing
Coal mining
Coil coating
Copper forming
Electrical and electronic components
Electroplating
Explosives manufacturing
Foundries
Gum and wood chemicals
Inorganic chemicals manufacturing
Iron and steel manufacturing
Leather tanning and finishing
Mechanical products manufacturing
Nonferrous metal manufacturing
Ore mining
Organic chemicals manufacturing
Paint and ink formulation
Pesticides
Petroleum refining
Pharmaceutical preparations
Photographic equipment and supplies
Plastics processing
Plastic and synthetic materials manufacturing
Porcelain enameling
Printing and publishing
Pulp and paper mills
Rubber processing
Soap and detergent manufacturing
Steam electric power plants
Textile Mills
Timber Products Processing

Receiving Water: Lake Monticello and Broad River
Receiving Water Classification (see R.61-69 for water classifications): Fresh Water
→Does this discharge(s) have the potential to affect waters in another state? No (If yes, EPA review required.)

Is the discharge to Impaired Waters?: Yes
If Yes, list the monitoring station number and parameter(s) causing impairment: B-337 for fecal coliform

→Average Discharge Flow: (Q_d) (MGD): 674.92 (from permit application) (EPA review required for any average discharge exceeding 0.5 MGD)
→Is this permit for a Federal facility with a daily average flow greater than 0.05 MGD (from all sources)? No (If yes, EPA review required.)

Stream Data from Wasteload Allocation dated (4/18/02)

Receiving Stream Flow Data	cfs	MGD
7Q10 at discharge point (Q_{7Q10})	0.000	0.000
Average Annual Flow at discharge point (AAF_d)	0.000	0.000

Is the discharge above a drinking water intake? Yes, Intake #S20103, City of Columbia, Broad River
Map showing the SWP area and the discharge point included: Yes

Source Water Protection Stream Flow Data	cfs	MGD
7Q10 at source water protection area boundary (Q_{7Q10i})	592.820	382.465
Average Annual Flow at source water protection area boundary (AAF_i)	2732.000	1762.580

Data from Discharge Monitoring Reports (DMRs) and NPDES permit application (including all subsequent data presented) from 1/97 - 5/02 has been used to evaluate permit limitations.

I. GENERAL INFORMATION

A. The effluent from this facility may be subject to the requirements of any of the following regulations: R.61-9.125, 129, 133, and 403; 40 CFR Part 136; Subchapter N (40 CFR Parts 400 through 402 and 404 through 471); R.61-9.503, R.61-9.504 and R.61-9.505.

B. Authority: This permit is written in accordance with applicable laws and regulations including, but not limited to, Regulation 61-9, Regulation 61-68, Pollution Control Act and Clean Water Act.

C. Under R.61-9.124.8 (Fact Sheet), a fact sheet shall be prepared for every draft permit for a major NPDES facility or activity, for every Class I sludge management facility, for every NPDES draft permit that incorporates a variance or requires an explanation under section 124.56(b), and for every draft permit which the Department finds is the subject of wide-spread public interest or raises major issues. The Rationale will be included as an attachment to the Fact Sheet prepared under this regulation.

D. The conclusions noted in the Rationale establish proposed effluent limitations and permit requirements addressed in R.61-9.122.43 (Establishing Permit Conditions), R.61-9.122.44 (Establishing Limitations, Standards and other permit conditions) and other appropriate sections of R.61-9.

II. RATIONALE GUIDANCE PROCEDURES

A. The receiving stream 7Q10, annual average stream flow at the discharge point, and 7Q10 and annual average stream flow at the boundary of the source water protection area above a proposed or existing drinking water intake (if applicable) are determined by the SCDHEC's Wasteload Allocation Section. The 7Q10 and Annual Average Flow are based on information published or verified by the USGS or an estimate extrapolation from published or verified USGS data. These flows may be adjusted by the Wasteload Allocation Section to account for existing water withdrawals that impact the stream flow. The 7Q10 (or 30Q5 if provided by the applicant) and annual average flow at the discharge point or 7Q10 (or 30Q5 if provided by the applicant) and annual average flow at the boundary of the SWP area for a proposed or existing drinking water intake will be used to determine dilution

factors, as appropriate, in accordance with R.61-68.C.4.a & 4.b for aquatic life, human health, and organoleptic effects respectively.

B. Water and organism consumption and drinking water MCL data will be evaluated as human health values when calculating dilution factors. "The Department may, after Notice of Intent included in a notice of a proposed NPDES permit in accordance with Regulation 61-9.124.10, determine that drinking water MCLs or W/O shall not apply to discharges to those waterbodies where there is: no potential to affect an existing or proposed drinking water source and no state-approved source water protection area." For permitting purposes, a proposed drinking water source is one for which a complete permit application, including plans and specifications for the intake, is on file with the Department at the time of consideration of an NPDES permit application for a discharge that will affect or has the potential to affect the drinking water source." See R.61-68.E.12.c(5). The Department defines the source water protection (SWP) area to be the primary SWP area delineated by the Source-Water Assessment and Protection (SWAP) Program initiated by the EPA and required by the states to identify SWP areas to protect drinking water sources. Using the procedure described in the document entitled, "Determination of the Primary and Secondary Source-Water Protection Areas for Selected Surface-Water Public-Supply Systems in South Carolina, 1999," USGS Water Resource Investigations Report 00-4097, the primary SWP area for a drinking water intake is the area which encompasses all 14-digit Hydrologic Unit Code (HUC) basins that adjoin streams, tributaries, and reservoirs between an intake and the upstream 10-percent exceedance, 24-hour travel distance (TOT_{10}). The entire basin above a drinking water intake has been designated as the SWP area where the drainage area is equal to or less than one HUC basin or is estimated to have less than 24-hours of instream travel time between the intake and the HUC basin in the headwaters of the drainage basin.

C. Application of numeric criteria to protect human health: If separate numeric criteria are given for organism consumption, water and organism consumption (W/O), and drinking water Maximum Contaminant Levels (MCLs), they shall be applied as appropriate. The most stringent of the criteria shall be applied to protect the existing and classified uses of the waters of the State. See R.61-68.E.12.b(1).

D. Numeric criteria have been established in R.61-68 based on organoleptic data (prevention of undesirable taste and odor). For those substances which have aquatic life and/or human health numeric criteria and organoleptic numeric criteria, the most stringent of the three shall be used for derivation of permit effluent limitations. See R.61-68.E.11.

E. Sampling Frequency: Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. Monitoring results must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in the permit (R.61-9.122.41). Typically requirements to report monitoring results shall be established on a case-by-case basis with a frequency dependent on the nature and effect of the discharge but in no case less than once a year (R.61-9.122.44)

F. Compliance Schedules:

1. A person issued an NPDES permit by the Department who is not in compliance with applicable effluent standards and limitations or other requirements contained therein at the time the permit is issued, shall be required to achieve compliance within a period of time as set forth by the Department, with effluent standards and limitations, with water quality standards, or with specific requirements or conditions set by the Department. The Department shall require compliance with terms and conditions of the permit in the shortest reasonable period of time as determined thereby or within a time schedule for compliance which shall be specified in the issued permit.

2. If a time schedule for compliance specified in an NPDES permit which is established by the Department, exceeds nine (9) months, the time schedule shall provide for interim dates of achievement for compliance with certain applicable terms and conditions of the permit. (R.61-9.122.47)

G. Procedure for establishing effluent limitations:

1. Effluent limits (mass and concentration) for Five day Biochemical Oxygen Demand (BOD_5), Ultimate Oxygen Demand (UOD), Dissolved Oxygen (DO), Total Ammonia Nitrogen (as N), and Nutrients are established by the Wasteload Allocation (WLA) Section, with consideration given to technology-based limitations.

   a. Five day Biochemical Oxygen Demand BOD_5, Ultimate Oxygen Demand (UOD), Dissolved Oxygen (DO):

   Effluent limits for conventional oxygen demanding constituents (BOD_5, UOD and DO) are established to protect in-stream water quality and uses, while utilizing a portion of the assimilative capacity of the receiving water. The ability of a water body to assimilate oxygen-demanding substances is a function of its physical and chemical characteristics above and below the discharge point. Various mathematical techniques, called models, have been developed to estimate this capacity. The Department follows the procedures as outlined in the "State/EPA Region IV Agreement on the Development of Wasteload Allocations/Total Maximum Daily Loads and NPDES Permit Limitations" dated October 30, 1991 (as updated) for determining the assimilative capacity of a given water body. Mathematical models such as QUAL2E and QUAL2E-UNCAS are used in accordance with "Enhanced Stream Water Quality Models QUAL2E and QUAL2E-UNCAS: Documentation and Users Manual" (EPA/600/3-87/007; dated May 1987) as updated. BOD_5 and UOD values determined from modeling results will be used in permitting as monthly average derived limits (C_{wla}). Daily maximum derived limits will be determined by multiplying the monthly average value by two.

   For facilities subject to effluent guidelines limitations or other technology-based limitations, BOD_5 will also be evaluated in accordance with the applicable industrial categorical guidelines. These parameters will be identified in Part III of this rationale when they are applicable to the permit.

   b. Total Ammonia Nitrogen (as N):

   Ammonia limitations based on oxygen demand will be determined from modeling information as described above. These values will be used as monthly average derived limits and a daily maximum will be determined by multiplying the monthly average derived limit by two. These values will be compared with the ammonia water quality criteria for protection of aquatic life from Regulation 61-68, Attachment 3 and any categorical limitations. The more stringent of the limitations will be imposed. Calculations for aquatic life criteria and other wasteload recommendations will be shown later in Part III of this rationale when ammonia is a pollutant of concern.

   c. Discharges of Nutrients:

   In order to protect and maintain lakes and other waters of the State, consideration is given to the control of nutrients reaching the waters of the State. Therefore, in accordance with regulation R.61-68.E.9, the Department controls the nutrients as prescribed below. Nutrient limitations will be determined from the best available information and/or modeling performed by the Wasteload Allocation Section to meet these water quality standards.

   i. Discharges of nutrients from all sources, including point and nonpoint, to waters of the State shall be prohibited or limited if the discharge would result in or if the waters experience growths of microscopic or macroscopic vegetation such that the water quality standards would be violated or the existing or classified uses of the waters would be impaired. Loading of nutrients shall be addressed on an individual basis as necessary to ensure compliance with the narrative and numeric criteria.

ii. Numeric nutrient criteria for lakes are based on an ecoregional approach which takes into account the geographic location of the lakes within the State and are listed below. These numeric criteria are applicable to lakes of 40 acres or more. Lakes of less than 40 acres will continue to be protected by the narrative criteria.

1. for the Blue Ridge Mountains ecoregion of the State, total phosphorus shall not exceed 0.02 mg/l, chlorophyll *a* shall not exceed 10 ug/l, and total nitrogen shall not exceed 0.35 mg/l

2. for the Piedmont and Southeastern Plains ecoregions of the State, total phosphorus shall not exceed 0.06 mg/l, chlorophyll *a* shall not exceed 40 ug/l, and total nitrogen shall not exceed 1.50 mg/l

3. for the Middle Atlantic Coastal Plains ecoregion of the State, total phosphorus shall not exceed 0.09 mg/l, chlorophyll *a* shall not exceed 40 ug/l, and total nitrogen shall not exceed 1.50 mg/l.

iii. In evaluating the effects of nutrients upon the quality of lakes and other waters of the State, the Department may consider, but not be limited to, such factors as the hydrology and morphometry of the waterbody, the existing and projected trophic state, characteristics of the loadings, and other control mechanisms in order to protect the existing and classified uses of the waters.

iv. The Department shall take appropriate action, to include, but not limited to: establishing numeric effluent limitations in permits, establishing Total Maximum Daily Loads, establishing waste load allocations, and establishing load allocations for nutrients to ensure that the lakes attain and maintain the above narrative and numeric criteria and other applicable water quality standards.

v. The criteria specific to lakes shall be applicable to all portions of the lake. For this purpose, the Department shall define the applicable area to be that area covered when measured at full pool elevation.

2. Effluent concentration limits (C_{efflim}) for parameters other than the parameters listed in G.1.a-c above are established using the following procedures:

Q_{7Q10}	7Q10 of the receiving stream at the discharge point in mgd. (may require adjustment for withdrawals)
AAF_d	Average Annual Flow (AAF) of the receiving stream at the discharge point in mgd. (may require adjustment for withdrawals)
Q_{7Q10i}	7Q10 of the receiving stream at the SWP Area boundary in mgd.
AAF_i	Average Annual Flow (AAF) of the receiving stream at the SWP Area boundary in mgd.
Q_d	Long term average discharge flow in mgd.

a. Determine dilution factors:
The following information is to be used (where applicable) for establishing effluent concentration limits:

DF_1: Dilution factor based on 7Q10 of the receiving stream at the discharge point (Q_{7Q10}). This dilution factor is used to determine the derived limits for protection of the following aquatic life and human health concerns for the reasons indicated:

i. Aquatic Life (see R.61-68.C.4.a(1)). Protection of aquatic life on a short-term basis is needed at the point where aquatic organisms become exposed to the discharge.

ii. Human Health – Organism Consumption for parameters identified as non-carcinogens per R.61-68.C.4.b(1). Protection for human health on a short-term basis for consumption of aquatic organisms is needed at the point the aquatic organisms become exposed to the discharge.

$$DF_1 = \left(\frac{Q_{7Q10} + Q_d}{Q_d} \right)$$

DF_2: Dilution factor, at the discharge point, based on the Average Annual Flow of the receiving stream at the discharge point (AAF_d). This dilution factor is used to determine the derived limits for protection of the following human health and organoleptic concerns for the reasons indicated:

i. Human Health – Organism Consumption for parameters identified as carcinogens per R.61-68.C.4.b(1). Protection for human health on a long-term basis to prevent cancer due to consumption of aquatic organisms is needed at the point the aquatic organisms become exposed to the discharge where it enters the stream.

ii. Organoleptic effects per R.61-68.C.4.b(1). Protection for taste and odor issues related to the discharge is needed at the point where the discharge enters the stream.

$$DF_2 = \left(\frac{AAF_d + Q_d}{Q_d} \right)$$

DF_3: Dilution factor based on the 7Q10 at the source water protection area boundary for protection of a proposed or existing water intake downstream of the discharge (Q_{7Q10i}). This dilution factor is used to determine the derived limits for protection of the following human health concerns for the reasons indicated:

i. Human Health – Water and Organism Consumption for parameters identified as non-carcinogens per R.61-68.C.4.b(1) and E.12.c(5) to protect for short-term health effects when the discharge is above any drinking water intake. Protection of human health relative to drinking the water from the stream and consuming aquatic organisms from the same stream is provided by this criterion, but drinking the water withdrawn from the stream may require a potentially higher level of protection in terms of applicable dilution than consumption of organisms. In addition, to satisfy the requirements of R.61-68.C.10(a), the Department has determined that dilution at the boundary of the Source Water Protection area will protect the drinking water intake to meet this requirement.

For discharges affecting the primary SWP area, dilution will be determined using the largest TOT_{10} flow along the SWP area boundary upstream of the drinking water intake of concern. If multiple drinking water intakes are present below the discharge, the SWP area of the intake closest to the discharge will be protected. If the entire basin is designated as the SWP area, the boundary will be the TOT_{10} at the beginning of the basin, even if it is outside the State boundaries (e.g. North Carolina).

ii. Human Health - Drinking Water Maximum Contaminant Level (MCL) for parameters identified as non-carcinogens per R.61-68.C.4.b(1) and E.12.c(5) to protect for short-term health effects when the discharge is above any drinking water intake. Protection of human

health relative to drinking the water from the stream after conventional treatment per R.61-68.G.8 and 10 is provided by this criterion. In addition, to satisfy the requirements of R.61-68.C.10(a), the Department has determined that dilution at the boundary of the Source Water Protection area will protect the drinking water intake to meet this requirement.

For discharges affecting the primary SWP area, dilution will be determined using the largest TOT_{10} flow along the SWP area boundary upstream of the drinking water intake of concern. If multiple drinking water intakes are present below the discharge, the SWP area of the intake closest to the discharge will be protected. If the entire basin is designated as the SWP area, the boundary will be the TOT_{10} at the beginning of the basin, even if it is outside the State boundaries (e.g. North Carolina).

$$DF_3 = \left(\frac{Q_{7Q10i} + Q_d}{Q_d} \right)$$

DF_4: Dilution factor based on the Average Annual Flow at the source water protection area boundary for protection of a proposed or existing water intake downstream of the discharge (AAF_i) This dilution factor is used to determine the derived limits for protection of the following human health concerns for the reasons indicated:

i. Human Health–Water and Organism Consumption for parameters identified as carcinogens per R.61-68.C.4.b(1) and E.12.c(5) to protect for long-term health effects due to cancer when the discharge is above any drinking water intake. Protection of human health relative to drinking the water from the stream and consuming aquatic organisms from the same stream is provided by this criterion, but drinking the water withdrawn from the stream may require a potentially higher level of protection in terms of applicable dilution than consumption of organisms. In addition, to satisfy the requirements of R.61-68.C.10(a), the Department has determined that dilution at the boundary of the Source Water Protection area will protect the drinking water intake to meet this requirement.

For discharges affecting the primary SWP area, dilution will be determined using the largest TOT_{10} flow along the SWP area boundary upstream of the drinking water intake of concern. If multiple drinking water intakes are present below the discharge, the SWP area of the intake closest to the discharge will be protected. If the entire basin is designated as the SWP area, the boundary will be the TOT_{10} at the beginning of the basin, even if it is outside the State boundaries (e.g. North Carolina).

ii. Human Health - Drinking Water Maximum Contaminant Level (MCL) for parameters identified as carcinogens per R.61-68.C.4.b(1) and E.12.c(5) to protect for long-term health effects due to cancer when the discharge is above any drinking water intake. Protection of human health relative to drinking the water from the stream and consuming aquatic organisms from the same stream is provided by this criterion, but drinking the water withdrawn from the stream may require a potentially higher level of protection in terms of applicable dilution than consumption of organisms. In addition, to satisfy the requirements of R.61-68.C.10(a), the Department has determined that dilution at the boundary of the Source Water Protection area will protect the drinking water intake to meet this requirement.

For discharges affecting the primary SWP area, dilution will be determined using the largest TOT_{10} flow along the SWP area boundary upstream of the drinking water intake of concern. If

multiple drinking water intakes are present below the discharge, the SWP area of the intake closest to the discharge will be protected. If the entire basin is designated as the SWP area, the boundary will be the TOT_{10} at the beginning of the basin, even if it is outside the State boundaries (e.g. North Carolina).

$$DF_4 = \left(\frac{AAF_t + Q_d}{Q_d} \right)$$

Dilution Factors (using formulas above):

DF_1	1.00
DF_2	1.00
DF_3, if applicable	1.57
DF_4, if applicable	3.61

b. Determine monthly average derived limits using the following procedures:

WQS_{al} Freshwater Stream Standard (based on an established criteria or other published data per R.61-68) for protection of Aquatic Life; may be a CCC or CMC as defined below

WQS_{org} Stream Standard (based on an established criteria or other published data per R.61-68), for protection of Human Health – Organism Consumption

WQS_{wo} Stream Standard (based on an established criteria or other published data per R.61-68), for protection of Human Health – Water & Organism Consumption. Applicable only if any portion of the mixing zone for this discharge is in a state-approved source water protection area for a proposed or existing water intake downstream of the wastewater treatment plant discharge point.

WQS_{mcl} Stream Standard (based on an established criteria or other published data per R.61-68), for Drinking Water MCL (Maximum Contaminant Level). Applicable only if any portion of the mixing zone for this discharge is in a state-approved source water protection area for a proposed or existing water intake downstream of the wastewater treatment plant discharge point.

WQS_{ol}: Stream Standard (based on an established criteria or other published data per R.61-68), based on Organoleptic Data.

C_{aqlife} Concentration limit derived from aquatic life data

C_{HH} Concentration limit derived from human health data as determined from organism (C_{org}), water/organism (C_{wo})and MCL (C_{mcl}) data

C_{ol} Concentration limit derived from organoleptic data

C_b Background concentration of the concerned parameter in mg/l determined from ambient monitoring data or data provided by applicant. The 90th percentile of ambient monitoring data for aquatic life protection for the parameters identified in the Appendix (Water Quality Numeric Criteria) to Regulation 61-68 from the last 3 years, or whatever is available if less than 3 years, will typically be used per the procedures used for 303(d) listing. The median value of ambient monitoring data for human health protection for the parameters identified in the Appendix (Water Quality Numeric Criteria) to Regulation 61-68 from the last 3 years, or whatever is available if less than 3 years, will typically be used per the procedures used for 303(d) listing. The background concentration is assumed to be zero (0) in the absence of actual data based on Departmental guidance and EPA recommendation.

i. Determine the derived limit for protection of Aquatic Life (C_{aqlife})

1. The following guidelines apply to determining aquatic life limits:

a. Typically, the Criterion Maximum Concentration (CMC) is applied as a daily maximum derived limit and the Criterion Continuous Concentration (CCC) is applied as a monthly average derived limit, after consideration of dilution and background concentrations. Exceptions exist based on EPA criteria and are indicated for specific parameters. The CMC and CCC for specific metals will be adjusted using the procedures in 60 FR 22229, "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance-Revision of Metals Criteria," May 4, 1995 and the "Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria," Oct. 1, 1993 and applied as a daily maximum and monthly average, respectively, after consideration of dilution and background concentrations.

b. If only a CMC exists for a particular parameter, a daily maximum derived permit limit only (no monthly average) will be set using that value, after consideration of dilution and background concentrations. If only a CCC is given, it will be used as a monthly average derived limit and the daily maximum derived limit will be two (2) times the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the US EPA's "Technical Support Document for Water Quality-based Toxics Control", EPA/505/2-90-001, March 1991 (hereafter known as the TSD) considering an assumed coefficient of variation (CV) of 0.6 and 95th percentile occurrence probability.

c. If only an acute toxicity effect concentration for a number of species for a particular pollutant is given as a LC_{50}, the lowest concentration should be divided by an acute-to-chronic ratio (ACR) of 10 and a sensitivity factor of 3.3, for an acceptable instream concentration in order to protect against chronic toxicity effects (from R.61-68.E.14.a(1)). Other acute toxicity data will be handled similarly. The value obtained from this calculation will be used as a monthly average derived limit after consideration of dilution and background concentrations. The daily maximum will be two (2) times the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the TSD considering an assumed coefficient of variation (CV) of 0.6 and 95th percentile occurrence probability.

d. If a chronic toxicity effect concentration for a number of species for a particular pollutant is given as a no observed effect concentration (NOEC), the lowest concentration should be divided by a sensitivity factor of 3.3 in order to protect against chronic toxicity to the most sensitive species (from R.61-68.E.14.a(2)). Other chronic toxicity data will be handled similarly. The value obtained from this calculation will be used as a monthly average derived limit after consideration of dilution and background concentrations. The daily maximum will be two (2) times the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the TSD considering an assumed coefficient of variation (CV) of 0.6 and 95th percentile occurrence probability.

e. If both acute and chronic data are available for a particular pollutant, monthly average derived limit will be calculated as in c and d above for each acute and chronic, respectively. The more stringent of the monthly average derived limits will be the monthly average derived limit used after consideration of dilution and background concentrations. The daily maximum will be two (2) times the value obtained for the monthly average based on a simplified statistical procedure for determining permit limits recommended in Section 5.4.2 of the TSD considering an assumed coefficient of variation (CV) of 0.6 and 95th percentile occurrence probability.

2. Consider the background concentration (C_b) of the parameter of concern. If the background concentration is equal to or greater than the applicable stream standard (*WQS*, as defined above) for the parameter of concern, then the derived concentration limit (C_{aqlife}) for that parameter and for the protection of that stream standard, is established equal to the stream standard (*WQS*). An exception exists where the naturally occurring instream concentration for a substance is higher than the derived permit effluent limitation. In those situations, the Department may establish permit effluent limitations (C_{efflim}) at a level higher than the derived limit, but no higher than the natural background concentration. In such cases, the Department may require biological instream monitoring and/or whole effluent toxicity (WET) testing (See R.61-68.E.12.c.2). i.e.

   If C_b is not based on naturally occurring concentrations and

   $$C_b \geq WQS$$

   Then

   $$C_{aqlife} = WQS.$$

   If C_b is based on naturally occurring concentrations and

   $$C_b \geq WQS$$

   Then

   $$C_{aqlife} < C_{eff\ lim} \leq C_b.$$

   Otherwise, the limits are established as described in Item 3 or 4 below.

3. For the parameters listed in Table A below, Regulation R.61-68 Section E.12 provides for the use of the EPA Office of Water Policy and "Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria", October 1, 1993. A subsequent revision published in the Federal Register (60 FR 22229) on May 4, 1995 updated the data in the original report. See R.61-68 Attachment 1 "Conversion Factors for Dissolved Metals" and Attachment 2 "Parameter for Calculating Freshwater Dissolved Metals Criteria that are Hardness-Dependent". The following equations and constants will be used to calculate aquatic life metals limits based on the Federal Register data. The water quality standard for these metals (CCC or CMC) will also be adjusted using this approach in accordance with Regulation 61-68.E.12.d(3) for evaluation of ambient water quality.

   TSS, Effluent Total Suspended Solids (TSS) concentration in mg/l from actual or proposed monthly average permit limits.

   TSS$_b$ Background or in-stream Total Suspended Solids (TSS) concentration. The background TSS is assumed to be 1 mg/l in the absence of actual stream data based on the 5th percentile of ambient TSS data on South Carolina streams from 1993-2000.

   TSS$_{avg}$ Average in-stream (mixed) TSS concentration.

   CF Conversion factor considered most relevant in fresh water for aquatic life as defined by EPA in dissolved metals documents for each listed metal

   H Hardness in mg/l of $CaCO_3$. Per R.61-68.E.12.a(3), the CMC and CCC are based on a hardness of 25 mg/l if the ambient hardness is less than 25 mg/l. Concentrations of hardness less than 400 mg/l may be based on the actual mixed stream hardness if it is greater than 25 mg/l and less than 400 mg/l and 400 mg/l if the ambient hardness is greater than 400 mg/l. The background hardness is assumed to be 25 mg/l in the absence of actual stream data. Mixed stream hardness may be determined using effluent hardness and actual stream hardness.

   K_{po} Metal-specific equilibrium constant

a	Metal-specific constant
K_p	Linear partition coefficient
K_{pb}	Linear partition coefficient for use in the derivation of an adjusted water quality standard
C_d	Dissolved phase metal concentration
C_t	Total metal concentration
S	a constant to represent the CCC or CMC

The following table lists the values for the constants, the CCC and CMC, the recommended values of the conversion factor (CF), and the adjusted CCC and CMC:

Table A

Parameter	k_{po}	a	CMC (µg/l)	CF_{CMC}	CCC (µg/l)	CF_{CCC}
Arsenic	0.48×10^6	-0.7286	340	100	150	100
Cadmium	4.00×10^6	-1.1307	0.95*	100*	0.83*	96.7*
Chromium+3	3.36×10^6	-0.9304	580*	31.6	68*	86
Chromium+6	3.36×10^6	-0.9304	16	98.2	11	96.2
Copper	1.04×10^6	-0.7436	3.8*	96	2.9*	96
Lead	0.31×10^6	-0.1856	14*	99.3*	0.54*	99.3*
Mercury	2.91×10^6	-1.1356	1.6	85	0.091	85
Nickel	0.49×10^6	-0.5719	150*	99.8	16*	99.7
Zinc	1.25×10^6	-0.7038	37*	97.8	37*	98.6

* The equations for calculating the CCC, CMC, and conversion factors are given in the Appendix to Regulation 61-68 and Attachments 1and 2 for each parameter. The values given for the CMC and CCC and CF in the table are based on 25 milligrams/liter (mg/l) hardness (as expressed as $CaCO_3$).

Effluent TSS concentration (TSS_e) (mg/l) (based on monthly average permit limit)	6.4
Background or In-stream TSS concentration (TSS_b) (mg/l)	1
Calculated In-stream Average TSS concentration after mixing (TSS_{ave}) (mg/l)	6.40

From Technical Guidance Manual for Performing Waste Load Allocations Book II, Rivers and Streams, EPA/440/484/022:

$$S = CCC \text{ or } CMC$$

$$C_d = S \times CF$$

To determine the adjusted water quality standard (WQS_{al}), use S and the equation for C_d above and the following equations:

$$K_{pb} = K_{po} \times (TSS_b)^a$$

$$WQS_{al} = C_d \times \{1 + (K_{pb} \times TSS_b \times 10^{-6})\}$$

To determine the effluent limit (C_{aqlife}) , use S and the equation for C_d above and the following equations:

$$TSS_{avg} = \frac{(Q_d \times TSS_e) + (Q_{7Q10} \times TSS_b)}{Q_d + Q_{7Q10}}$$

$$K_p = K_{po} \times (TSS_{avg})^a$$

$$C_t = C_d \times \{1 + (K_p \times TSS_{avg} \times 10^{-6})\}$$

Once C_t has been calculated, it is multiplied by DF_1 and background concentrations are accounted for to obtain the monthly average derived limit (C_{aqlife}):

$$C_{aqlife} = (C_t \times DF_1) - \left\{C_b \times \left(\frac{Q_{7Q10}}{Q_d}\right)\right\}$$

4. For all other parameters not included in paragraph 3, Table A, monthly average derived limits (C_{aqlife}) for aquatic life protection are calculated as follows:

$$C_{aqlife} = (DF_1 \times WQS_{al}) - \left\{C_b \times \left(\frac{Q_{7Q10}}{Q_d}\right)\right\}$$

ii. Determine derived limit for protection of Human Health

1. The following guidelines apply to determining human health limits:

   a. The human health criterion given by Regulation 61-68 will be applied as a monthly average derived limit after consideration of dilution and background concentrations (C_{HH-avg}). Exceptions exist based on EPA criteria and are indicated for specific parameters. No limits on human health based on water and organism consumption or drinking water MCLs will be imposed if there is no potential to affect a drinking water intake or source water protection area (i.e., if there is no intake downstream of the discharge).

   b. The daily maximum permit limit will be determined from the monthly average value from (a) above and a multiplier (M) determined using a statistical procedure recommended in Section 5.5 using average = 95th percentile from Table 5-3 in the TSD. The permitted or proposed number of samples per month (n) is used with the coefficient of variation (CV) to determine M. CV is assumed to be 0.6 as a default value if information is not known.

$$M = \frac{e^{(Z_n\sigma - 0.5\sigma^2)}}{e^{(Z_n\sigma_n - 0.5\sigma_n^2)}}$$

where:

$$\sigma_n^2 = \ln\left(\frac{CV^2}{n} + 1\right)$$

$$\sigma^2 = \ln\left(CV^2 + 1\right)$$

CV = coefficient of variation of the effluent concentration = $\dfrac{Std.\ Deviation}{Mean}$

n = the number of effluent samples per month (where frequency is less than 1/month, n =1)

z_m = the percentile exceedance probability for the daily maximum permit limit (=2.326 for 99th percentile basis)

z_a = the percentile exceedance probability for the monthly average permit limit (=1.645 for 95th percentile basis)

$$C_{HH\text{-}max} = M * C_{HH\text{-}avg}$$

2. Consider the background concentration (C_b) of the parameter of concern. If the background concentration is equal to or greater than the applicable stream standard (*WQS*, as defined above) for the parameter of concern, then the derived concentration limit (C_{HHe}) for that parameter and for the protection of that stream standard, is established equal to the stream standard (*WQS*). An exception exists where the naturally occurring instream concentration for a substance is higher than the derived permit effluent limitation. In those situations, the Department may establish permit effluent limitations (C_{effLim}) at a level higher than the derived limit, but no higher than the natural background concentration. In such cases, the Department may require biological instream monitoring and/or whole effluent toxicity (WET) testing (See R.61-68.E.12.c.3).

   If C_b is not based on naturally occurring concentrations and

   $$C_b \geq WQS$$

   Then

   $$C_{HH} = WQS.$$

   If C_b is based on naturally occurring concentrations and

   $$C_b \geq WQS$$

   Then

   $$C_{HH} < C_{eff\ lim} \leq C_b.$$

   Otherwise, the limits are established as described in Items 3-6 below.

3. Human Health – Organism Consumption (C_{org}).

   a. For Carcinogens
   The Monthly Average is calculated as follows:

   $$C_{org} = (DF_2 \times WQS_{org}) - \left\{C_b \times \left(\frac{AAF_d}{Q_d}\right)\right\}$$

   b. For Non-carcinogens
   The Monthly Average is calculated as follows:

$$C_{org} = (DF_1 \times WQS_{org}) - \left\{ C_b \times \left(\frac{Q_{7Q10}}{Q_d} \right) \right\}$$

4. Human Health – Water and Organism Consumption (C_{wo})

   a. For Carcinogens
   The Monthly Average is calculated as follows:

$$C_{wo} = (DF_4 \times WQS_{wo}) - \left\{ C_b \times \left(\frac{AAF_l}{Q_d} \right) \right\}$$

   b. For Non-carcinogens
   The Monthly Average is calculated as follows:

$$C_{wo} = (DF_3 \times WQS_{wo}) - \left\{ C_b \times \left(\frac{Q_{7Q10l}}{Q_d} \right) \right\}$$

5. Human Health – Drinking Water Maximum Contaminant Level (MCL) (C_{mcl}).

   a. For Carcinogens
   The Monthly Average is calculated as follows:

$$C_{mcl} = (DF_4 \times WQS_{mcl}) - \left\{ C_b \times \left(\frac{AAF_l}{Q_d} \right) \right\}$$

   b. For Non-carcinogens
   The Monthly Average is calculated as follows:

$$C_{mcl} = (DF_3 \times WQS_{mcl}) - \left\{ C_b \times \left(\frac{Q_{7Q10l}}{Q_d} \right) \right\}$$

6. Organoleptic criteria (C_{ol}).

   The Monthly Average is calculated as follows:

$$C_{ol} = (DF_2 \times WQS_{ol}) - \left\{ C_b \times \left(\frac{AAF_d}{Q_d} \right) \right\}$$

c. Determine most stringent of applicable data using the monthly average derived limits determined or calculated above:

$C_{effluent}$ = minimum of ($C_{aquifer}$, C_{org}, C_{wo}, C_{mcl}, C_{ol}, C_{wla})

Note: If a CMC is present for the parameter of concern, the daily maximum derived limit obtained from that calculation must also be considered under reasonable potential.

d. Determine whether the discharge causes, has the reasonable potential to cause or contributes to a water quality violation.

Regulation 61-9.122.44(d)(1)(i) states: "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Department determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

When determining whether a discharge causes, has the reasonable potential to cause or contributes to an instream excursion, the Department will use procedures which account for controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and, where appropriate, the dilution of the effluent in the receiving water (R.61-9.122.44(d)(1)(ii)).

Based on the above statements, there are three scenarios when limitations are required, as follows:

i. When data provided by the permit applicant indicates values greater than the proposed limitation derived above, that discharge will <u>cause</u> an excursion above a narrative or numeric water quality criterion.

ii. A discharge will be determined to <u>contribute</u> to an excursion of a water quality criterion when the waterbody is impaired (e.g., on the 303(d) list) for the parameter of concern and that parameter is also being discharged.

iii. <u>Reasonable potential to cause</u> a water quality violation is determined using the following information:

Chapter 3 of the TSD provides information for determining the need for permit limits based on the regulatory statements above. A statistical procedure is also presented in Chapter 3 for use in determining reasonable potential from effluent data. "National Guidance for the Permitting, Monitoring, and Enforcement of Water Quality-Based Effluent Limitations Set Below Analytical Detection/Quantitation Level" draft dated March 22, 1994, offers recommendations on how to interpret data below detection capabilities to make a reasonable potential analysis.

All pollutants given in a wasteload allocation or an effluent limitation guideline will be limited in the permit.

When effluent data consists of non-quantifiable/non-detectable values or when no effluent data is available, other factors and information are considered to determine reasonable potential. In situations where a pollutant is known to be present in the wastestream (due to production data or other information), we know it is being discharged and has the potential to impact even though it may not be quantifiable. The fact that it is present will be enough information to say reasonable potential exists for that pollutant. Therefore, a reasonable potential decision is based on various data and information, and not just non-quantifiable/non-detectable data. Consideration is given to existing data, dilution in the stream, type of receiving water, designated use, type of industry/wastestream, ambient data, history of compliance, and history of toxic impact. If any source of information indicates reasonable potential to cause, or contribute to an exceedance of the water quality standard, a water quality limit will be developed.

Note: The result of the following calculations may indicate that reasonable potential does not exist. However, as stated above, other information may "override" this numerical determination to justify the need for a limit.

1. The procedure for determining reasonable potential from actual effluent data is explained in Box 3-2 on page 53 of the TSD. Multiplying factors are determined from Table 3-2 at a 95% confidence level and 95% probability in Section 3.3.2. The following describes the procedures used for determining reasonable potential for chemical-specific parameters and WET, under certain circumstances. More information on determining reasonable potential for WET is given in Item 2 below.

Step 1: Data Analysis: The statistical calculations involved in the "Reasonable Potential" analysis require discrete numerical data. The following describes how the effluent data will be used in determining reasonable potential.

Actual analytical results should be used whenever possible. Results less than detection and quantification should be used as follows:

a. If the permittee reports results below the practical quantitation limit (PQL) (as defined by the permit), then the reported "less than PQL" value for a given sample is assumed to be zero.

b. If the permittee uses a detection/quantification level that is **greater** than the PQL, then the reported "less than" value for a given sample is assumed to be a discrete value equal to the detection/quantification level used by the permittee.

c. If the reported data consists of both discrete and non-discrete values and/or the data is reported using varying detection/quantification levels, then a combination of the above two approaches is used, or the data is evaluated in a manner that is most appropriate for that data set.

Note: For information on the acceptable analytical methods and PQLs please refer to NPDES permit application attachment titled "Practical Quantitation Limits (PQL) and Approved Test Methods."

Step 2: Using data from the permit application, other data supplied by the applicant and/or Discharge Monitoring Report (DMR) data, determine the total number of observations (n) for a particular set of effluent data and determine the highest value (C_{max}) from that data set. For the monthly average comparison, the data set will include monthly average results and n will be the number of months in which they sampled in the time period being evaluated. When there is also a daily maximum comparison, the data set will include daily maximum results and n will be the total number of samples in the time period being evaluated. Individual results may not necessarily be used in the calculation.

Step 3: Determine the coefficient of variation (CV) for the data set. For a data set where $n>10$, the CV is calculated as standard deviation divided by mean for the data set being evaluated. For data set where $n<10$, the CV is estimated to equal 0.6. For less than 10 items of data, the uncertainty in the CV is too large to calculate a standard deviation or mean with sufficient confidence.

$$CV = 0.6 \quad \text{for} \quad n < 10$$

$$CV = \frac{\sigma}{\mu} \quad \text{for} \quad n > 10$$

where: σ = Standard Deviation of the samples
μ = Mean of the samples

Step 4: Determine the appropriate multiplying factor (*MF*) from either Table 3-2 or using the formulae in Section 3.3.2 of the TSD.

a. Determine the percentile represented by the highest concentration in the sample data.

$$p_n = (1 - Confidence\ Level)^{1/n}$$

where: p_n = Percentile represented by the highest concentration in the data
n = number of samples
Confidence Level = 0.95 i.e. 95%

b. Determine the multiplying factor (*MF*), which is the relationship between the percentile described above (C_p) and the selected upper bound of the lognormal effluent distribution, which in this case will be the 95th percentile (C_{95}).

$$MF = \frac{C_{95}}{C_p} = \frac{e^{(Z_{95}\sigma + 0.5\sigma^2)}}{e^{(Z_p\sigma + 0.5\sigma^2)}}$$

where: Z_{95} is the standardized Z-score for the 95th percentile of the standardized normal distribution = 1.645

Z_p is the standardized Z-score for the pth percentile of the standardized normal distribution.(determined in (b) above)

Note: The values of Z-scores are listed in tables for the normal distribution. If using Microsoft® Excel, this can be calculated using the NORMSINV function.

$$\sigma^2 = \ln(CV^2 + 1)$$

$$\sigma = \sqrt{\ln(CV^2 + 1)}$$

Step 5: Multiply the highest value from the data set (C_{max}) by the multiplying factor (*MF*) determined in Step 4 to obtain the maximum receiving water concentration (*RWC*).

$$RWC = C_{max} \times MF$$

Step 6: *RWC* Derived monthly average limit (C_{effm}) implies that a reasonable potential does not exist.

RWC > Derived monthly average limit (C_{effm}) implies that a reasonable potential exists.

Note: If a CMC is available for a given parameter, the daily maximum value will be used in addition to the monthly average for a determination of reasonable potential.

2. Reasonable potential for WET will be determined from numerical data using one of the following procedures:

   a. When the effluent data is given as LC_{50} and/or NOEC values:

   Step 1: Convert the given LC_{50} and *NOEC* values to toxic units, TU_a for acute data and TU_c for chronic data, respectively, using the following formulae:

$$TU_a = \frac{100}{LC_{50}}$$

$$TU_c = \frac{100}{NOEC}$$

   Step 2: Using DMR data or other data provided by the applicant, determine the total number of observations (n) for a particular set of effluent data and determine the highest value ($TU_{a,\,max}$ or $TU_{c,\,max}$) from that data set.

   Step 3: Determine the coefficient of variation (*CV*) for the data set. For a data set where $n>10$, the *CV* is calculated as standard deviation divided by mean. For data set where $n<10$, the *CV* is estimated to equal 0.6. For less than 10 items of data, the uncertainty in the *CV* is too large to calculate a standard deviation or mean with sufficient confidence.

   Step 4: Determine the appropriate multiplying factor (*MF*) from either Table 3-2 or using the formulae in Section 3.3.2. (see iii.1, Step 4 above).

   Step 5: Multiply the highest value of $TU_{a,\,max}$ or $TU_{c,\,max}$ from the data set by the multiplying factor (*MF*) determined in Step 4 and the dilution at the edge of the mixing zone (the test concentration obtained from mixing zone modeling or demonstration) to obtain the maximum receiving water concentration (*RWC*)

   RWC for Acute Toxicity = [$TU_{a,\,max}$ * *MF* * *conc. at MZ boundary*]
   RWC for Chronic Toxicity = [$TU_{c,\,max}$ * *MF* * *conc. at MZ boundary*]

   Step 6: *RWC* for Acute Toxicity $0.3*TU_a$ implies that a reasonable potential does not exist
   RWC for Acute Toxicity > $0.3*TU_a$ implies that a reasonable potential exists

   RWC for Chronic Toxicity $1.0*TU_c$ implies that a reasonable potential does not exist
   RWC for Chronic Toxicity > $1.0*TU_c$ implies that a reasonable potential exists

   b. When pass/fail effluent data only is available and all tests have passed, the Department may be able to determine reasonable potential in a manner similar to Item 1 above assuming the test concentration of interest is greater than or equal to the concentration at which the permittee has tested. If the permittee has not tested at or above the test concentration of interest, the Department cannot say that reasonable potential does not exist, unless perhaps, circumstances related to the discharge have changed. If any failures exist in the data set that cannot be

removed, reasonable potential may be determined to exist.

c. Where WET results are given as percent effect, the procedures in Item 1, Steps 1-6 above are followed. In the case of WET in these circumstances, C_{lim} will be 25% for the monthly average and 40% for the maximum since these are the limits for WET testing as a percent effect preferred by the Department.

e. Determine permit limits based on water quality data

i. When the discharge is determined to cause or have the reasonable potential to cause a water quality violation for a particular parameter, except WET, limits are needed. Limits are typically based on the monthly average values calculated from G.2.c above. However, daily maximum values may be evaluated under reasonable potential under certain circumstances. If reasonable potential exists for either average or maximum derived limits, limits on both are needed per Regulation 61-9.122.45(d).

1. If the monthly average from G.2.c is based on a wasteload allocation for oxygen-demanding pollutants and nutrients and

a. no CMC exists, the water quality limits are
monthly average = C_{wla}
daily maximum = 2 x C_{wla}

b. a CMC exists (for ammonia), the water quality limits are
monthly average = C_{wla}

and the daily maximum is the most stringent of

daily maximum = 2 x C_{wla}
or
daily maximum = $C_{aqlife\text{-}dm}$ using CMC as WQS in G.2.b.i.3 or 4

2. If the monthly average from G.2.c is based on aquatic life data given as a CCC, if the discharge causes, has the reasonable potential to cause or contributes to a water quality violation based on the monthly average and a CMC also exists for the parameter, the water quality limits are

monthly average = $C_{aqlife\text{-}mo}$ using CCC as WQS in G.2.b.i.3 or 4
daily maximum = $C_{aqlife\text{-}dm}$ using CMC as WQS in G.2.b.i.3 or 4

3. If the monthly average from G.2.c is based on aquatic life data given as a CCC and if the discharge does not cause, have the reasonable potential to cause or contribute to a water quality violation for that monthly average, but a CMC also exists for the parameter and the discharge causes, has the reasonable potential to cause or contributes to a water quality violation based on that daily maximum, the water quality limits are

monthly average = $C_{aqlife\text{-}mo}$ using CCC as WQS in G.2.b.i.3 or 4
daily maximum = $C_{aqlife\text{-}dm}$ using CMC as WQS in G.2.b.i.3 or 4

4. If the monthly average from G.2.c is based on aquatic life data given as a CCC or other acute or chronic data and no CMC exists for the parameter, the water quality limits are

monthly average = C_{aqlife}

daily maximum = 2 x $C_{aq\,life}$

5. If no CMC exists and the monthly average from G.2.c is based on human health (organism, w/o, MCL) data, the water quality limits are

   monthly average = C_{HH}
   daily maximum = M x C_{HH} using the calculation for M from G.2.b.ii.1.b

6. If a CMC exists and the monthly average from G.2.c is based on human health (organism, w/o, MCL) data, the water quality limits will be

   monthly average = C_{HH}

   and the daily maximum will be the most stringent of

   daily maximum = M x C_{HH} using the calculation for M from G.2.b.ii.1.b

   or

   daily maximum = $C_{aq\,life\text{-}dm}$ using CMC as WQS in G.2.b.i.3 or 4

7. If no CMC exists and the monthly average from G.2.c is based on organoleptic data, the water quality limits are

   monthly average = C_{ol}
   daily maximum = M x C_{ol} using the calculation for M from G.2.b.ii.1.b

8. If a CMC exists and the monthly average from G.2.c is based on organoleptic data, the water quality limits will be

   monthly average = C_{ol}

   and the daily maximum will be the most stringent of

   daily maximum = M x C_{ol} using the calculation for M from G.2.b.ii.1.b

   or

   daily maximum = $C_{aq\,life\text{-}dm}$ using CMC as WQS in G.2.b.i.3 or 4

9. If only a CMC exists, then the water quality limits will be no monthly average and

   daily maximum = $C_{aq\,life\text{-}dm}$ using CMC as WQS in G.2.b.i.3 or 4

ii. If the discharge is determined to cause or have the reasonable potential to cause a water quality violation for WET, permit limitations will be explained in the rationale for that parameter.

iii. If the discharge is determined to contribute to an existing water quality violation, monthly average and daily maximum limits will be set giving no credit for dilution of the receiving stream (end-of-pipe limits) based on the criteria in Item 1 above.

f. Consider Effluent Limitations Guidelines (ELG or Categorical guidelines)

The more stringent of the effluent limitations guidelines average and maximum derived limits and water quality-derived average and maximum limits determined in e above shall be used as permit limits, unless other information indicates more stringent limits are needed as indicated in the notes at the end of this section. Categorical limitations based on mass may first be converted to concentration using the long term average flow of the discharge for both the monthly average and daily maximum calculations, unless the applicable guidelines require use of an alternate flow.

1. For Effluent guidelines based on production, limits will be calculated as follows:

$$ELG\lim = \sum (ELGprod)(ELG) \text{ where}$$

ELGlim: the mass limit, in lbs/day, for an applicable pollutant based on the production
ELGprod: the production rate, in lbs, for the applicable guideline(s), usually based on long term average data
ELG: the effluent guideline limitation, given as a measure of production (e.g. lbs/1000 lbs), for an applicable pollutant

2. For Effluent guidelines based on flow, limits will be calculated as follows:

$$ELG\lim = \sum (ELGflow)(ELG)(8.34) \quad \text{where}$$

ELGlim :the mass limit, in lbs/day, for an applicable pollutant based on applicable flow
ELGprod: the long term average flow rate, in MGD, for the applicable guideline(s)
ELG: the concentration limitation, in mg/l, for an applicable pollutant from the applicable guideline(s)

a. For BOD and TSS limits based on OCPSF Effluent Guidelines with two or more applicable subparts in subparts B-H , the limits will be calculated as follows:

$$ELG_o = \sum \left(\frac{subpart\ production}{total\ OCPSF\ production} \right) (ELG\ \lim) \text{ where}$$

ELG_o: the final OCPSF limitation, in lbs/day
ELGlim: the limitation, in lbs/day, determined from the calculation in item 2 above.

H. Other considerations

1. When the derived permit effluent limitation based on aquatic life numeric criteria is below the practical quantitation limit for a substance, the derived permit effluent limitation shall include an accompanying statement in the permit that the practical quantitation limit using approved analytical methods shall be considered as being in compliance with the limit. Appropriate biological monitoring requirements shall be incorporated into the permit to determine compliance with appropriate water quality standards. (R.61-68.E.12.c(2))

2. When the derived permit effluent limitation based on human health numeric criteria is below the practical quantitation limit for a substance, the derived permit effluent limitation shall include an accompanying statement in the permit that the practical quantitation limit using approved analytical methods shall be considered as being in compliance with the limit. (R.61-68.E.12.c(3))

Note 1: The effluent concentration limits determined above may not necessarily be the NPDES permit limit. NPDES Permit limits are determined after a reasonable potential analysis is conducted using these derived limits and also after evaluating other issues (e.g. anti-backsliding).

Note 2: Mass limitations may be required in certain circumstances. When mass limits are calculated the formula to be used is as follows.

*Mass (lb/day) = Flow (mgd) * Concentration (mg/l) * 8.34*

Note 3: Final Limitations will typically be rounded to two (2) significant figures (based on EPA's policy with its national criteria) while considering the PQL for a given parameter. Rounding will be performed using the following procedure (as recommended by the DHEC lab):

a. If the digit of interest is even and the number following it is a five (5), the digit of interest remains the same.

b. If the digit of interest is odd and the number following it is a five (5), the digit of interest is rounded up.

c. If the digit of interest is even or odd and the number following it is between 0 and 4, the digit of interest remains the same.

d. If the digit of interest is even or odd and the number following it is between 6 and 9, the digit interest is rounded up.

III. PERMIT LIMITATIONS AND MONITORING REQUIREMENTS

Outfall 001

Outfall 001 discharges once-through non-contact cooling water at an average rate of 674 MGD to the Monticello Reservoir. Outfall 007 is an internal outfall to Outfall 001which consists of low volume waste. Applicable guidelines for this outfall are the Steam Electric Point Source Category for existing sources.

Flow

1. Previous permit limits (effective **10/1/1997**):
   Monthly average: Monitor and Report, MGD
   Daily Maximum: Monitor and Report, MGD
   Sampling Frequency: Continuous
   Sample Type: Estimate

2. NPDES Application (2C & 2E): (No. of flow analyses: 12)
   Long Term Average Value: 674.92 MGD
   Maximum Daily Value: 738.72 MGD

3. DMR Data: The highest flow was reported on 11/01 as 738.7 MGD

4. Conclusion:
   Monthly average: M & R
   Daily maximum: M&R
   Sampling Frequency: Continuous
   Sampling Type: Estimate

Total Suspended Solids (TSS)

1. Previous permit limits (effective **10/1/1997**):
   Monthly average: N/A
   Daily Maximum: N/A

2. NPDES Application (2C & 2E): (No. of TSS analyses: 1)
   Long Term Average Value: N/A
   Maximum Daily Value: 6.4 mg/l

3. DMR Data: N/A

4. Water Quality Data: N/A

5. Effluent Limitation Guidelines: N/A

6. Other information: N/A

7. PQL: 1000 µg/l

8. Conclusion: There shall be no limit for TSS.

pH

1. Previous Permit Limits (effective 10/1/1997): 6.0 – 8.5 standard units.
   Sampling Frequency: 1/Month
   Sample type: Grab

2. NPDES Application (2C & 2E): (No. of pH analyses: 12)
   Minimum: 7.15 standard units.
   Maximum: 7.57 standard units.

3. DMR Data: The highest pH was reported on 4/97 as 8.4 s.u. and the lowest pH was reported on 2/28 as 6.01 s.u.

4. Water Quality Data: Effluent Limits for pH are established in accordance with Reg. 61-68.G. 10. For Class Fresh Water this value is 6.0 – 8.5 standard units.

5. Effluent limitation guidelines: N/A

6. Other information:

7. PQL: Not applicable

8. Conclusion: pH should be between 6.0 s.u. and 8.5 s.u.
   Sampling Frequency: 1/Month
   Sample type: Grab

Temperature

1. Previous permit limits (effective 10/1/1997):
   Monthly average: MR
   Daily maximum: 113°F (45°C)
   Sampling frequency: Continuous
   Sample type: Continuous

2. NPDES Application (2C & 2E):
   Summer:
      Long Term Avg: 38.4°C
      Daily Max: 43.5°C
   Winter:
      Long Term Average: 23.5°C
      Maximum Daily Value: 37.3°C

3. DMR Data: The highest value was reported on 7/98 as 119.1°F

4. Water Quality Criterion: R.61-68.E.10.a, 1998: The water temperature of all FRESHWATERS which are free flowing shall not be increased more than 5°F (2.8°C) above natural temperature conditions and shall not exceed a maximum of 90°F (32.2°C) as a result of the discharge of heated liquids unless" a site-specific standard has been established in accordance with the regulation, a mixing zone has been established in accordance with the regulation or a CWA Section 316(a) determination has been completed.

   On April 7, 1975, as a part of permitting activities of the original NPDES permit, SCE&G provided information to

support its request that alternative thermal effluent limitations be allowed under Section 316(a) of the Act. In April 30, 1976, a determination was made that the permittee had submitted adequate information to demonstrate that the alternative limitations for the thermal component of the discharge would assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on the Monticello Reservoir. The alternate maximum discharge temperature for Outfall 001 is 45°C(113°F). A maximum thermal plume temperature of 32.2°C(90°F) and temperature rise of 1.66°C(3.0°F) is also imposed. On December 4, 2000, the permittee requested that the requirement to monitor the plume temperature rise be eliminated. There have been no observed adverse impacts to the aquatic environment attributed to the plume temperature rise. DMR data from 1993 until present shows that there have been no violations of the 3 F plume temperature rise. The Department agreed that there was no useful data being generated by the continuous monitoring at Monticello Reservoir and the request to remove plume temperature rise monitoring requirements from the permit was granted August 2001.

A continuation of the 316(a) variance was allowed by the reissuance of the NPDES permit on July 1, 1984, January 3, 1989, and June 19, 1997. A request to continue the variance was included as part of the application for reissuance of the NPDES Permit which was received on April 17, 2002. In order to support the request, the permittee has indicated there has been no change in facility operation and no change in the biological community. A tentative determination has been made that continuation of the 316(a) variance is appropriate in the reissuance of this permit.

5. Other Information: In addition to the discharge temperature, the permittee monitors and reports the plume temperature at the inlet structure as well as the intake temperature on the inlet side of the main condenser.

6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: yes

7. Effluent limitations guidelines (ELGs) and professional judgment-based limits: N/A

8. PQL:

9. Conclusion: Based on the approved 316(a) study, the limit is
   - Discharge Temperature:
     - Monthly average: MR
     - Daily maximum: 45°C (113°F)
     - Sampling Frequency: Continuous
     - Sample type: Continuous
   - Intake Temperature:
     - Monthly average: MR
     - Daily maximum: MR
     - Sampling Frequency: Continuous
     - Sample type: Continuous
   - Plume Temperature:
     - Monthly average: 32.2°C (90°F)
     - Daily maximum: MR
     - Sampling Frequency: Continuous
     - Sample type: Continuous

Copper

1. Previous permit limits: N/A

2. NPDES Application (2C & 2E): 1.84 µg/l

3. DMR Data: N/A

4. Water Quality Criterion: see spreadsheet

5. Other Information:

6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: Yes, based on Aquatic Life from R.61-68

7. Effluent limitations guidelines (ELGs) and professional judgment-based limits: N/A

8. PQL: 0.010 mg/l

9. Conclusion: In a letter dated September 24, 2002, the permittee stated that there was no source for copper in this outfall and that the level of copper in the discharge is equal to the amount of copper in the intake. As explained in Section II.G.2.b.i.2, if the background concentration is equal to or greater than the applicable stream standard for the parameter of concern, then the derived concentration limit (C_{aqlife}) for that parameter and for the protection of that stream standard, is established equal to the stream standard. The Department does not have any intake data to compare to the discharge data. However, due to the fact that there is insufficient data to do a reasonable potential calculation, the limit for copper shall be monitor and report. A reopener clause will be added to Part V.A in order to evaluate the monitoring data for reasonable potential. Reasonable potential may be evaluated after each sample using the guidelines established in the permit rationale. (In accordance with Part II.J.4.b.(1), zero may be used in the calculation when the PQL stated above is achieved.) At any time reasonable potential is determined not to exist, the permittee may submit a written request that copper monitoring be discontinued. In addition, the permittee may conduct a dilution study, mixing zone study, recalculation procedure, water-effect ratio procedure, resident species procedure or other EPA-approved procedure in order to either eliminate the monitoring requirement for copper or obtain a site specific limit.

   Daily maximum: Monitor and Report
   Monthly Average: Monitor and Report
   Sampling Frequency: 1/Month
   Sample type: Grab

Mercury

1. Previous permit limits: N/A

2. NPDES Application (2C & 2E): <0.200 µg/l

3. DMR Data: N/A

4. Water Quality Criterion: see spreadsheet

5. Other Information:

6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: Yes, based on Human Health Organism Consumption from R.61-68

7. Effluent limitations guidelines (ELGs) and professional judgment-based limits: N/A

8. PQL: 0.0005 µg/l; EPA Method 1669/1631C

9. Conclusion: As stated in Section II.G.2.d.iii.1.b of the rationale, if the permittee uses a detection level that is

greater than the PQL, then the reported "less than" value for a given sample is assumed to be a discrete value equal to the detection level used by the permittee. The reported value for mercury was <0.2 µg/l and the practical quantitation limit is 0.0005 µg/l. Due to the fact that there is insufficient data to do a reasonable potential calculation, the limit for mercury shall be monitor and report. A reopener clause will be added to Part V.A in order to evaluate the monitoring data for reasonable potential. Reasonable potential may be evaluated after each sample using the guidelines established in the permit rationale. (In accordance with Part II.J.4.b.(1), zero may be used in the calculation when the PQL stated above is achieved.) At any time reasonable potential is determined not to exist, the permittee may submit a written request that mercury monitoring be discontinued.

Monthly average: Monitor and Report
Daily maximum: Monitor and Report
Sampling Frequency: 1/Month
Sample type: Grab

Aluminum

1. Previous permit limits: N/A
2. NPDES Application (2C & 2E): 416 µg/l
3. DMR Data: N/A
4. Water Quality Criterion: see spreadsheet
5. Other Information:
6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: Yes, based on Aquatic Life from 53 FR 33178, 8/30/88
7. Effluent limitations guidelines (ELGs) and professional judgment-based limits: N/A
8. PQL: 0.05 mg/l
9. Conclusion: Due to the fact that there is no state standard, there shall be no limit for aluminum.

Iron

1. Previous permit limits: N/A
2. NPDES Application (2C & 2E): 443 µg/l
3. DMR Data: N/A
4. Water Quality Criterion: see spreadsheet
5. Other Information:
6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: Yes, based on Human Health Water/Organism Consumption from R.61-68

7. Effluent limitations guidelines (ELGs) and professional judgment-based limits: N/A

8. PQL: 0.02 mg/l

9. Conclusion: In a letter dated September 24, 2002, the permittee stated that the level of iron in the discharge is equal to the amount of iron in the intake. As explained in Section II.G.2.b.i.2, if the background concentration is equal to or greater than the applicable stream standard for the parameter of concern, then the derived concentration limit (C_{eqlim}) for that parameter and for the protection of that stream standard, is established equal to the stream standard. The Department does not have any intake data to compare to the discharge data. However, due to the fact that there is insufficient data to do a reasonable potential calculation, the limit for iron shall be monitor and report. A reopener clause will be added to Part V.A in order to evaluate the monitoring data for reasonable potential. Reasonable potential may be evaluated after each sample using the guidelines established in the permit rationale. (In accordance with Part II.J.4.b.(1), zero may be used in the calculation when the PQL stated above is achieved.) At any time reasonable potential is determined not to exist, the permittee may submit a written request that iron monitoring be discontinued. In addition, the permittee may conduct a dilution study, mixing zone study, recalculation procedure, water-effect ratio procedure, resident species procedure or other EPA-approved procedure in order to either eliminate the monitoring requirement for iron or obtain a site-specific limit.
   Daily maximum: Monitor & Report
   Monthly Average: Monitor & Report
   Sampling Frequency: 1/Month
   Sample type: Grab

Manganese

1. Previous permit limits: N/A

2. NPDES Application (2C & 2E): 51.5 µg/l

3. DMR Data: N/A

4. Water Quality Criterion: see spreadsheet

5. Other Information:

6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: Yes, based on Human Health Water/Organism Consumption from R.61-68

7. Effluent limitations guidelines (ELGs) and professional judgment-based limits: N/A

8. PQL: 0.01 mg/l

9. Conclusion: In a letter dated September 24, 2002, the permittee stated that the level of manganese in the discharge is equal to the amount of manganese in the intake. As explained in Section II.G.2.b.i.2, if the background concentration is equal to or greater than the applicable stream standard for the parameter of concern, then the derived concentration limit (C_{eqlim}) for that parameter and for the protection of that stream standard, is established equal to the stream standard. The Department does not have any intake data to compare to the discharge data. However, due to the fact that there is insufficient data to do a reasonable potential calculation, the limit for manganese shall be monitor and report. A reopener clause will be added to Part V.A in order to evaluate the monitoring data for reasonable potential. Reasonable potential may be evaluated after each sample using the guidelines established in the permit rationale. (In accordance with Part II.J.4.b.(1), zero may be used in the calculation when the PQL stated above is achieved.) At any time reasonable potential is determined not to exist, the permittee may submit a written request that manganese

monitoring be discontinued. In addition, the permittee may conduct a dilution study, mixing zone study, recalculation procedure, water-effect ratio procedure, resident species procedure or other EPA-approved procedure in order to either eliminate the monitoring requirement for manganese or obtain a site specific limit.

Daily maximum: Monitor & Report
Monthly Average: Monitor & Report
Sampling Frequency: 1/Month
Sample type: Grab

Total Residual Chlorine (TRC)

1. Previous Permit Limits (effective 10/1/1997): N/A

2. NPDES Application (2C & 2E): Believed Absent

3. DMR Data: N/A

4. Water Quality Data:
   a. Aquatic Life
      Water Quality Criteria from Reg. 61-68, Appendix:
      Freshwater:
      CCC = 11 µg/l
      CMC = 19 µg/l

   b. Human Health: none

5. Effluent limitation guidelines: 0.20 mg/l Maximum Concentration

6. Other information: There is a prohibition statement on the limitations page for Outfall 001 stating that there shall be no addition of chlorine to the main condenser cooling water.

7. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: No

8. PQL: 0.05 mg/l; EPA Method SM4500C1 B, C, D, F OR G

9. Conclusion: There shall be no limit for Total Residual Chlorine due to the fact that the permittee is not permitted to chlorinate the main condenser cooling water.

Outfall 003

Outfall 003 consists of low level radiological wastes including reactor grade water, non-reactor grade floor drains and laundry and hot shower drains. Wastewaters are treated in the Liquid Waste Processing System by evaporation and ion exchange. The wastewater is then held in Waste Monitor Tank #'s 1 & 2 for monitoring to check that the wastewater is within NPDES & NRC limits prior to discharging. Applicable guidelines for this outfall are the Steam Electric Point Source Category for existing sources.

Flow

1. Previous permit limits:
   Monthly average: MR

Daily maximum: MR
Sampling frequency: 1/Occurence
Sample type: Estimate

2. NPDES Application (2C & 2E):
   Long Term Average: 0.004258 MGD
   Maximum Daily Value: 0.004950 MGD

3. DMR Data: The highest value was reported on 1/97 as 0.005 MGD

4. Conclusion:
   Daily maximum: MR
   Monthly Average: MR
   Sampling Frequency: 1/Occurence
   Sample type: Estimate

Total Suspended Solids (TSS)

1. Previous permit limits (effective 10/1/1997):
   Monthly average: 30 mg/l
   Daily Maximum: 100 mg/l

2. NPDES Application (2C & 2E): (No. of TSS analyses: 295)
   Long Term Average Value: 0.25 mg/l
   Maximum Daily Value: 12.2 mg/l

3. DMR Data: The highest value reported was 20 mg/l on 2/02

4. Water Quality Data: N/A

5. Effluent Limitation Guidelines: 30 mg/l monthly average; 100 mg/l daily max (low volume waste)

6. Other information: N/A

7. PQL: 1000 µg/l

8. Conclusion:
   Daily maximum: 100 mg/l
   Monthly Average: 30 mg/l
   Sampling Frequency: 1/Occurence
   Sample type: Grab

Oil & Grease

1. Previous permit limits (Effective 10/1/1997):
   Monthly Average: 15 mg/l
   Daily Maximum: 20 mg/l
   Sample Frequency: 1/Occurence
   Sample Type: Grab

2. NPDES Application (2C):
   Maximum Daily Value: <5 mg/l

3. DMR Data: 17.5 mg/l (7/98)

4. Governing Water Quality Criterion: N/A

5. Other Information: Reg. 61-68.E.5.b states that all surface waters shall be free from floating debris, oil, grease, scum, and other floating material attributable to sewage, industrial waste, or other waste in amounts sufficient to be unsightly to such a degree as to create a nuisance or interfere with classified water uses or existing water uses.

6. Effluent Guidelines Limitations: 15 mg/l monthly average; 20 mg/l daily max (low volume waste)

7. Conclusion:
   Monthly average: 15 mg/l
   Daily maximum: 20 mg/l
   Sampling Frequency: 1/Occurence
   Sample type: Grab

pH

1. Previous Permit Limits (effective **10/1/1997**): N/A

2. NPDES Application (2C & 2E): (No. of pH analyses: 295)
   Minimum: 6.1 standard units.
   Maximum: 8.9 standard units.

3. DMR Data: The highest pH was reported on 9/97 as 8.3 s.u. and the lowest pH was reported on 7/97 as 6.0 s.u.

4. Water Quality Data: Effluent Limits for pH are established in accordance with Reg. 61-68.G. 10. For Class **Fresh Water** this value is 6.0 – 8.5 standard units.

5. Effluent limitation guidelines: 6.0 – 9.0 s.u.

6. Other information:

7. PQL: Not applicable

8. Conclusion: Due to the high dilution of the Broad River, the pH limit shall be based on effluent guidelines. Therefore, the limits for pH shall be between 6.0 s.u. and 9.0 s.u.
   Sampling Frequency: 1/Occurence
   Sample type: Grab

Outfall 004

Outfall 004 consists of steam generator blowdown discharged at an average rate of 0.144 MGD. The wastewater is discharged via Outfall 001 to the Monticello Reservoir. Applicable guidelines for this outfall are the Steam Electric Point Source Category for existing sources.

Flow

1. Previous permit limits:
   Monthly average: MR
   Daily maximum: MR

Sampling frequency: 1/Occurence
Sample type: Continuous

2. NPDES Application (2C & 2E):
   Long Term Average: 0.021312 MGD
   Maximum Daily Value: 0.061245 MGD

3. DMR Data: The highest value was reported on 4/020 as 0.589167 MGD

4. Conclusion:
   Daily maximum: MR
   Monthly Average: MR
   Sampling Frequency: 1/Occurence
   Sample type:

Total Suspended Solids (TSS)

1. Previous permit limits (effective 10/1/1997):
   Monthly average: 30 mg/l
   Daily Maximum: 100 mg/l

2. NPDES Application (2C & 2E): (No. of TSS analyses: 3)
   Long Term Average Value: 0.3 mg/l
   Maximum Daily Value: 0.6 mg/l

3. DMR Data: The highest value reported was 8.7 mg/l on 4/97

4. Water Quality Data: N/A

5. Effluent Limitation Guidelines: 30 mg/l monthly average; 100 mg/l daily max (low volume waste)

6. Other information: N/A

7. PQL: 1000 µg/l

8. Conclusion:
   Daily maximum: 100 mg/l
   Monthly Average: 30 mg/l
   Sampling Frequency: 1/Occurence
   Sample type: Grab

Oil & Grease

1. Previous permit limits (Effective 10/1/1997):
   Monthly Average: 15 mg/l
   Daily Maximum: 20 mg/l
   Sample Frequency: 1/Occurence
   Sample Type: Grab

2. NPDES Application (2C):
   Maximum Daily Value: <5 mg/l

3. DMR Data: 3 mg/l (9/98)

4. Governing Water Quality Criterion: N/A

5. Other Information: Reg. 61-68.E.5.b states that all surface waters shall be free from floating debris, oil, grease, scum, and other floating material attributable to sewage, industrial waste, or other waste in amounts sufficient to be unsightly to such a degree as to create a nuisance or interfere with classified water uses or existing water uses.

6. Effluent Guidelines Limitations: 15 mg/l monthly average; 20 mg/l daily max (low volume waste)

7. Conclusion:
   Monthly average: 15 mg/l
   Daily maximum: 20 mg/l
   Sampling Frequency: 1/Occurence
   Sample type: Grab

pH

1. Previous Permit Limits (effective **10/1/1997**): N/A

2. NPDES Application (2C & 2E): (No. of pH analyses: 1)
   Minimum: 9.61 standard units.
   Maximum: 9.61 standard units.

3. DMR Data: N/A

4. Water Quality Data: Effluent Limits for pH are established in accordance with Reg. 61-68.G. 10. For Class **Fresh Water** this value is 6.0 – 8.5 standard units.

5. Effluent limitation guidelines: 6.0 – 9.0 s.u.

6. Other information:

7. PQL: Not applicable

8. Conclusion: This outfall is internal to Outfall 001. Therefore, a pH limit shall be placed on the final outfall (Outfall 001).

Outfall 005

Outfall 005 is an internal outfall consisting of treated sanitary sewage with an average discharge flow of 0.0037 MGD. The wastewater is treated in an aeration pond, followed by a stabilization pond. Effluent is chlorinated in a chlorine contact chamber prior to commingling with other wastewaters and discharging via Outfall 014 to the Monticello Reservoir.

Flow

1. Previous permit limits (effective **10/1/1997**):
   Monthly average: Monitor & Report
   Daily Maximum: Monitor & Report
   Sampling Frequency: 1/Month
   Sample Type: Instantaneous

2. NPDES Application (2C & 2EE): (No. of flow analyses: 69)
   Average Daily Value: 0.0037 MGD
   Maximum Daily Value: 0.0165 MGD

3. DMR Data: The highest flow was reported on 4/99 as 0.0289 MGD

4. Conclusion:
   Monthly average: MR
   Daily maximum: MR
   Sampling Frequency: 1/Month
   Sampling Type: Instantaneous

Biochemical Oxygen Demand (BOD_5)

1. Previous permit limits (effective 10/1/1997):
   Monthly average: 30 mg/l
   Daily maximum: 45 mg/l
   Sampling frequency: 1/Month
   Sample type: 24 Hr Composite

2. NPDES Application (2C & 2EE): (# of analyses: 7)
   Average Daily Value: 22.2 mg/l
   Maximum Daily Value: 74 mg/l

3. DMR Data: The highest BOD_5 was reported on 3/01 as 74 mg/l

4. Effluent limitations guidelines: N/A

5. PQL: 2 mg/l (EPA Standard Method 5210B)

6. Waste Load Allocation: N/A

7. Other information: Reg 61-9.133, Secondary Treatment Regulation gives a monthly average of 30 mg/l and a weekly average of 45 mg/l. The daily maximum is calculated as twice the monthly average limit.

8. Conclusion: Based on R.61-9.133
   Monthly average = 30 mg/l
   Daily maximum = 45 mg/l
   Sampling Frequency: 1/Month
   Sampling Type: 24 Hr Composite

Total Suspended Solids (TSS)

1. Previous permit limits (effective 10/1/1997):
   Monthly average: 30 mg/l
   Daily Maximum: 45 mg/l
   Sampling frequency: 1/Month
   Sample Type: 24 Hr Composite

2. NPDES Application (2C & 2EE): (No. of TSS analyses: 12)
   Average Daily Value: 12.1 mg/l
   Maximum Daily Value: 24.5 mg/l

3. DMR Data: The highest TSS was reported on 3/00 as 26.5 mg/l

4. Water Quality Data: N/A

5. Effluent Limitation Guidelines: N/A

6. Other information: Reg 61-9.133, Secondary Treatment Regulation gives a monthly average of 30 mg/l and a weekly average of 45 mg/l. The daily maximum is calculated as twice the monthly average limit.

7. PQL: 0.50 mg/l

8. Conclusion: The limits for TSS shall be based on Reg. 61-9.133 Secondary Treatment Standards to demonstrate that proper treatment has been provided.
   Monthly average: 30 mg/l
   Daily maximum: 45 mg/l
   Sampling Frequency: 1/Month
   Sample type: 24 Hr Composite

pH

1. Previous Permit Limits (effective 10/1/1997): N/A

2. NPDES Application (2C & 2EE): (No. of pH analyses: 1)
   Minimum:
   Maximum: 6.37 standard units.

3. DMR Data: N/A

4. Water Quality Data: Effluent Limits for pH are established in accordance with Reg. 61-68.G. 10. For Class **Fresh Water** this value is 6.0 – 8.5 standard units.

5. Effluent limitation guidelines: N/A

6. Other information: Reg 61-9.133, Secondary Treatment Regulation states that pH shall be maintained between 6.0 to 9.0 s.u.

7. PQL: Not applicable

8. Conclusion: Due to the fact that this is an internal outfall, pH will be limited at the final discharge point (Outfall 014).

Fecal Coliform

1. Previous permit limits (effective 10/1/1997):
   Monthly average: 200/100 ml
   Daily maximum: 400/100 ml
   Sampling frequency: 2/Month
   Sample type: Grab

2. NPDES Application (2C & 2EE): (No. of analyses: 24)
   Average Daily Value: 4.3/100 ml

Maximum Daily Value: 49/100 ml

3. DMR Data: The highest value was reported on 5/99 as 280/100 ml.

4. Water Quality Data: Fecal Coliform Limits are established in accordance with Reg. 61-68.G.10.e For Class **Fresh Water** these values are: not to exceed 200/100 ml based on five consecutive samples in a 30 day period and no more than 10% of the samples in the 30 day period shall exceed 400/100 ml.

5. Other Information:

6. Wasteload Allocation: N/A

7. Effluent Guidelines Limitations: N/A

8. PQL: 1/100 ml (EPA Standard Method 9221 C, 9221 E, or 9221 D)

9. Conclusion: Based on Reg 61-68.
   Monthly average: 200/100 ml
   Daily maximum: 400/100 ml
   Sampling Frequency: 1/month
   Sample type: Grab

Total Residual Chlorine (TRC)

1. Previous Permit Limits (10/1/1997): N/A

2. NPDES Application (2E): (No. of analyses: 1)
   Maximum Daily Value: <0.05 mg/l

3. DMR Data: N/A

4. Water Quality Data:
   a. Aquatic Life
      Water Quality Criteria from Reg. 61-68, Appendix:
      Freshwater:
      CCC = 11 µg/l
      CMC = 19 µg/l

   b. Human Health: None

5. Effluent limitation guidelines: Not applicable.

6. Other information: N/A

7. PQL: 0.05 mg/l

8. Conclusion: Due to the fact that this is an internal outfall, TRC shall be monitored at the final discharge point (Outfall 014).

Outfall 06A

Outfall 06A is an internal outfall consisting of low volume wastes discharging at an average rate of 0.08 MGD. Low volume wastes discharged through this outfall include condensate polisher backwash, clarifier blowdown, carbon filter backwash, gravity filter backwash, and steam generator blowdown. Treatment consists of sedimentation for the reduction of suspended solids content before the effluent combines with Outfalls 005, 06B, and 008 for release to the Monticello Reservoir via Outfall 014.

Flow

1. Previous permit limits:
   Monthly average: MR
   Daily maximum: MR
   Sampling frequency: 1/Month
   Sample type: Instantaneous

2. NPDES Application (2C & 2E):
   Long Term Average: 0.056221 MGD
   Maximum Daily Value: 0.289 MGD

3. DMR Data: The highest value was reported on 5/00 as 0.4506 MGD

4. Conclusion:
   Daily maximum: MR
   Monthly Average: MR
   Sampling Frequency: 1/Month
   Sample type: Instantaneous

Total Suspended Solids (TSS)

1. Previous permit limits (effective 10/1/1997):
   Monthly average: 30 mg/l
   Daily Maximum: 100 mg/l

2. NPDES Application (2C & 2E): (No. of TSS analyses: 12)
   Long Term Average Value: 1.3 mg/l
   Maximum Daily Value: 5.7 mg/l

3. DMR Data: The highest value reported was 5.7 mg/l on 5/01

4. Water Quality Data: N/A

5. Effluent Limitation Guidelines: 30 mg/l monthly average; 100 mg/l daily max (low volume waste)

6. Other information: N/A

7. PQL: 1000 µg/l

8. Conclusion:
   Daily maximum: 100 mg/l
   Monthly Average: 30 mg/l
   Sampling Frequency: 1/Month
   Sample type: Grab

Oil & Grease

1. Previous permit limits (Effective 10/1/1997):
   Monthly Average: 15 mg/l
   Daily Maximum: 20 mg/l
   Sample Frequency: 1/Month
   Sample Type: Grab

2. NPDES Application (2C):
   Maximum Daily Value: <5 mg/l

3. DMR Data: 14.8 mg/l (9/01)

4. Governing Water Quality Criterion: N/A

5. Other Information: Reg. 61-68.E.5.b states that all surface waters shall be free from floating debris, oil, grease, scum, and other floating material attributable to sewage, industrial waste, or other waste in amounts sufficient to be unsightly to such a degree as to create a nuisance or interfere with classified water uses or existing water uses.

6. Effluent Guidelines Limitations: 15 mg/l monthly average; 20 mg/l daily max (low volume waste)

7. Conclusion:
   Monthly average: 15 mg/l
   Daily maximum: 20 mg/l
   Sampling Frequency: 1/Month
   Sample type: Grab

pH

1. Previous Permit Limits (effective 10/1/1997): N/A

2. NPDES Application (2C & 2E): (No. of pH analyses: 1)
   Minimum: 9.35 standard units.
   Maximum: 9.35 standard units.

3. DMR Data: N/A

4. Water Quality Data: Effluent Limits for pH are established in accordance with Reg. 61-68.G. 10. For Class **Fresh Water** this value is 6.0 – 8.5 standard units.

5. Effluent limitation guidelines: 6.0 – 9.0 s.u.

6. Other information:

7. PQL: Not applicable

8. Conclusion: This outfall is internal to Outfall 001. Therefore, a pH limit shall be placed on the final outfall (Outfall 014).

Outfall 06B

Outfall 06B is an internal outfall consisting of low volume wastes discharging at an average rate of 0.05 MGD. Low

volume wastes discharged through this outfall include wastewater from various sumps, storm water from transformer areas and fuel oil storage and handling areas , and boiler house drains. Treatment consists of a 6,000 gallon common collection sump, oil skimming and sedimentation for the reduction of suspended solids content before the effluent combines with Outfalls 005, 06A, and 008 for release to the Monticello Reservoir via Outfall 014.

Flow

1. Previous permit limits:
   Monthly average: MR
   Daily maximum: MR
   Sampling frequency: 1/Month
   Sample type: Instantaneous

2. NPDES Application (2C & 2E):
   Long Term Average: 0.056074 MGD
   Maximum Daily Value: 0.289 MGD

3. DMR Data: The highest value was reported on 5/02 as 0.2856 MGD

4. Conclusion:
   Daily maximum: MR
   Monthly Average: MR
   Sampling Frequency: 1/Month
   Sample type: Instantaneous

Total Suspended Solids (TSS)

1. Previous permit limits (effective 10/1/1997):
   Monthly average: 30 mg/l
   Daily Maximum: 98 mg/l

2. NPDES Application (2C & 2E): (No. of TSS analyses: 12)
   Long Term Average Value: 5.0 mg/l
   Maximum Daily Value: 11.7 mg/l

3. DMR Data: The highest value reported was 15 mg/l on 8/99

4. Water Quality Data: N/A

5. Effluent Limitation Guidelines: 30 mg/l monthly average; 100 mg/l daily max (low volume waste)

6. Other information: N/A

7. PQL: 1000 µg/l

8. Conclusion: The previous permit limits are more stringent than the effluent guideline limits for low volume waste. The permittee has been meeting the previous permit limits, therefore, due to antibacksliding, the previous permit limits shall apply.
   Daily maximum: 98 mg/l
   Monthly Average: 30 mg/l
   Sampling Frequency: 1/Month

Sample type: Grab

Oil & Grease

1. Previous permit limits (Effective 10/1/1997):
   Monthly Average: 15 mg/l
   Daily Maximum: 20 mg/l
   Sample Frequency: 1/Month
   Sample Type: Grab

2. NPDES Application (2C):
   Maximum Daily Value: 7 mg/l

3. DMR Data: 53 mg/l (12/00)

4. Governing Water Quality Criterion: N/A

5. Other Information: Reg. 61-68.E.5.b states that all surface waters shall be free from floating debris, oil, grease, scum, and other floating material attributable to sewage, industrial waste, or other waste in amounts sufficient to be unsightly to such a degree as to create a nuisance or interfere with classified water uses or existing water uses.

6. Effluent Guidelines Limitations: 15 mg/l monthly average; 20 mg/l daily max (low volume waste)

7. Conclusion:
   Monthly average: 15 mg/l
   Daily maximum: 20 mg/l
   Sampling Frequency: 1/Month
   Sample type: Grab

pH

1. Previous Permit Limits (effective 10/1/1997): N/A

2. NPDES Application (2C & 2E): (No. of pH analyses: 1)
   Minimum: 9.07 standard units.
   Maximum: 9.35 standard units.

3. DMR Data: N/A

4. Water Quality Data: Effluent Limits for pH are established in accordance with Reg. 61-68.G. 10. For Class Fresh Water this value is 6.0 – 8.5 standard units.

5. Effluent limitation guidelines: 6.0 – 9.0 s.u.

6. Other information:

7. PQL: Not applicable

8. Conclusion: This outfall is internal to Outfall 014. Therefore, a pH limit shall be placed on the final outfall (Outfall 014).

Outfall 007

Outfall 007 is an internal outfall consisting of low volume wastes discharging at an average rate of 0.08 MGD. Low volume wastes discharged through this outfall include wastewater from ion exchange regeneration, and sumps in the chemical feed equipment area, caustic tank area, and "D" battery room. Treatment consists of a flow equalization and neutralization in a 100,000 gallon wastewater treatment tank before the effluent is discharged into the Circulating Water System discharge piping for release to the Monticello Reservoir via Outfall 001.

Flow

1. Previous permit limits:
   Monthly average: MR
   Daily maximum: MR
   Sampling frequency: 1/Month
   Sample type: Estimate

2. NPDES Application (2C & 2E):
   Long Term Average: 0.079108 MGD
   Maximum Daily Value: 0.185 MGD

3. DMR Data: The highest value was reported on 10/00 as 0.27 MGD

4. Conclusion:
   Daily maximum: MR
   Monthly Average: MR
   Sampling Frequency: 1/Month
   Sample type: Estimate

Total Suspended Solids (TSS)

1. Previous permit limits (effective 10/1/1997):
   Monthly average: 30 mg/l
   Daily Maximum: 100 mg/l

2. NPDES Application (2C & 2E): (No. of TSS analyses: 12)
   Long Term Average Value: 6.9 mg/l
   Maximum Daily Value: 26.5 mg/l

3. DMR Data: The highest value reported was 26.5 mg/l on 2/01

4. Water Quality Data: N/A

5. Effluent Limitation Guidelines: 30 mg/l monthly average; 100 mg/l daily max (low volume waste)

6. Other information: N/A

7. PQL: 1000 µg/l

8. Conclusion:
   Daily maximum: 100 mg/l
   Monthly Average: 30 mg/l
   Sampling Frequency: 1/Month
   Sample type: Grab

Oil & Grease

1. Previous permit limits (Effective 10/1/1997):
   Monthly Average: 15 mg/l
   Daily Maximum: 20 mg/l
   Sample Frequency: 1/Month
   Sample Type: Grab

2. NPDES Application (2C):
   Maximum Daily Value: <5 mg/l

3. DMR Data: 9.3 mg/l (6/99)

4. Governing Water Quality Criterion: N/A

5. Other Information: Reg. 61-68.E.5.b states that all surface waters shall be free from floating debris, oil, grease, scum, and other floating material attributable to sewage, industrial waste, or other waste in amounts sufficient to be unsightly to such a degree as to create a nuisance or interfere with classified water uses or existing water uses.

6. Effluent Guidelines Limitations: 15 mg/l monthly average; 20 mg/l daily max (low volume waste)

7. Conclusion:
   Monthly average: 15 mg/l
   Daily maximum: 20 mg/l
   Sampling Frequency: 1/Month
   Sample type: Grab

pH

1. Previous Permit Limits (effective 10/1/1997): N/A

2. NPDES Application (2C & 2E): (No. of pH analyses: 1)
   Minimum: 6.1 standard units.
   Maximum: 8.9 standard units.

3. DMR Data: The highest pH was reported on 10/99 as 9.0 s.u. and the lowest pH was reported on 4/02 as 6.1 s.u.

4. Water Quality Data: Effluent Limits for pH are established in accordance with Reg. 61-68.G. 10. For Class Fresh Water this value is 6.0 – 8.5 standard units.

5. Effluent limitation guidelines: 6.0 – 9.0 s.u.

6. Other information:

7. PQL: Not applicable

8. Conclusion: pH should be between 6.0 s.u. and 9.0 s.u.
   Sampling Frequency: 1/Month
   Sample type: Grab

Outfall 008

Outfall 008 is an internal outfall consisting of low volume wastes and chemical metal cleaning wastes and discharges approximately 1-2 times per year. Low volume wastes discharged through this outfall include oil waste collection sump, and clarifier blowdown sump. Treatment consists of neutralization (metal cleaning waste only) and sedimentation for the reduction of suspended solids content before the effluent combines with Outfalls 005, 06A, and 06B for release to the Monticello Reservoir via Outfall 014.

Flow

1. Previous permit limits:
   Monthly average: MR
   Daily maximum: MR
   Sampling frequency: 1/Day
   Sample type: Instantaneous

2. NPDES Application (2C & 2E):
   Long Term Average: 0 MGD
   Maximum Daily Value: 0 MGD

3. DMR Data: The highest value was reported on 3/98 as 2.3936 MGD

4. Conclusion:
   Daily maximum: MR
   Monthly Average: MR
   Sampling Frequency: 1/Day
   Sample type: Instantaneous

Total Suspended Solids (TSS)

1. Previous permit limits (effective 10/1/1997):
   Monthly average: 30 mg/l
   Daily Maximum: 100 mg/l

2. NPDES Application (2C & 2E): (No. of TSS analyses: 12)
   Maximum Daily Value: 4.1 mg/l

3. DMR Data: The highest value reported was 5.7 mg/l on 3/98

4. Water Quality Data: N/A

5. Effluent Limitation Guidelines: 30 mg/l monthly average; 100 mg/l daily max (metal cleaning waste)

6. Other information: N/A

7. PQL: 1000 µg/l

8. Conclusion:
   Daily maximum: 100 mg/l
   Monthly Average: 30 mg/l
   Sampling Frequency: 1/Occurence
   Sample type: Grab

Oil & Grease

1. Previous permit limits (Effective 10/1/1997):
   Monthly Average: 15 mg/l
   Daily Maximum: 20 mg/l
   Sample Frequency: 1/Occurence
   Sample Type: Grab

2. NPDES Application (2C):
   Maximum Daily Value: <5 mg/l

3. DMR Data: 6.5 mg/l (11/98)

4. Governing Water Quality Criterion: N/A

5. Other Information: Reg. 61-68.E.5.b states that all surface waters shall be free from floating debris, oil, grease, scum, and other floating material attributable to sewage, industrial waste, or other waste in amounts sufficient to be unsightly to such a degree as to create a nuisance or interfere with classified water uses or existing water uses.

6. Effluent Guidelines Limitations: 15 mg/l monthly average; 20 mg/l daily max (metal cleaning waste)

7. Conclusion:
   Monthly average: 15 mg/l
   Daily maximum: 20 mg/l
   Sampling Frequency: 1/Occurence
   Sample type: Grab

pH

1. Previous Permit Limits (effective 10/1/1997): N/A

2. NPDES Application (2C & 2E): (No. of pH analyses: 1)
   Minimum: 9.75 standard units.
   Maximum: 9.75 standard units.

3. DMR Data: N/A

4. Water Quality Data: Effluent Limits for pH are established in accordance with Reg. 61-68.G. 10. For Class Fresh Water this value is 6.0 – 8.5 standard units.

5. Effluent limitation guidelines: 6.0 – 9.0 s.u.

6. Other information:

7. PQL: Not applicable

8. Conclusion: This outfall is internal to Outfall 014. Therefore, a pH limit shall be placed on the final outfall (Outfall 014).

_ron

1. Previous permit limits (Effective 10/1/1997):
   Monthly Average: 1.0 mg/l

Daily Maximum: 1.0 mg/l
Sample Frequency: 1/Occurence
Sample Type: Grab

2. NPDES Application (2C & 2E): 2130 µg/l

3. DMR Data: 0.466 (4/99)

4. Water Quality Criterion: from Reg. 61-68, Appendix
   Aquatic Life: monthly average = 1000 µg/l
   Human Health: Water & Organism Consumption: monthly average: 300 µg/l

5. Other Information:

6. Effluent limitations guidelines (ELGs): 1.0 mg/l monthly average and daily max

7. PQL: 0.02 mg/l

8. Conclusion: Based on effluent limitation guidelines
   Daily maximum: 1.0 mg/l
   Monthly Average: 1.0 mg/l
   Sampling Frequency: 1/Month
   Sample type: Grab

Copper

1. Previous permit limits (Effective 10/1/1997):
   Monthly Average: 1.0 mg/l
   Daily Maximum: 1.0 mg/l
   Sample Frequency: 1/Occurence
   Sample Type: Grab

2. NPDES Application (2C & 2E): 5.88 µg/l

3. DMR Data: 0.01 mg/l (4/99)

4. Water Quality Criterion: : from Reg. 61-68, Appendix
   Aquatic Life: monthly average = 5.7 µg/l; daily max = 7.4 µg/l
   Human Health: Water & Organism Consumption: monthly average = 1,300 µg/l; daily max = 1,900 µg/l
   Organoleptic Data: monthly average = 1000 µg/l; daily max ≈ 1500 µg/l

5. Other Information:

6. Effluent limitations guidelines (ELGs): 1.0 mg/l monthly average and daily max

7. PQL: 0.010 mg/l

8. Conclusion: Based on effluent limitations guidelines
   Daily maximum: 1.0 mg/l
   Monthly Average: 1.0 mg/l
   Sampling Frequency: 1/Occurence

Sample type: Grab

Outfall 012

Outfall 012 consists of storm water runoff in the north/north east area of the plant from yard drains, roof drains, refueling water storage tank pit drains, industrial & CDRM coolers and drainage from the Turbine Building Closed Cycle Cooling System Cooling Towers.

Flow

1. Previous permit limits:
   Monthly average: MR
   Daily maximum: MR
   Sampling frequency: 1/Month
   Sample type: Estimate

2. NPDES Application (2C & 2E):
   Long Term Average: 0.025575 MGD
   Maximum Daily Value: 0.0456 MGD

3. DMR Data: The highest value was reported on 7/99 as 0.4506 MGD

4. Conclusion:
   Daily maximum: MR
   Monthly Average: MR
   Sampling Frequency: 1/Month
   Sample type: Estimate

Total Suspended Solids (TSS)

1. Previous permit limits (effective 10/1/1997):
   Monthly average: 26 mg/l
   Daily Maximum: 70 mg/l

2. NPDES Application (2C & 2E): (No. of TSS analyses: 12)
   Long Term Average Value: 1.5 mg/l
   Maximum Daily Value: 8.78 mg/l

3. DMR Data: The highest value reported was 44.9 mg/l on 7/99

4. Water Quality Data: N/A

5. Effluent Limitation Guidelines: 30 mg/l monthly average; 100 mg/l daily max (low volume waste)

6. Other information: Outfall 012 consists of storm water runoff and low volume waste. Based on Steam Electric Effluent Guidelines, low volume wastes have total suspended solids limits of 30 mg/l monthly average and 100 mg/l daily max. The procedures for flow weighted averaging calculations when regulated waste streams are commingled are taken from the August 22, 1985 memo entitled "Guidance for NPDES Permits Issued to Steam Electric Power Plants". The TSS values of 20 mg/l monthly average and 30 mg/l daily maximum for the yard drain component of the discharge comes from this memo. The storm water runoff provides dilution, and is accounted for as follows:

	Flow	Monthly Avg Limit	Daily Max Limit
Low Volume Waste	0.008 MGD	30 mg/l	100 mg/l
Yard Drains	0.006 MGD	20 mg/l	30 mg/l

The limitations for TSS are calculated as follows:

Monthly Average

$$\frac{0.008(30) + 0.006(20)}{0.014} = 25.7 \text{ mg/l}$$

Daily Maximum

$$\frac{0.008(100) + 0.006(30)}{0.014} = 70 \text{ mg/l}$$

7. PQL: 1000 µg/l

8. Conclusion: The permittee has requested that the monitoring frequency be changed from 1/Month to 2/Year. A review of the DMR data for this outfall shows that the levels of TSS have been consistently low. Therefore, the Department agrees with the permittee's request for a reduction in sampling frequency.
   Daily maximum: 70 mg/l
   Monthly Average: 26 mg/l
   Sampling Frequency: 2/Year
   Sample type: Grab

Oil & Grease

1. Previous permit limits (Effective 10/1/1997):
   Monthly Average: 9 mg/l
   Daily Maximum: 11 mg/l
   Sample Frequency: 1/Month
   Sample Type: Grab

2. NPDES Application (2C):
   Maximum Daily Value: <5 mg/l

3. DMR Data: 8.7 mg/l (8/01)

4. Governing Water Quality Criterion: N/A

5. Other Information: Reg. 61-68.E.5.b states that all surface waters shall be free from floating debris, oil, grease, scum, and other floating material attributable to sewage, industrial waste, or other waste in amounts sufficient to be unsightly to such a degree as to create a nuisance or interfere with classified water uses or existing water uses.

6. Effluent Guidelines Limitations: 15 mg/l monthly average; 20 mg/l daily max (low volume waste).

7. Other Information: Outfall 012 consists of storm water runoff and low volume waste. Based on Steam Electric Effluent Guidelines, low volume wastes have oil and grease limits of 15 mg/l monthly average and 20 mg/l daily max. The procedures for flow weighted averaging calculations when regulated waste streams are commingled are taken from the August 22, 1985 memo entitled "Guidance for NPDES Permits Issued to Steam Electric Power Plants". The O&G values of 0 mg/l monthly average and 0 mg/l daily maximum for the yard drain component of the discharge

comes from this memo. The storm water runoff provides dilution, and is accounted for as follows:

	Flow	Monthly Avg Limit	Daily Max Limit
Low Volume Waste	0.008 MGD	15 mg/l	20 mg/l
Yard Drains	0.006 MGD	0 mg/l	0 mg/l

The limitations for TSS are calculated as follows:

Monthly Average

$$\frac{0.008(15) + 0.006(0)}{0.014} = 8.6 \text{ mg/l}$$

Daily Maximum

$$\frac{0.008(20) + 0.006(0)}{0.014} = 11.4 \text{ mg/l}$$

7. Conclusion:
   Monthly average: 9 mg/l
   Daily maximum: 11 mg/l
   Sampling Frequency: 1/Month
   Sample type: Grab

pH

1. Previous Permit Limits (effective **10/1/1997**): 6.0 – 8.5 standard units.
   Sampling Frequency: 1/Month
   Sample type: Grab

2. NPDES Application (2C & 2E): (No. of pH analyses: 12)
   Minimum: 7.0 standard units.
   Maximum: 8.0 standard units.

3. DMR Data: The highest pH was reported on 9/00 as 8.1 s.u. and the lowest pH was reported on 3/99 as 6.1 s.u.

4. Water Quality Data: Effluent Limits for pH are established in accordance with Reg. 61-68.G. 10. For Class **Fresh Water** this value is 6.0 – 8.5 standard units.

5. Effluent limitation guidelines: 6.0 – 9.0 s.u.

6. Other information:

7. PQL: Not applicable

8. Conclusion: Based on R.61-9, pH should be between 6.0 s.u. and 8.5 s.u.
   Sampling Frequency: 1/Month
   Sample type: Grab

Outfall 013

Outfall 013 consists of storm water runoff in the south east area of the plant from the yard drains, roof drains, water storage tank sumps, and miscellaneous building floor drains. No treatment is provided before is discharge to the Broad River via Mayo Creek.

Flow

1. Previous permit limits:
   Monthly average: MR
   Daily maximum: MR
   Sampling frequency: 2/Year
   Sample type: Estimate

2. NPDES Application (2C & 2E):
   Long Term Average: 0.0005 MGD
   Maximum Daily Value: 0.0005 MGD

3. DMR Data: The highest value was reported on 9/98 as 0.0222 MGD

4. Conclusion:
   Daily maximum: MR
   Monthly Average: MR
   Sampling Frequency: 2/Year
   Sample type: Estimate

Total Suspended Solids (TSS)

1. Previous permit limits (effective 10/1/1997):
   Monthly average: MR
   Daily Maximum: MR

2. NPDES Application (2C & 2E): (No. of TSS analyses: 2)
   Long Term Average Value: 1.05 mg/l
   Maximum Daily Value: 2.00 mg/l

3. DMR Data: The highest value reported was 2.8 mg/l on 3/99

4. Water Quality Data: N/A

5. Effluent Limitation Guidelines: N/A

6. Other information:

7. PQL: 1000 µg/l

8. Conclusion:
   Daily maximum: MR
   Monthly Average: MR
   Sampling Frequency: 2/Year
   Sample type: Grab

pH

1. Previous Permit Limits (effective **10/1/1997**): MR
   Sampling Frequency: 2/Year
   Sample type: Grab

2. NPDES Application (2C & 2E): (No. of pH analyses: 2)
   Minimum: 7.08 standard units.
   Maximum: 7.32 standard units.

3. DMR Data: The highest pH was reported on 3/01 as 8.0 s.u. and the lowest pH was reported on 9/00 as 6.2 s.u.

4. Water Quality Data: Effluent Limits for pH are established in accordance with Reg. 61-68.G. 10. For Class **Fresh Water** this value is 6.0 – 8.5 standard units.

5. Effluent limitation guidelines: N/A

6. Other information:

7. PQL: Not applicable

8. Conclusion: There have been no excursions of pH, therefore, the limit for pH shall remain monitor and report
   Sampling Frequency: 2/Year
   Sample type: Grab

Outfall 014

Outfall 014 represents the combined internal outfalls 005, 06A, 06B and 008. It consists of sanitary sewage and low volume wastes and discharges to the Monticello Reservoir via the Circulating Water Discharge Canal. Outfall 014 will be used to apply water quality-based limitations prior to discharge to the Monticello Reservoir.

Flow

1. Previous permit limits (effective **10/1/1997**):
   Monthly average: Monitor and Report, MGD
   Daily Maximum: Monitor and Report, MGD
   Sampling Frequency: Continuous
   Sample Type: Continuous

2. NPDES Application (2C & 2E): (No. of flow analyses: 365)
   Long Term Average Value: 0.106304 MGD
   Maximum Daily Value: 1.7 MGD

3. DMR Data: The highest flow was reported on 10/98 as 5.46 MGD

4. Conclusion:
   Monthly average: MR
   Daily maximum: MR
   Sampling Frequency: Continuous
   Sampling Type: Continuous

pH

1. Previous Permit Limits (effective 10/1/1997):
   October – April: 6.0 – 8.5 standard units
   May – September: 6.0 – 9.0 s.u.
   Sampling Frequency: 1/Month
   Sample type: Grab

2. NPDES Application (2C & 2E): (No. of pH analyses: 12)
   Minimum: 6.9 standard units.
   Maximum: 9.0 standard units.

3. DMR Data: The highest pH was reported on 10/01 as 9.0 s.u. and the lowest pH was reported on 11/97 as 6.3 s.u.

4. Water Quality Data: Effluent Limits for pH are established in accordance with Reg. 61-68.G. 10. For Class Fresh Water this value is 6.0 – 8.5 standard units.

5. Effluent limitation guidelines: N/A

6. Other information: On December 6, 1999, VC Summer requested an alternate limit for pH of 6.0 - 9.5 s.u. during the months of May - September. The request was a result of permit violations for pH, which the permittee attributed to an algae growth problem due to high temperatures and dry weather during the summer. The Watershed Water Quality Management Strategy for the Broad Basin (Technical Report No. 001-98) issued by SCDHEC shows an increasing trend for pH in Lake Monticello and classified uses are being maintained. The Department therefore concludes that there is not an anthropogenic cause for the algal growth. VC Summer requested that the pH variance months be changed to April – October. The algae blooms have been starting earlier and lasting longer due to the extreme drought and heat.

7. PQL: Not applicable

8. Conclusion:
   November – March: 6.0 – 8.5 standard units
   April – October: 6.0 – 9.0 s.u.
   Sampling Frequency: 1/Month
   Sample type: Grab

Copper

1. Previous permit limits:
   Daily maximum: 0.028 mg/l
   Monthly Average: 0.039 mg/l
   Sampling Frequency: 1/Month
   Sample type: Grab

2. NPDES Application (2C & 2E): 3.38 µg/l

3. DMR Data: 0.035 mg/l (10/97)

4. Water Quality Criterion: see spreadsheet

5. Other Information:

6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: Yes, based on Aquatic Life from R.61-68

7. Effluent limitations guidelines (ELGs) and professional judgment-based limits: N/A

8. PQL: 0.010 mg/l

9. Conclusion: Based on reasonable potential, limit shall be imposed for copper. A schedule of compliance shall be included to allow time to comply with the limit.
   Daily maximum: 0.007 mg/l
   Monthly Average: 0.009 mg/l
   Sampling Frequency: 1/Month
   Sample type: Grab

Mercury

1. Previous permit limits: N/A

2. NPDES Application (2C & 2E): <0.200 µg/l

3. DMR Data: N/A

. Water Quality Criterion: see spreadsheet

5. Other Information:

6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: Yes, based on Human Health Organism Consumption from R.61-68

7. Effluent limitations guidelines (ELGs) and professional judgment-based limits: N/A

8. PQL: 0.0005 µg/l; EPA Method 1669/1631C

9. Conclusion: As stated in Section II.G.2.d.iii.1.b of the rationale, if the permittee uses a detection level that is greater than the PQL, then the reported "less than" value for a given sample is assumed to be a discrete value equal to the detection level used by the permittee. The reported value for mercury was <0.2 µg/l and the practical quantitation limit is 0.0005 µg/l. Due to the fact that there is insufficient data to do a reasonable potential calculation, the limit for mercury shall be monitor and report. A reopener clause will be added to Part V.A in order to evaluate the monitoring data for reasonable potential. Reasonable potential may be evaluated after each sample using the guidelines established in the permit rationale. (In accordance with Part II.J.4.b.(1), zero may be used in the calculation when the PQL stated above is achieved.) At any time reasonable potential is determined not to exist, the permittee may submit a written request that mercury monitoring be discontinued.
   Monthly average: Monitor and Report
   Daily maximum: Monitor and Report
   Sampling Frequency: 1/Month
   Sample type: Grab

Aluminum

1. Previous permit limits: N/A

2. NPDES Application (2C & 2E): 30.1 µg/l

3. DMR Data: N/A

4. Water Quality Criterion: see spreadsheet

5. Other Information:

6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: Yes, based on Aquatic Life from 53 FR 33178, 8/30/88

7. Effluent limitations guidelines (ELGs) and professional judgment-based limits: N/A

8. PQL: 0.05 mg/l

9. Conclusion: Due to the fact that there is no state standard, there shall be no limit for aluminum.

Zinc

1. Previous permit limits:
   Daily maximum: 0.059 mg/l
   Monthly Average: 0.065 mg/l
   Sampling Frequency: 1/Month
   Sample type: Grab

2. NPDES Application (2C & 2E): <10 µg/l

3. DMR Data: 0.058 mg/l (4/98)

4. Water Quality Criterion: see spreadsheet

5. Other Information:

6. Does the discharge cause, have the Reasonable Potential to Cause or Contribute: No

7. Effluent limitations guidelines (ELGs) and professional judgment-based limits: N/A

8. PQL: 0.010 mg/l

9. Conclusion: Based on reasonable potential, there shall be no limit imposed for zinc

Total Residual Chlorine (TRC)

1. Previous Permit Limits (10/1/1997):
   Monthly Average: 0.011 mg/l
   Daily Maximum: 0.019 mg/l
   Sample Type: Grab

Sampling Frequency: 1/Month

2. NPDES Application (2C): (No. of analyses: 12)
   Long Term Average: <0.05 mg/l
   Maximum Daily Value: <0.05 mg/l

3. DMR Data: The highest TRC value was reported on 6/99 as 0.20 mg/l.

4. Water Quality Data:
   a. Aquatic Life
      Water Quality Criteria from Reg. 61-68, Appendix:
      Freshwater:
      CCC = 11 µg/l
      CMC = 19 µg/l

   b. Human Health: None

5. Effluent limitation guidelines: Not applicable.

6. Wasteload Allocation Recommendation: 0.011 mg/l monthly average; 0.019 mg/l daily max

7. PQL: 0.05 mg/l

. Conclusion: The TRC limit is based on Aquatic Life Criteria.
   Monthly Average: 0.011 mg/l
   Daily Maximum: 0.019 mg/l
   Sampling Frequency: 1/Month
   Sample Type: Grab

Ammonia

1. Previous permit limits (Effective 10/1/1997):
   Monthly Average: 2.1 mg/l
   Daily Maximum: 4.2 mg/l
   Sampling Frequency:1 /Month
   Sample Type: Grab

2. NPDES Application (2C): (# of analyses: 1)
   Maximum Daily Value: 0.29 mg/l

3. DMR Data: The highest ammonia value was reported on 9/01 as 1.8 mg/l.

4. Waste Load Allocation, dated (04/23/01) based on dissolved oxygen modeling:
   Summer:
   Max Conc. Protecting Against Chronic Toxicity: 2.22 mg/l

   Winter:
   Max Conc. Protecting Against Chronic Toxicity: 4.36 mg/l

5. Water Quality Criteria for Protection of Aquatic Life from Reg. 61-68, Appendix, Attachment 3: Freshwater:

When salmonids are present, the CMC is determined by:

$$CMC = \left\{ \frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}} \right\}$$

Establish the CCC when fish early life stages (ELS) are present:

$$CCC = \left\{ \frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right\} \times \left\{ \min\left(2.85, 1.45 \times 10^{0.028 \times (25-T)}\right) \right\}$$

Note: The Department always considers fish early life stages to be present unless data is presented which demonstrates their absence.

Where:
pH = 7.5 s.u.
T = Summer: 25°C, Winter: 13°C

CCC= Summer: 2.22 mg/l, Winter: 4.36 mg/l

Monthly Average: Summer: 2.2 mg/l, Winter: 4.4 mg/l based on CCC above

. Water Quality Data for Protection of Human Health: None

7. Water Quality Criteria based on Organoleptic Data: None

8. Other information:

9. Conclusion: Ammonia shall be limited in accordance with Aquatic Life Criteria and WLA. The limits will be the same as the previous permit.
   Monthly Average: 2.1 mg/l
   Daily Maximum: 4.2 mg/l
   Sampling Frequency: 1/Month
   Sample Type: Grab

Whole Effluent Toxicity (WET)

Previous permit requirements:

Outfall 001: Quarterly chronic toxicity testing at a chronic test concentration (CTC) of 100% with limitations expressed as a maximum of 50% effect and an average of 20% effect

Outfall 012: Quarterly acute toxicity testing at an acute test concentration (ATC) of 100% with limitations expressed as a maximum of 50% effect and an average of 20% effect

Outfall 014: Quarterly chronic toxicity testing at a chronic test concentration (CTC) of 100% with limitations expressed as a maximum of 50% effect and an average of 20% effect

DMR Data:

Outfall 001: 19 WET tests were performed during the last permit period. The highest reported monthly average and daily max percent increase in mortality was 20% on 9/01 and 9/00. The highest reported monthly average and daily max percent reduction in reproduction was 17.4% on 6/02.

Outfall 012: 18 WET tests were performed during the last permit period. The highest reported monthly average and daily max percent increase in mortality was 15% on 3/01.

Outfall 014: 18 WET tests were performed during the last permit period. The highest reported monthly average percent increase in mortality was 35.3% on 6/99 and the highest reported daily max percent increase in mortality was 70.6% on 6/99. The highest reported monthly average and daily max percent reduction in reproduction was 45% on 12/00.

Other Information: EPA sent a letter dated April 17, 1998 recommending that the WET testing endpoints be modified as well as the methods for statistically analyzing the toxicity endpoints.

Testing Requirements for this permit:

From the information described above, using the procedures in Regulation 61-9.122.44(d)(1)(ii), the Department has determined that this discharge causes, has the reasonable potential to cause or contributes to an excursion of the narrative water quality standard of "no toxics in toxic amounts" from Regulation 61-68. Therefore, limitations on WET are needed.

The Department, after review of recent EPA guidance on WET testing, has added language to the Bureau of Water document entitled "Options for Data Analysis of Whole Effluent Toxicity Testing Required by NPDES Permits," September 2001 referenced in the permit which accounts for test variability, an issue that has been raised by numerous permittees. The EPA documents "Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System Program," June 2000 and "Method Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing (40 CFR Part 136)," July 2000 list some of the ways in which variability may be addressed. The pass/fail test previously used has been replaced with a multi-dilution requirement, as recommended by EPA, which allows the permittee the ability to collect more information relative to the point where toxicity actually occurs and average test results for compliance where more than one test is conducted during a monitoring period.

Your permit has WET limitations. These limitations are expressed as a maximum of 40% effect and an average of 25% effect. These limitations are designed to protect to the narrative water quality criterion for toxicity of "no toxics in toxic amounts." A maximum likelihood regression model will be used to determine the percent effect of the test as specified in Part V of the permit. For a monitoring period where a single test is performed, the Department has determined that an average 25% effect closely corresponds to 0.05 alpha level and a maximum 40% effect is close to 0.01 alpha level under current test design and methods.

<u>Outfall 001:</u>

$$\text{Dilution Factor} = \frac{\text{Flow of Discharge}}{7Q10 + \text{Flow of Discharge}} = \frac{674.92\ \text{MGD}}{0.0\ \text{MGD} + 674.92\ \text{MGD}} = 1.0$$

Instream Waste Concentration = 1/DF x 100 = 1/1 x 100 = 100%

reasonable potential calculation was conducted for Outfall 001 using the DMR data from 12/97 – 6/02. The previous permit required Chronic Toxicity Testing at CTC = 100% with limitations of 20% monthly average and 50% daily maximum for percent increase in mortality and percent reduction in reproduction. The reasonable potential calculation was conducted on the overall percent reduction, which is the greater of the percent effect on survival and reproduction. The procedure for determining reasonable potential is explained in Box 3-2 on page 53 of EPA's Technical Support Document

for Water Quality-Based Toxics Control (TSD). The following table shows the DMR data that was used to calculate reasonable potential in accordance with the TSD. The Reasonable Potential Multiplying Factor (RPMF) from Table 3-2 is 1.6. The reasonable potential multiplying factor is used with the highest data point to give the 95% Confidence Level and 95% Probability Basis for the highest reasonable potential for the parameter. Multiply the RPMF by the highest value in the data set to obtain the maximum receiving water concentration.

Sample Date	TCP3B % Effect	TJP3B % Mort	Max
12/31/1997	0	0.5	0.5
03/31/1998	0	0	0
06/30/1998	6.3	0	6.3
09/30/1998	10.5	0	10.5
12/31/1998	0	0	0
03/31/1999	0	14.3	14.3
06/30/1999	0	10	10
09/30/1999	0	10	10
12/31/1999	0	10	10
03/31/2000	0	0	0
06/30/2000	6.3	0	6.3
09/30/2000	11.1	20	20
12/31/2000	15	0	15
03/31/2001	0	0	0
06/30/2001	0	0	0
09/30/2001	16.7	20	20
12/31/2001	5.3	0	5.3
03/31/2002	0	0	0
06/30/2002	17.4	10	17.4

number of samples	19
standard deviation	7.205184
mean	7.663158
CV = st.dev/mean	0.940237
max value	20
MF (from Data sheet)	1.60
RWC = MF * max	32

The RWC obtained is 32%. Compare this value to the average limitation of 25% inhibition and a maximum limitation of 40% inhibition at the test concentration as explained above. EPA recommends that permitting authorities find reasonable potential when the projected RWC is greater than an ambient criterion.

Chronic toxicity testing will be performed at the chronic test concentration (CTC) of 100% for Outfall 001.

<u>Outfall 014:</u>

$$\text{Dilution Factor} = \frac{\text{Flow of Discharge}}{7Q10 + \text{Flow of Discharge}} = \frac{0.106\ \text{MGD}}{0.0\ \text{MGD} + 0.106\ \text{MGD}} = 1.0$$

Instream Waste Concentration = 1/DF x 100 = 1/1 x 100 = 100%

Chronic toxicity testing will be performed at the chronic test concentration (CTC) of 100% for Outfall 014.

The following calculation, as explained in the Bureau's guidance document *Options for Data Analysis of Whole Effluent Toxicity Testing Required by NPDES Permits*, September 2001, shows how the multiple concentrations are derived. To determine a geometric series of effluent concentrations given a low concentration *L*, a high concentration *H*, and *n* concentrations, the concentration factor is

$F = (H/L)^{1/(n-1)}$ and the *i*th concentration is $C_i = L * F^{i-1}$

Where, F is the concentration factor and n is the number of concentrations:

For n = 5, L = 50, and H = 100, $F = \frac{100}{50}^{1/(5-1)} = 2^{1/4} = 1.19$

After determining the concentration factor the following formula is used to determine the test concentrations:

$C_I = L \times F^{(I-1)}$ where, *I* is the number of concentrations

Determining the four concentrations: Note; *I* = 1,2, 3, 4, 5

$C_1 = 50 \times 1.19^{(1-1)} = 50\%$

$C_2 = 50 \times 1.19^{(2-1)} = 60\%$

$C_3 = 50 \times 1.19^{(3-1)} = 71\%$

$C_4 = 50 \times 1.19^{(4-1)} = 84\%$

For this discharge situation, the concentrations are 0%, 50%, 60%, 71%, 84% and 100% for each multiple concentration test.

Outfall 012

The Permittee is presently required to conduct quarterly whole effluent acute toxicity testing at an ATC of 100%. In order for new toxicity limits to be drafted, the Department allows the Permittee to submit information concerning a mixing zone for the effluent discharge. A Schedule of Compliance will be written into the permit to submit this information. The Permittee will be given existing toxicity limits for a period of one year after the effective date of the permit. At the end of this interim period, final whole effluent toxicity chronic testing at a chronic test concentration (CTC) of 100% will be placed in the permit. Upon sufficient mixing demonstration, the permit will be modified to include alternate WET test requirements.

A reasonable potential calculation was conducted for Outfall 012 using the DMR data from 12/97 – 6/02. The previous permit required Acute Toxicity Testing at ATC = 100% with limitations of 20% monthly average and 50% daily maximum for percent increase in mortality. The procedure for determining reasonable potential is explained in Box 3-2 on page 53 of EPA's Technical Support Document for Water Quality-Based Toxics Control (TSD). The following table shows the DMR data that was used to calculate reasonable potential in accordance with the TSD.

Sample Date	TJP3B % Mort
12/31/1997	0
03/31/1998	5

06/30/1998	5
09/30/1998	0
12/31/1998	0
03/31/1999	5
06/30/1999	0
09/30/1999	0
12/31/1999	15
03/31/2000	0
06/30/2000	0
09/30/2000	0
12/31/2000	0
03/31/2001	15
06/30/2001	5
09/30/2001	0
12/31/2001	0
03/31/2002	0
06/30/2002	10

number of samples	19
standard deviation	5.058141489
mean	3.157894737
CV = st.dev/mean	1.601744805
max value	15
MF (from Data sheet)	1.90
RWC = MF * max	28.5

The Reasonable Potential Multiplying Factor (RPMF) from Table 3-2 is 1.9. The reasonable potential multiplying factor is used with the highest data point to give the 95% Confidence Level and 95% Probability Basis for the highest reasonable potential for the parameter. Multiply the RPMF by the highest value in the data set to obtain the maximum receiving water concentration. The RWC obtained is 28.5%. Compare this value to a maximum limitation of one percent (≤1%) lethality at the test concentration. EPA recommends that permitting authorities find reasonable potential when the projected RWC is greater than an ambient criterion.

Section 316(b)

Section 316(b) of the Act requires that the location, design, construction, and capacity of a cooling water intake structure reflect the best technology available for minimizing environmental impact. A determination has been made, in a accordance with Section 316(b) of the Act, that the location, design, construction, and capacity of the cooling water intake structure(s) reflects the best technology available for minimizing adverse environmental impact. This determination was based on information submitted by SCE&G in a 316(b) Demonstration (March 1977).

Chemical Additives

Ammonia
Hydrazine
Methoxypropylamine
Carbohydrazine
Boron (Boric Acid)
Zinc Sulfate
Soda Ash
Aluminum Sulfate

Gaseous Chlorine
Clay, Polymer
Tetrasodium Pyrophosphate
Sodium Hydroxide
Sulfuric Acid
Chlorine
Sodium Hypochlorite
CT-2 (Betz)
Polymer (Betz 1190)
Sodium Metasilicate
Betz Depositrol
Betz Dianodic
Betz Flowgard
Sodium Nitrate/Sodium Borate
Lithium Hydroxide
Hydrogen Peroxide
Potassium Chromate
Potassium Hydroxide
Potassium dichromate

Sludge Disposal

The Permittee shall be required to obtain prior approval for any sludge disposal activities at this facility

Operator

The Permittee's present treatment system consists of sedimentation and neutralization. The highest classification of the operation of all treatment equipment is usually used to determine the operator requirement. Based on the wastewater treatment system classification, an operator with a Grade C-Bio or higher certification is required to accept the responsibility of inspections made by lower grade operators.

Co-Treatment

Where various wastes are combined for treatment and discharge, 40 CFR 423.13(h) requires that the quantity of each pollutant or pollutant property not exceed the specified limitation for that waste source. Applicable effluent guidelines concentrations were flow weighted in calculating final effluent concentrations.

(SCE&G updated)

Sec 3.4 Ref 2

SOLID WASTE MANAGEMENT
AND
WASTE MINIMIZATION PLAN
FOR
VIRGIL C. SUMMER NUCLEAR STATION

PREPARED BY
SOUTH CAROLINA ELECTRIC
AND
GAS COMPANY

Revision 1

APPROVALS

_____
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Date Issued_____

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SECTION 1

INTRODUCTION

This solid waste management and minimization plan has been prepared per the requirements of the current NPDES Permit (SC0030856) and RCRA sections 3002(b) and 3005(h) for the Virgil C. Summer Nuclear Station. The purpose of the plan is to describe in detail how solid wastes produced at the facility will be handled and disposed. For the purpose of this plan, the term "solid waste" will refer to sludge, waste oil, and solid wastes whether hazardous or not. This plan will be used as a guide to ensure that all solid wastes are properly disposed of in accordance with the rules and regulations of the South Carolina Department of Health and Environmental Control's (DHEC) Bureau of Solid and Hazardous Waste Management.

This plan is divided into five sections: Introduction, Background, Solid Waste Management Practices, Management of Future Solid Wastes, and Waste Minimization. Section 3, Solid Waste Management Practices, describes in detail each existing solid waste produced at the plant. Subsections included in the description for each waste are: Identification, Collection and Storage, Transfer, Disposal and Waste Minimization. The plan also includes a map of the facility.

Once the plan is approved by SCDHEC, the plan will be kept on file at the facility. Modifications should be made as new or different solid wastes are produced or identified at the plant. All modifications should be submitted to DHEC for approval. This revision incorporates the RCRA Waste Minimization Plan requirements and adds new waste categories in Sections 3.22-3.26.

SECTION 2

BACKGROUND

The Virgil C. Summer Nuclear Station is located 26 miles northwest of Columbia, South Carolina near the community of Jenkinsville in Fairfield County. The plant is a joint project between South Carolina Electric and Gas Company, operator and two-thirds owner of the plant, and the South Carolina Public Service Authority (Santee Cooper), owner of the remaining one-third. The plant is a three loop pressurized water reactor that produces 930 Megawatts of electricity.

The plant's newest NPDES Permit, effective date of November 1, 1993, has the following condition:

> "All sludges, waste oil and solid and hazardous waste shall be properly disposed of in accordance with the rules and regulations of the Bureau of Solid and Hazardous Waste Management, including the intake screen backwash. Within ninety (90) days of the permit effective date, the permittee shall submit a plan which details the sludge and solids management and disposal practices including the chemical metal cleaning sludge at this facility for review and approval."

In addition, on May 28, 1993. EPA published, in Federal Register (58 FR 31114), interim final guidance on what EPA would consider to constitute a "program in place" for compliance with the certification requirements of RCRA sections 3002(b) and 3005(h). Section 3002(b) requires generators of hazardous waste to certify, on their hazardous waste manifests, that they have a waste minimization program in place to reduce the volume and quantity or toxicity of such waste to the degree determined by the generator

to be economically practicable. Section 3005(h) requires that owners and operators of facilities that receive a permit for the treatment, storage, or disposal of hazardous waste on the premises where such waste was generated, to make the same certification no less often than annually. Virgil C. Summer Nuclear Station is both a generator of hazardous waste and an interim permitted storage facility, therefore sections 3002(b) and 3005(h) are applicable.

The issue of waste minimization was also addressed in the NRC's IEN94-0023. The NRC endorsed the Federal Register and recommended that the concepts of waste minimization were also applicable to radioactive waste.

To meet these requirements, SCE&G personnel developed this plan based on the existing operations at the plant.

SECTION 3

SOLID WASTE MANAGEMENT PRACTICES

3.1 Oil Waste Absorbents

3.1.1 Identification

Oil waste absorbents consist of clean-up materials such as rags, oil-dry or other oil absorbents.

3.1.2 Collection and Storage

The oil waste absorbents are collected from various clean-up operations on site and stored in drums. Once the drums are filled, they are moved to a designated storage area, L-52, until a sufficient number of drums are collected to warrant disposal.

3.1.3 Transfer

The drums are transferred via an independent vendor.

3.1.4 Disposal

Disposal is handled by an independent vendor.

3.1.5 Waste minimization

The volume of waste absorbents is minimized by an aggressive maintenance program. Oil leaks are identified during plant walkdowns. Any oil leaks are identified, contained and maintenance work requests are initiated to repair the leak.

3.2 **Empty Oil Drums**

3.2.1 Identification

Empty oil drums are left from various equipment operations on site. The drums are emptied as much as possible through the used of the product. A small quantity of residue may be left in the drums. These drums are not classified as hazardous waste.

3.2.2 Collection and Storage

The empty oil drums are collected and stored on site at the designated storage are, L-52, until a sufficient number of drums are collected to warrant disposal.

3.2.3 Transfer

The drums are transferred via a independent vendor.

3.2.4 Disposal

Disposal is by metal recycling and is handled by an independent vendor if the drum cannot be re-used.

3.2.5 Waste minimization

Drums are rinsed and reused whenever possible, as a means of waste minimization. Drums that can not re-used are placed with scrap metal for recycling.

3.3 Scrap Metal

3.3.1 Identification

Scrap metal consists of unusable metals generated through various plant operations. These scrap metals are not classified as hazardous.

3.3.2 Collection and Storage

The scrap metal is collected from different areas of the site and stored in a roll-off container.

3.3.3 Transfer

The roll-off container itself is hauled using a container truck. Hauling is done by an independent service.

3.3.4 Disposal

The scrap metal is sent to a scrap metal dealer for recycling.

3.3.5 Waste Minimization

No attempt is made to minimize the volume of this waste. The waste is recycled.

3.4 **Plant Garbage**

3.4.1 Identification

This is general garbage collected on site. It consists of employee generated trash such as office and lunch room garbage. It is also includes operations generated trash such as material bags, cardboard boxes, and wood. This garbage is not hazardous.

3.4.2 Collection and Storage

The garbage is collected in various receptacles located on site. Recyclable white paper and green bar paper is separated and stored in tagged trash bags. Cardboard boxes are collected and stored in waste containers. Aluminum cans are collected in plastic receptacles and stored for recycling. The plant garbage is stored in large roll-off containers.

3.4.3 Transfer

The roll-off containers are hauled using a container truck. The white paper and green bar paper is transferred for recycling by an independent vendor. The cardboard boxes are transferred for recycling by an independent vendor. The aluminum cans are transferred to a recycling center.

3.4.4 Disposal

The plant garbage is hauled to a permitted municipal landfill for disposal. White paper, green bar paper, aluminum cans, and cardboard boxes are recycled.

3.4.5 Waste minimization

This waste source is minimized through recycling of paper, cardboard and aluminum. Personnel are encouraged to reduce other sources of waste whenever possible.

3.5 Metal Working Wastes

3.5.1 Identification

Metal working wastes are products (machine filings, slag, and welding rod butts) generated from various metal working operations. Machine filings are thin metal shavings generated in the preparatory or finishing process of metal objects prior to welding, assembly, etc. Slag is resolidified molten metal drippings generated when cutting steel with an acetylene gas torch. Welding rod butts are small metal rod remnants generated in the welding process due to the physical limitations that do not allow for complete consumption of the welding rods.

3.5.2 Collection and Storage

Machine filings and slag are collected from the floor by sweeping. The machine filings and slag are put into trash cans. The welding rod butts are collected in small cans or buckets by the welder. The small cans are emptied into trash cans. The trash cans are then emptied into a container provided by a private waste transporter.

3.5.3 Transfer

The container itself is hauled by an independent service.

3.5.4 Disposal

The container contents along with the plant garbage are hauled to a permitted municipal landfill for disposal.

3.5.5 Waste minimization

There is no attempt to minimize this source of waste.

3.6 Waste Gaskets

3.6.1 Identification

Waste Gaskets are unusable gaskets of various material (rubber, paper, teflon, etc.) generated during the repair or rebuilding of plant equipment. Asbestos containing gaskets are discussed in section 3.24.

3.6.2 Collection and Storage

The waste gaskets are collected and put into trash cans which are then emptied into a container provided by a private waste transporter. Gaskets that are contaminated with radioactive material are disposed of as radioactive waste.

3.6.3 Transfer

The container itself is hauled by an independent service.

3.6.4 Disposal

The container contents along with the plant garbage are hauled to a permitted municipal landfill for disposal. Asbestos containing gasket material is handled in accordance with the company asbestos disposal plan.

3.6.5 Waste minimization

The amount of gasket material waste generated is a function of the amount of work performed in the plant, therefore no attempt is made to minimize this volume of this waste.

3.7 Waste Solvents

3.7.1 Identification

Liquid solvent waste, used in the Oil Analysis Lab, is generated when solvent used in cleaning processes becomes saturated with oil or grease. Liquid solvents are also used in the various laboratories for certain analytical procedures.

3.7.2 Collection and Storage

The waste solvent is collected in drums at the satellite accumulation stations which are located in various places in the plant and labs.

3.7.3 Transfer

The collection drums are picked up and transported by a permitted independent vendor.

3.7.4 Disposal

The waste solvent will be recycled by an independent vendor or processed by an approved disposal facility.

3.7.5 Waste minimization

Waste solvents are recycled for reuse whenever possible. Chemistry personnel are trained to minimize the use of solvents for cleaning. Less toxic or non-hazardous wastes are used whenever possible.

3.8 **Resins from Water Treatment Plant**

3.8.1 Identification

Resins from the Water Treatment Plant are a styrene and divinylbenzene copolymer in the form of small spherical beads. The waste resin is removed from the demineralizer vessels in the water treatment plant. The beads are removed because they no longer produce demineralized water that meets quality standards.

3.8.2 Collection and Storage

The beads are collected and stored in suitable drums.

3.8.3 Transfer

The containers are transferred on trucks.

3.8.4 Disposal

After approval from DHEC is granted, the resin beads are sent to a landfill for burial.

3.8.5 Waste minimization

These resins typically last several years. They are routinely regenerated with acid and caustic to restore their ion exchange capacity. There are no additional steps taken to reduce this waste stream.

3.9 Waste Paint Products

3.9.1 Identification

Waste paint products (waste [dry & liquid] paint, paint thinner, brushes, buckets, etc.) are generated during structural painting.

3.9.2 Collection and Storage

Waste paint products are collected in drums and stored in the paint shop. The drums are collected and stored at lay down area, L-52. Waste paint products that are determined to be hazardous are disposed of as hazardous waste.

3.9.3 Transfer

Waste paint products are shipped via a independent vendor.

3.9.4 Disposal

Waste paint products are disposed of by an independent vendor. Non-hazardous products are disposed of as plant garbage. Hazardous paint products are disposed of as hazardous waste.

3.9.5 Waste minimization

The painters are instructed to withdraw only the amount of paint and thinner required to perform the task. Left-over paint that is reusable is recovered for future work. All paints used at the site are reviewed as part of the site Chemical Control Program. This program includes a review of the toxicity of each paint product. We try to select products with low toxicity when possible. The painters receive training on waste minimization.

3.10 Wastewater Sludge

3.10.1 Identification

Wastewater sludge is sludge collected from the on-site domestic wastewater treatment system. The system is a multicellular aerated lagoon and sand filter system. This waste stream is also referred to as NPDES Outfall 005.

3.10.2 Collection and Storage

The sludge will be collected within the wastewater system in one of the cells until it is necessary to remove it.

3.10.3 Transfer

The sludge will be transferred via a truck whenever it is necessary to remove the sludge.

3.10.4 Disposal

Based on sample analysis results and approval from SCDHEC, the sludge will be disposed of on site by land application. Chemistry Services will initiate all requests to SC DHEC for approval to dispose of this sludge.

3.10.5 Waste minimization

It is not practical to minimize this waste stream.

3.11 Water Treatment Sludge

3.11.1 Identification

The water treatment sludge consists of clarifier blowdown waste (floc), gravity filter backwash residue (dirt and carbon fines), activated carbon filter backwash residue (dirt and carbon fines), waste from the feeders supplying the clarifier (clay and Betz polymer 1190) and powdex resin from the condensate system polishers. These solids settle in the Alum Sludge Lagoon, NPDES Outfall 006A.

3.11.2 Collection and Storage

The solids are collected in the pond until it is necessary to remove the sludge.

3.11.3 Transfer

The sludge would be evacuated by a backhoe and transferred via truck to an on site disposal area.

3.11.4 Disposal

Based on sample analysis results and approval from SCDHEC, the sludge will be disposed of on site. Chemistry Services will initiate all requests to SC DHEC for approval to dispose of this sludge.

3.11.5 Waste minimization

Most of the waste in this outfall is from clarifier blowdown, which is mostly suspended solids from the lake. No attempt is made at minimizing this waste.

3.12 Chemical Metal Cleaning Sludge

3.12.1 Identification

Chemical metal cleaning sludge is sludge collected from the plant startup waste holding basin, NPDES Outfall 008. This sedimentation basin is for the retention of wastewater generated primarily by chemical cleaning of various equipment, piping, etc. within the plant.

3.12.2 Collection and Storage

The solids are collected in the pond. The use of the plant startup holding basin is very infrequent and has a very small sludge bed.

3.12.3 Transfer

If it is necessary to remove the sludge from the basin, the sludge would be evacuated using a backhoe and transferred via truck to an on-site disposal area.

3.12.4 Disposal

If it is necessary to remove the sludge from the basin, the sludge would be disposed of on-site based on sample analysis results and approval from SCDHEC. Chemistry Services will initiate all requests to SC DHEC for approval to dispose of this sludge.

3.12.5 Waste minimization

This waste stream is minimized by controlling the amount of waste allowed to enter the pond. Whenever possible, chemical cleaning contracts will specify that the vendor remove from site all wastes generated.

3.13 Plant Surge Basin Sludge

3.13.1 Identification

The plant surge basin (NPDES Outfall 006B) functions as a retention basin. Sources of wastewater to the plant surge basin consists primarily of wastewater from various plant sumps, storm water from transformer areas and fuel oil storage and handling areas. An oil skimmer removes oil which is collected in a holding tank. Sedimentation also occurs in the retention basin and reduces suspended solids content. The sludge, in the form of solids, is collected in the retention basin.

3.13.2 Collection and Storage

The solids are collected in the basin and stored until it is necessary to desludge the pond. Oil skimmed from the surface is collected in a holding tank.

3.13.3 Transfer

At which time it is necessary to remove the sludge, it will be excavated by a backhoe and transferred via truck to an on site disposal area. The skimmed oil is transferred to a tanker for recycling.

3.13.4 Disposal

Based on sample analysis results and approval from SCDHEC, the sludge will be disposed of on site. Chemistry Services will initiate all requests to SC DHEC for approval to dispose of this sludge. The skimmed oil is recycled by an approved vendor.

3.13.5 Waste minimization

No attempt is made to reduce the amount of sludge generated. The amount of waste oil is minimized by an aggressive maintenance program that repairs oil leaks within the plant. This minimizes the amount of oil that leaks into the various sumps.

3.14 Waste Oil

3.14.1 Identification

The waste oil is spent lubricating fluids from various pieces of equipment, machinery and vehicles used on site.

3.14.2 Collection and Storage

The waste oil is collected from the various locations in the plant and stored in drums and tanks. Once a drum is filled it is moved to the designated on site storage area, L-52. Waste oil from the turbine is stored in one 15,000 gallon underground storage tank or a 10,000 gallon tank located in the 412' elevation of the turbine building.

3.14.3 Transfer

The drums are transferred to a designated storage area, L-52. An independent vendor picks up and transfers the drum via a truck. The tanks are transferred to a tanker truck for recycling.

3.14.4 Disposal

The waste oil is recycled for energy recovery by an independent vendor.

3.14.5 Waste minimization

The amount of waste generated is considered small. The Oil Lab analyzes all in-use oil prior to change out to determine if change out is required. Those oils that meet specifications are reused. This in effect minimizes the amount of oily waste generated.

3.15 Sand Blast Material

3.15.1 Identification

Sand blast material is material which is used to prepare metals for painting. The sand blast material used is a diamond impregnated metal bond or more commonly called black diamond. When it is collected it can contain a small amount of paint and fine metal particles.

3.15.2 Collection and Storage

The sand blast material is collected in the sand blast area and reused.

3.15.3 Transfer and Disposal

The sand blast material is reused on site, therefore there is not a disposal plan for it.

3.15.4 Waste minimization

This waste is minimized by recycling as much of the sand blast material as possible.

3.16 Used Oil Filters

3.16.1 Identification

The used oil filters are collected from various pieces of equipment and machinery used on site.

3.16.2 Collection and Storage

The used oil filters from various pieces of equipment and machinery are collected, drained and placed in trash cans which are then emptied into a container provided by a private waste recycler.

3.16.3 Transfer

The accumulated filters are picked up by the waste recycler.

3.16.4 Disposal

The waste filters are compacted, by the waste contractor. The metal is then sent to a smelter to recover the metal. Oil obtained from the crushing operation is recovered by the vendor for energy recovery.

3.16.5 Waste minimization

The volume of waste is minimized by draining, then crushing the filters prior to disposal.

3.17 Waste Petroleum Naphtha (Mineral Spirits)

3.17.1 Identification

This waste stream was waste petroleum naphtha (mineral spirits) used in a parts cleaner. This solvent has been eliminated and replaced with a citrus-based cleaner.

3.18 Lead Waste

3.18.1 Identification

Lead waste comes from pure lead that is used for radiation penetration shielding throughout the radiation control area of the plant. This sealant is a lead impregnated rubber.

3.18.2 Collection and Storage

All lead waste generated on site will be collected by personnel sealing penetrations and placed in a drum. The drums will be stored in the Lead Shop (satellite accumulation) or at the lay down area, L-52.

3.18.3 Transfer

The drums will be transferred via a permitted vendor.

3.18.4 Disposal

The lead waste will be disposed of by a permitted vendor at a permitted disposal facility.

3.18.5 Waste minimization

There is only a small quantity of this waste generated. The individuals using the lead are encouraged to prepare only the necessary amount of the lead for the job at hand to minimize the waste generated.

3.19 Chromated Waste

3.19.1 Identification

Potassium Chromate/Potassium Dichromate are used as a corrosion inhibitor in the Component Cooling Water System at the plant. Small volumes of the chromated water are drained from components for maintenance or from leaks.

3.19.2 Collection and Storage

Small volumes of chromated water are collected in containers and labeled. Properly collected chromated water is not considered hazardous waste and is returned to the system for reuse. Chromated water that can not be returned to the system is treated as hazardous waste and handled accordingly. Large volumes of chromated waste are normally sent to the Component Cooling Water Drain Tank until it can be reused. If the small volume of chromated water contains radioactive material, it will be processed through the Radioactive Waste System.

3.19.3 Transfer

Any chromated waste for disposal is transferred via an independent vendor.

3.19.4 Disposal

Chromated waste is disposed of via an approved independent waste contractor.

3.19.5 Waste minimization

Waste chromated water is recovered for re-use in the plant systems when possible. Any unusable chromated waste will be treated as hazardous waste if it exceeds the regulatory limit for chrome. The station is pursuing the removal of chromates from station systems to preclude future generation of this waste.

3.20 Activated Carbon

3.20.1 Identification

Activated carbon is used as a filter media in the water treatment system. The waste is removed from the vessels when the media no longer meets quality standards.

3.20.2 Collection and Storage

The carbon media is collected and stored in suitable containers

3.20.3 Transfer

The collection containers are transferred via trucks.

3.20.4 Disposal

Based on sample analysis results and approval from SCDHEC, the activated carbon is sent to McMeekin Station for burning with coal..

3.20.5 Waste minimization

Since this waste is recycled and the quantity used is small, no attempt is made for minimization.

3.21 **Intake Screen Backwash**

3.21.1 Identification

The intake screen backwash consists primarily of aquatic plants removed from the main water intake screen. These plants are locally native plants that become uprooted and accumulate on the screens.

3.21.2 Collection and Storage

The intake screen is cleaned manually with a rake on an as needed basis. As the intake screen is cleaned, the materials are place in a truck.

3.21.3 Transfer

The material is transferred to a disposal area on site.

3.21.4 Disposal

The material is disposed of in an area on site.

3.21.5 Waste minimization

Their is no effort to reduce this waste stream, since it is highly dependent on the amount of floating debris in Lake Montecello.

3.22 BATTERIES

3.22.1 Identification

This waste stream stream include waste lead-acid batteries used at the station.

3.22.2 Collection and Storage

Used batteries are collected and stored in the warehouse for recycling.

3.22.3 Transfer

Used batteries are transferred by the independent vendor that recycles the batteries.

3.22.4 Disposal

The batteries are recycled to recover the metal by an approved vendor.

3.22.5 Waste minimization

This waste is minimized by recycling the batteries to an approved vendor.

3.23 PCB's, CAPACITORS

3.23.1 Identification

There are very few PCB containing components at the station. Capacitors that are not label as non-PCB, are treated as PCB waste.

3.23.2 Collection and Storage

Any material containing or suspected of containing PCB's is collected in drums. PCB waste may be collected and stored in drums for up to 30 days.

3.23.3 Transfer

Prior to the expiration of the 30 day temporary storage period, the capacitors must be transferred via truck to the storage area at Columbia Stores.

3.23.4 Disposal

All PCB containing components must be disposed of in an EPA approved incinerator.

3.23.5 Waste minimization

The volume of PCB containing material at the site is minimal. When they fail, PCB containing components are replaced with non-PCB components.

3.24 Asbestos Waste

3.24.1 Identification

Asbestos is a hydrated mineral silicate that is incombustible in air. It is found in heat insulating material, fireproofing material, block and pipe insulation, brake linings and gaskets. At this site the primary source of asbestos waste is gasket material. Gaskets are used at flanged surfaces in various plant systems. These gaskets are removed and replaced during maintenance activities.

3.24.2 Collection and Storage

Asbestos containing material will be collected in accordance with the company Asbestos Plan. It will be stored in 6 mil poly bags and labeled appropriately.

3.24.3 Transfer

Asbestos waste will be transported to Environmental Services for proper disposal.

3.24.4 Disposal

Asbestos waste may be disposed of at a SC DHEC approved county landfill.

3.24.5 Waste minimization

This waste stream will be minimized by selection of non-asbestos containing materials, whenever possible.

3.25 LIGHT BULBS

3.25.1 Identification

Used fluorescent lamps (including high-intensity discharge, or HID lamps) may be classified as hazardous waste. If the lamps exceed the TCLP test for the presence of heavy metals, then they are considered hazardous.

3.25.2 Collection and Storage

Used lamps are collected and stored for disposal. The unbroken used lamps should be stored in a manner to prevent breaking. Broken lamps should be stored in a sealable drum. All waste should be labeled as hazardous waste.

3.25.3 Transfer

This waste will be transferred to Environmental Services for disposal.

3.25.4 Disposal

These lamps are accumulated for recycling.

3.25.5 Waste minimization

This waste is recycled.

3.26 Laboratory Waste

3.26.1 Identification

V. C. Summer Station has 4 laboratories within the protected fence, one training lab and an environmental laboratory at the Nuclear Training Center. Each of these labs accumulate waste lab chemicals, mostly expired reagents.

3.26.2 Collection and Storage

These wastes are collected in each lab, then stored in a collection area for re-use or recycling. Hazardous wastes are accumulated in satellite accumulation points established in each lab.

3.26.3 Transfer

Re-usable or recyclable chemicals will be transported to the end user by company vehicles or picked up by the end user.

3.26.4 Disposal

Small quantities of lab chemicals used in analysis are allowed o be poured down lab sinks. Larger quantities will be disposed of as hazardous waste or accumulated for re-use or recycling.

3.26.5 Waste minimization

These wastes are routinely packaged in lab packs for disposal of as hazardous waste. To minimize this waste stream, other uses are being evaluated. Primarily, expired reagents will be collected for reuse in the training labs, where shelf-life is not critical. Additionally, these reagents will be donated to various high school or college labs. Lab wastes that can not be re-used or recycled will be disposed of as hazardous waste using an approved hazardous waste vendor.

Section 4

Management of Future Solid Wastes

This plan has described the handling, disposal and waste minimization of existing solid wastes produced at the facility. It is the intent of the plant to handle all solid wastes in accordance with S. C. Department of Health and Environmental Control regulations. In the event that new or different solid wastes are produced at the plant, this plan will be modified to indicate handling methods. Also, as new regulations evolve, handling practices will be evaluated and modified as required.

As a general guideline, the following is our plan:

1. If a waste is suspected of being hazardous, we will handle and dispose of it as such until proper testing proves otherwise.
2. Review the most current solid waste regulations yearly and modify this plan accordingly.
3. Submit all modifications of this plan to DHEC for approval.
4. Whenever possible, recycle wastes instead of landfilling or incinerating.

V. C. Summer Nuclear Station has a Chemical Use Permit program that controls the use of chemicals that are on site. V. C. Summer Nuclear Station is a generator of hazardous waste and therefore must be in compliance with the facility and generator requirements as specified in the South Carolina Hazardous Waste Management Regulations.

SECTION 5

WASTE (HAZARDOUS AND NON-HAZARDOUS) MINIMIZATION

5.1 POLICY

It shall be the policy of V. C. Summer Nuclear Station to minimize both the volume and toxicity of the waste generated at the station where practicable and economically justifiable. This policy receives the full endorsement of station management. Waste minimization is a process of continuous improvement. It is an integral part of the station's chemical control and waste program and as such should increase productivity and quality.

5.2 Goals

The following three goals are established for the generation of waste at the station:

1. To reduce the volume and toxicity of hazardous and non-hazardous waste streams.
2. To become a Small Quantity Generator of hazardous waste. This will require us to reduce the amount of hazardous waste generated to less than 2205 lbs (1000 kilo grams per month and to accumulate no more than 13,230 lbs (6000 kilograms) at any one time.
3. To rescind our Interim Part A storage permit for the of mixed waste(radioactive and hazardous) on-site. This will require us to ship all mixed waste within 90 days of the time it is generated for Large Quantity generator and 180 days for a Small Quantity generator.

The following are components of a sound waste minimization plan that should help meet the above goals:

1. Management Support

   Management has reviewed this plan. Their endorsement of the plan is shown by their signatures on the cover of the plan and their willingness to support any efforts to reduce costs and risk to the public, environment and plant staff..

2. Use of waste minimization audits and program implementation evaluations

   Periodic audits of the program will be performed by Chemistry Services, station Quality Assurance and SC DHEC. Recommendations identified through these assessments, and evaluations will be implemented when cost beneficial. Periodic (~annually) reviews of the program effectiveness will be performed. These reviews will provide feedback and identify potential areas for improvement.

   Waste assessments will identify opportunities at all points in the plant where materials can be prevented from becoming a waste and for waste minimization opportunities based on true costs associated with waste management and cleanup.

3. Waste cost tracking

   Annual costs for waste management will be tracked beginning in December 1995.

4. Encourage technology transfer

   We will continue to make use of any new technology that will help reduce the volume and toxicity of our waste. This will be done by contacting other utilities periodically, review of waste periodicals, and other sources.

Section 3.9 References

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Section 3.10 References

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2.	Santee Cooper undated. Site/Routing Procedure, Moncks Corner, South Carolina.	No	Yes
3.	Santee Cooper 1996. Transmission Line Standards Reference Manual, Section 3, Transmission Line Location, Engineering Survey, and Right-of-Way Activities, June 1, 1996.	No	Yes
4.	SCDHEC (South Carolina Department of Health and Environmental Control) 2005. Storm Water Management BMP Handbook. August 2005. Available at www.scdhec.com. Accessed September 9, 2006.	No	Yes
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6.	SCE&G 2000. Transmission Line and Substation Siting Processes. January 2000.	No	Yes
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Section 4.3			
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4.	Golden, J., R. P. Ouellette, S. Saari, and P. N. Cheremisinoff 1980. Chapter 8: Noise, in Environmental Impact Data Book (Second Printing), Ann Arbor Science Publishers, Inc., Ann Arbor, Michigan, 1980.	Yes	No
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14.	Santee Cooper 2006. Santee Cooper Transmission Vegetation Management Program, February 17, 2006.	No	Yes
15.	TtNUS (Tetra Tech NUS) 2007a. Mayo Creek Aquatic Survey. Prepared for SCE&G by Tetra Tech NUS, Aiken, South Carolina, 2007.	No	Yes
16.	TtNUS 2007b. Trip Report V.C. Summer Nuclear Station, M. L. Whitten and P. R. Moore. April 5-6, 2007.	No	Yes
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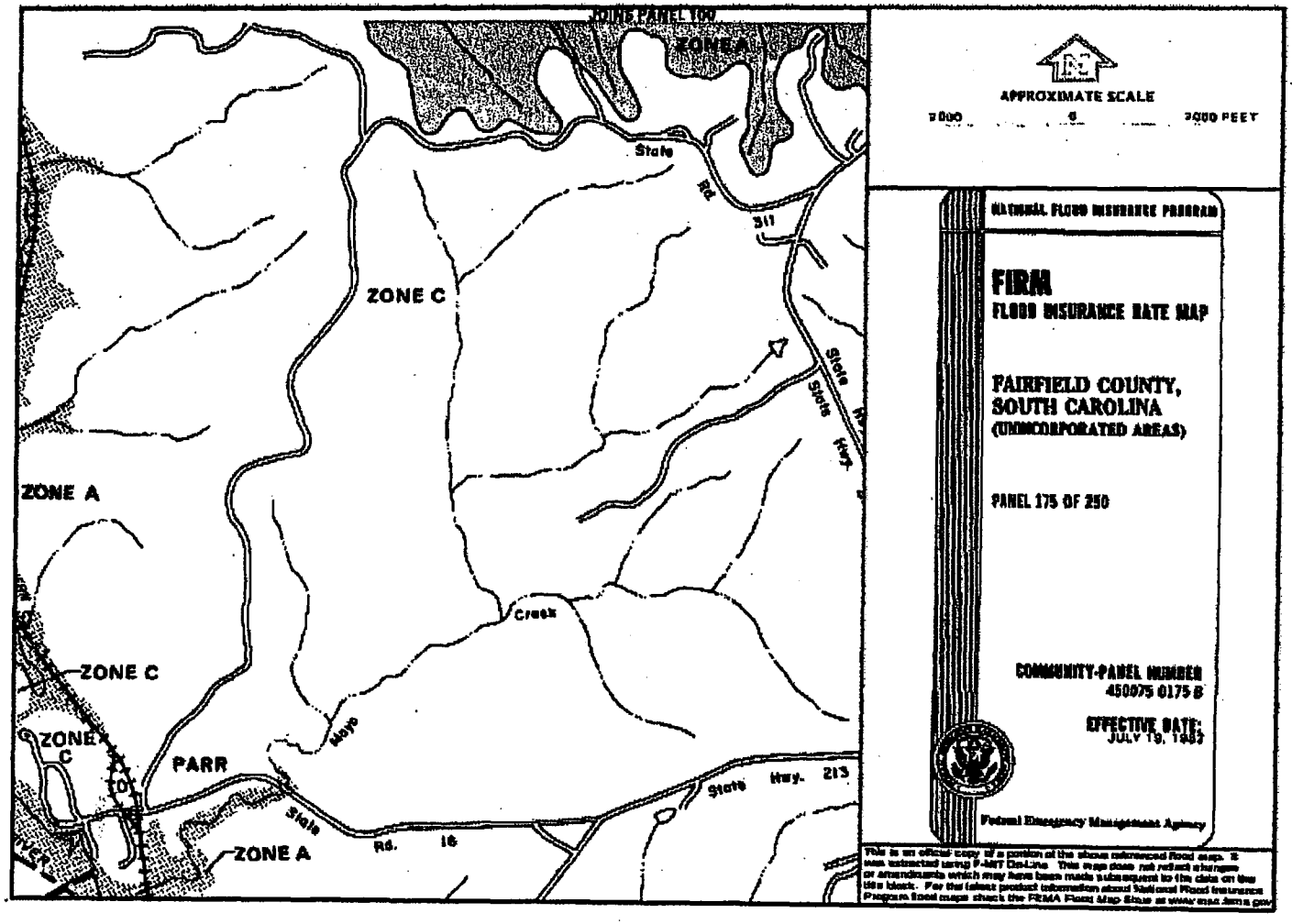


Sec 4.1 Rel 1

protection system under construction; base flood elevations and flood hazard factors not determined.

B — Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)

C — Areas of minimal flooding. (No shading)

D — Areas of undetermined, but possible, flood hazards.

V — Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.

V1-V30 — Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
NOVEMBER 25, 1977

FLOOD INSURANCE RATE MAP EFFECTIVE:
JULY 19, 1982

APPROXIMATE SCALE

2000 0 2000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

FAIRFIELD COUNTY,
SOUTH CAROLINA
(UNINCORPORATED AREAS)

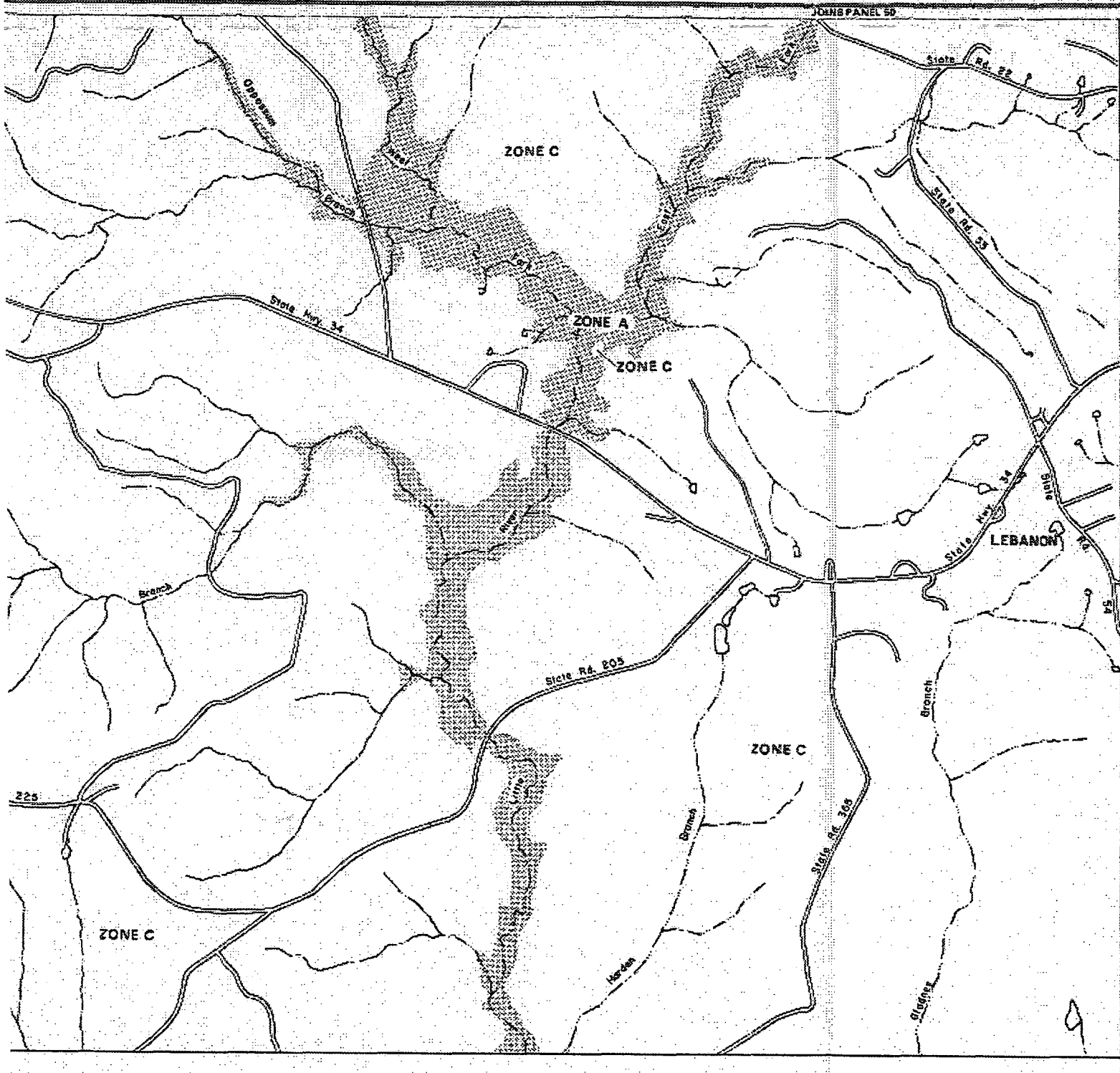
PANEL 175 OF 250

COMMUNITY-PANEL NUMBER
450075 0175 B

EFFECTIVE DATE:
JULY 19, 1982

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



KEY TO MAP

500-Year Flood Boundary	
100-Year Flood Boundary	ZONE B
Zone Designations*	
100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
SPECIAL FLOOD HAZARD AREA	ZONE A
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7x
Zone D Boundary	
River Mile	• M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
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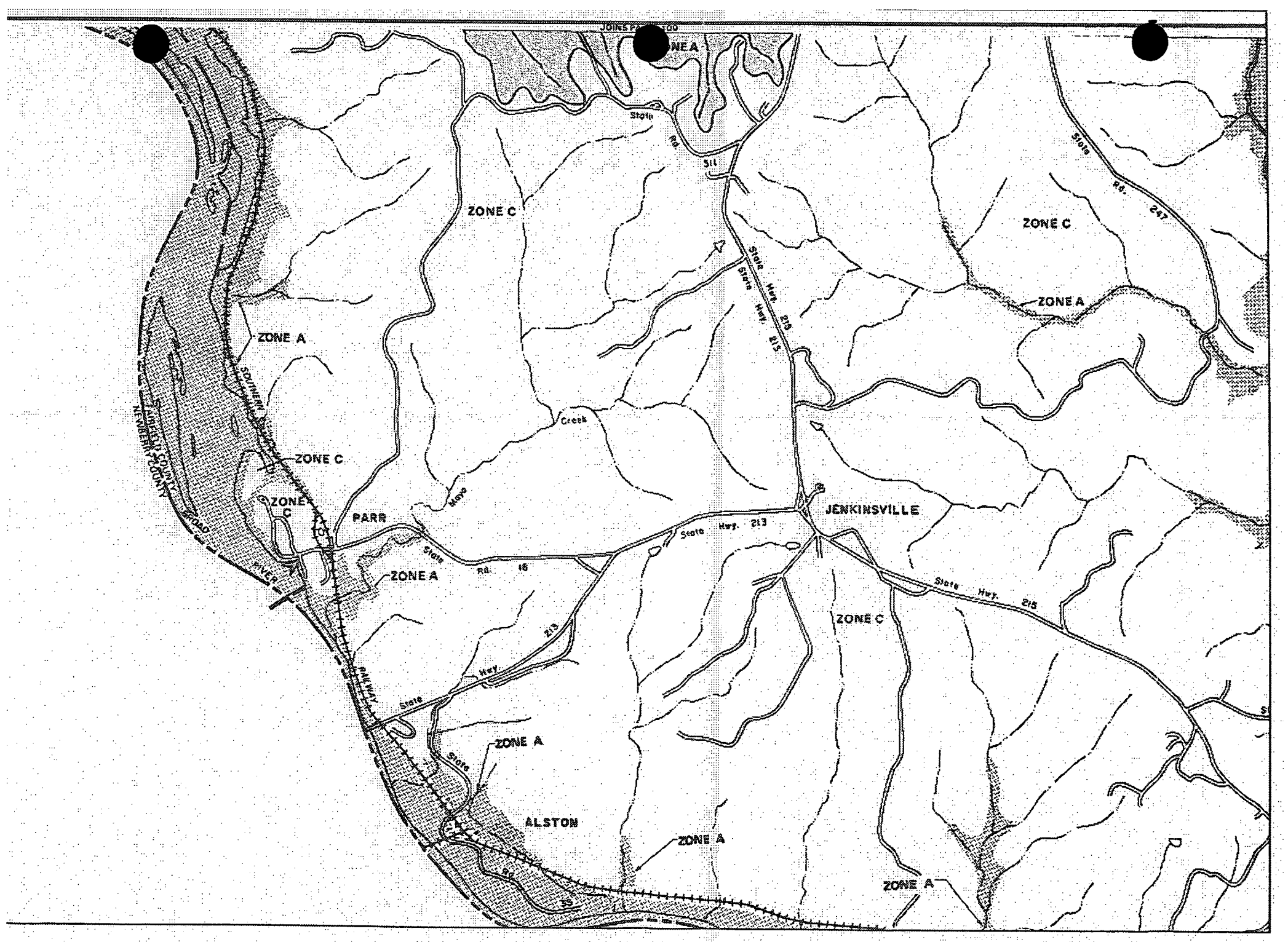
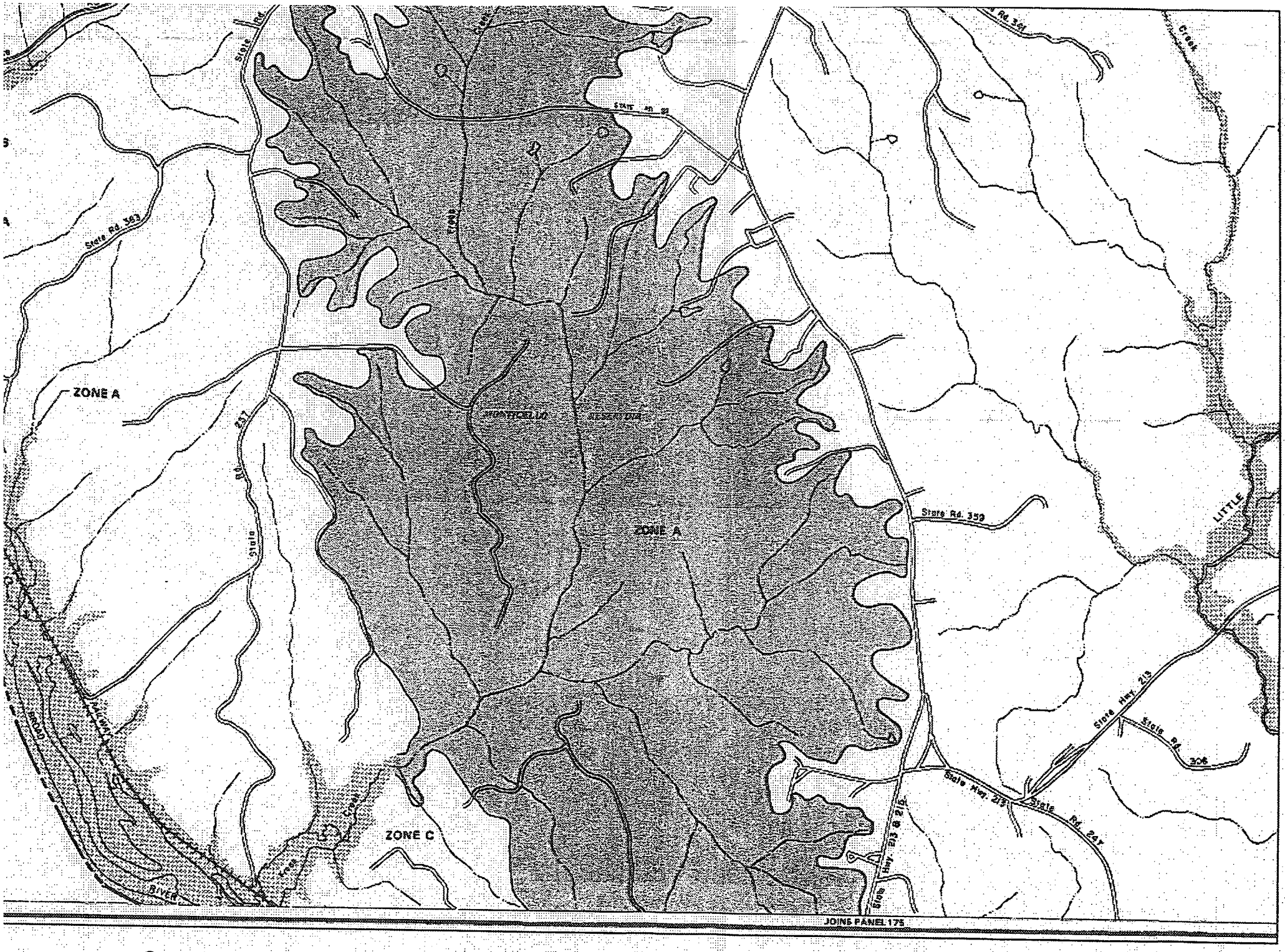
FLOOD INSURANCE RATE MAP EFFECTIVE:


ZONE A
ZONE C
ZONE A
ZONE C
ZONE C
ZONE A
ZONE C
ZONE A
ZONE C
ZONE A
ZONE A
ZONE A
ZONE A
PARR
JENKINSVILLE
ALSTON
State Rd. 511
State Hwy. 213
State Rd. 247
State Rd. 18
State Hwy. 213
State Hwy. 213
State Hwy. 213
State Hwy. 213
State Rd.
Creek
Mary
SOUTHERN RAILWAY
NEWBERRY COUNTY
LAURENS COUNTY
BROAD RIVER


State Rd. 363
State Rd. 361
Creek
State Rd. 32
ZONE A
State Rd. 237
ZONE A
State Rd. 359
LITTLE
State Hwy. 213
State Rd. 306
State Hwy. 213
State Rd. 247
State Hwy. 213 & 215
ZONE C
RIVER
JOINS PANEL 175

Sec 4.1 Ref 2

Santee Cooper (Undated)
Santee Cooper (1996)

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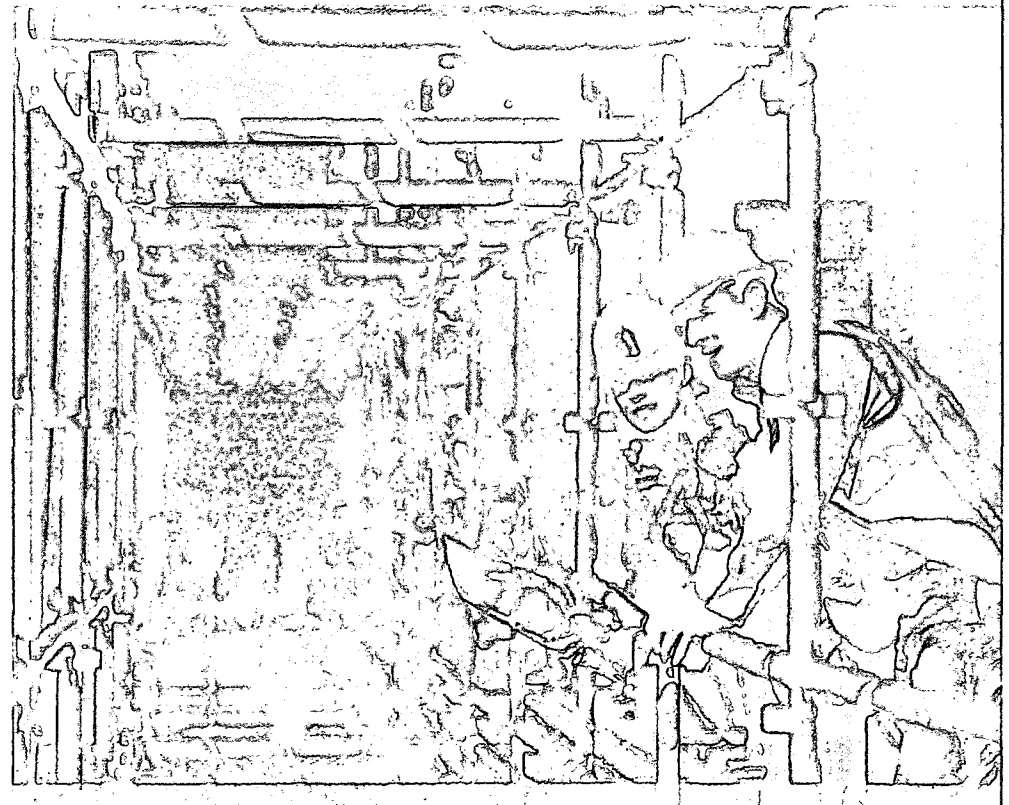
A SCANA COMPANY



A Comprehensive Approach to Transmission Line Siting

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Transmission Facilities Siting Process

Is future line length 30 or more miles?

YES

- Develop coarse screening parameters and criteria
- Collect data and apply weights
- Develop constraint / opportunity mapping
- Delineation of final routing study area

NO

PHASE I Alternate Route Development	PHASE II Alternate Route Eval/Comp	PHASE III Study Doc. & Agency Apprv
Project Scoping / Team Member Responsibility Assignments	Community workshops / agency comments	Agency contact / community notification
Delineation of Preliminary Routing Study Area	Develop alternate route evaluation criteria	Additional studies (if required by agencies)
Agency Contact / Community Involvement	Field review of alternate routes and adjustments (if needed)	Develop mitigation measures
Regional, environmental, land use & community data collection & entry	Alternate route evaluation & ranking	Produce environmental report or other routing study documentation
Analyze data / determine areas of constraint & opportunity	Cost & engineering evaluation; schedule development	Submit to review agencies / licensing authorities as needed
Identify alternate routes		
PRODUCT IDENTIFICATION OF ALTERNATE ROUTES	PREFERRED ROUTE	APPROVED ROUTE

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- 115 kV transmission line siting project

Siting Study Area Delineation

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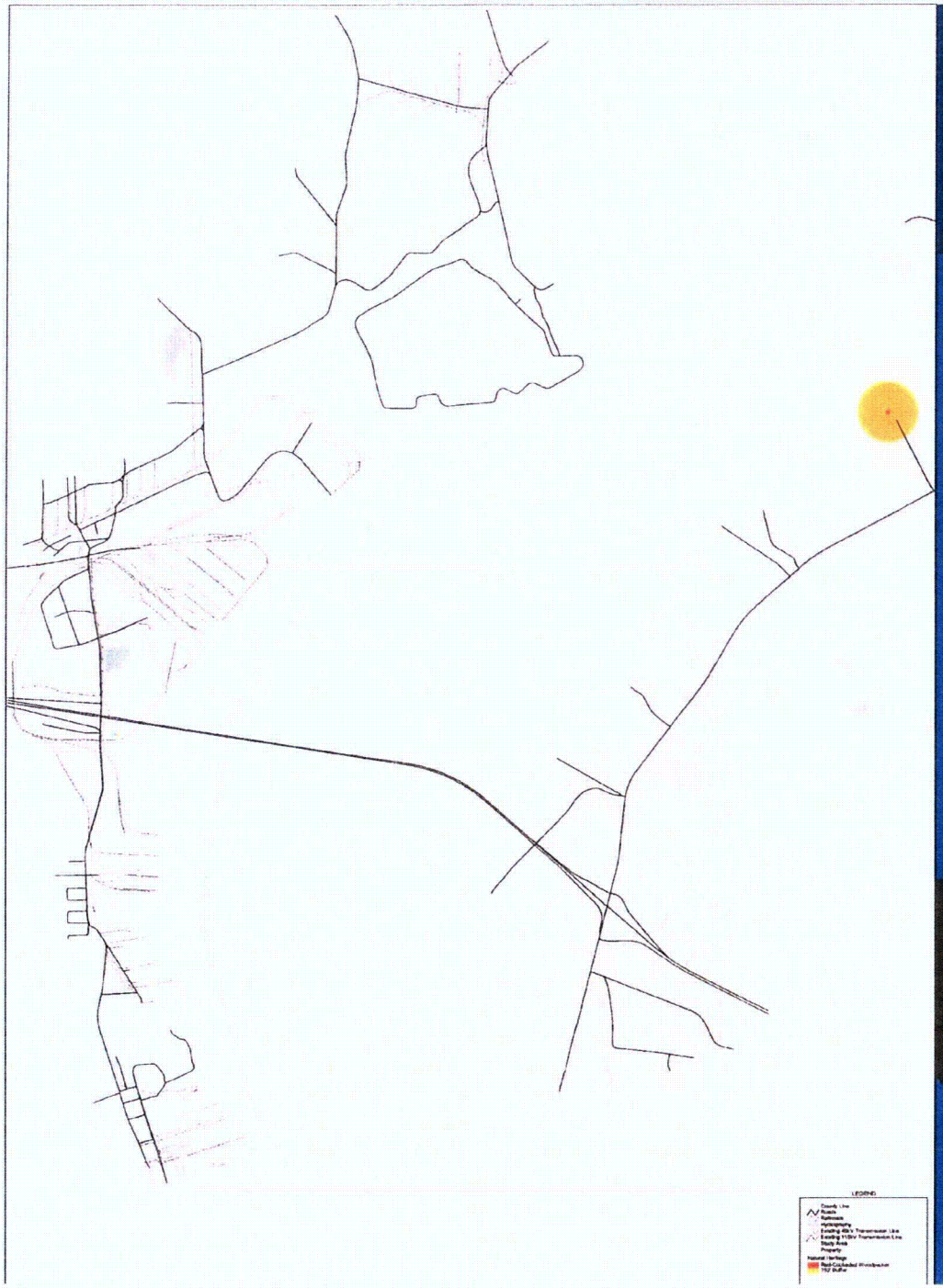
- 115 kV transmission line siting project

Land Cover Data Layer



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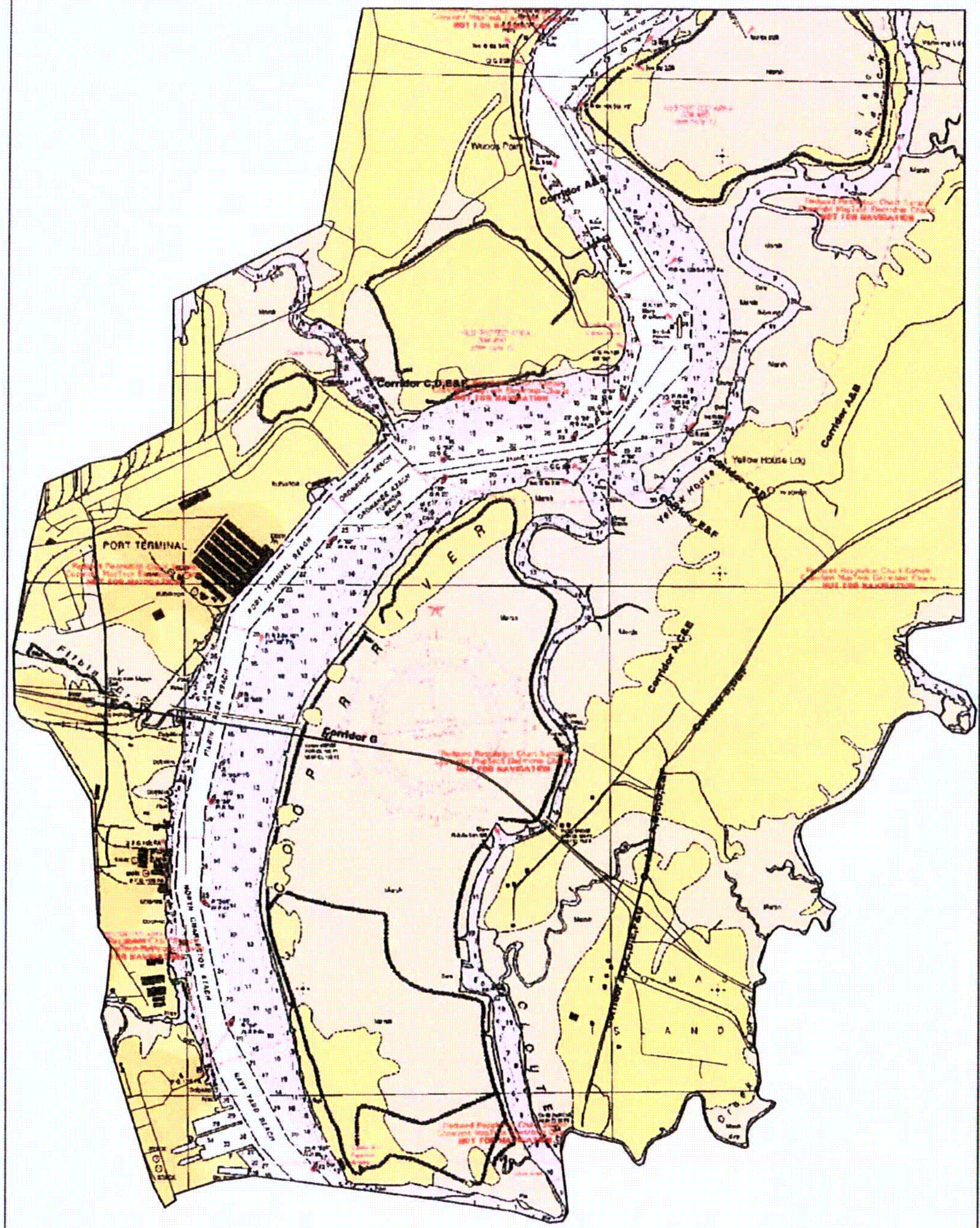
Natural Heritage Data Layer



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Ship Turn Basin Data Layer

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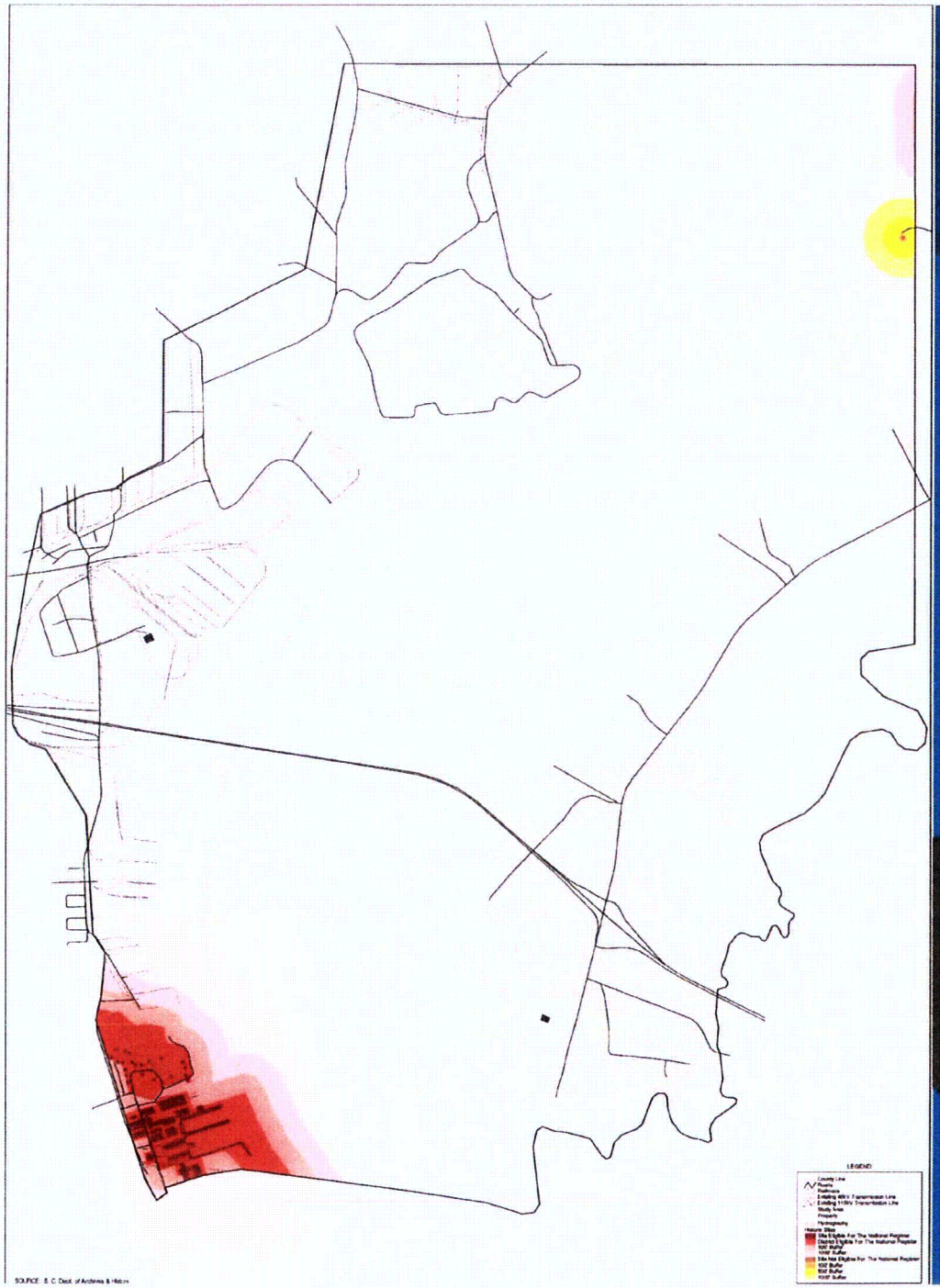
- 115 kV transmission line siting project

Cultural Resources Data Layer



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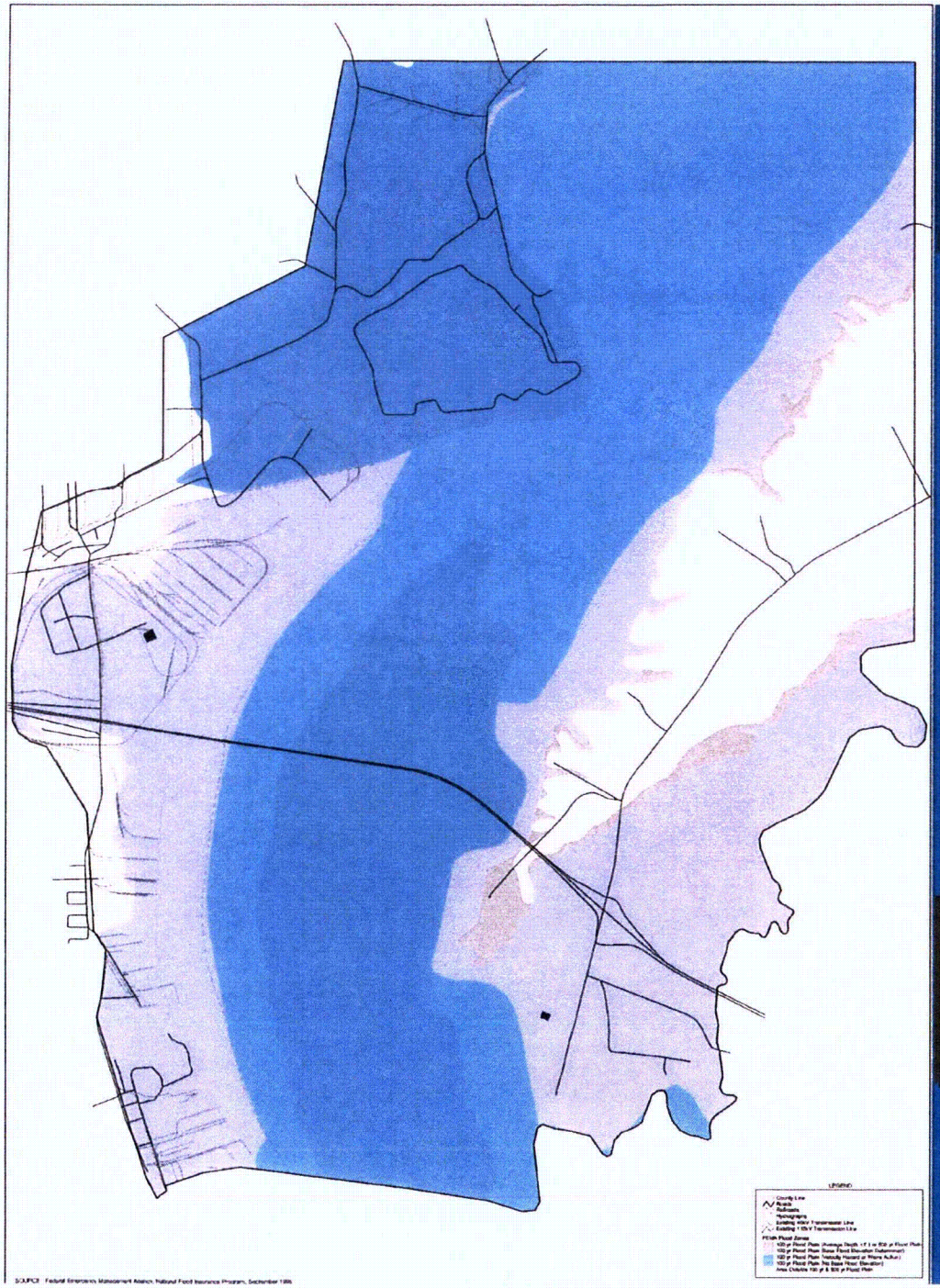
- 115 kV transmission line siting project

National Register of Historic Places Data Layer



SOURCE: Federal Emergency Management Agency, National Flood Insurance Program, September 1996

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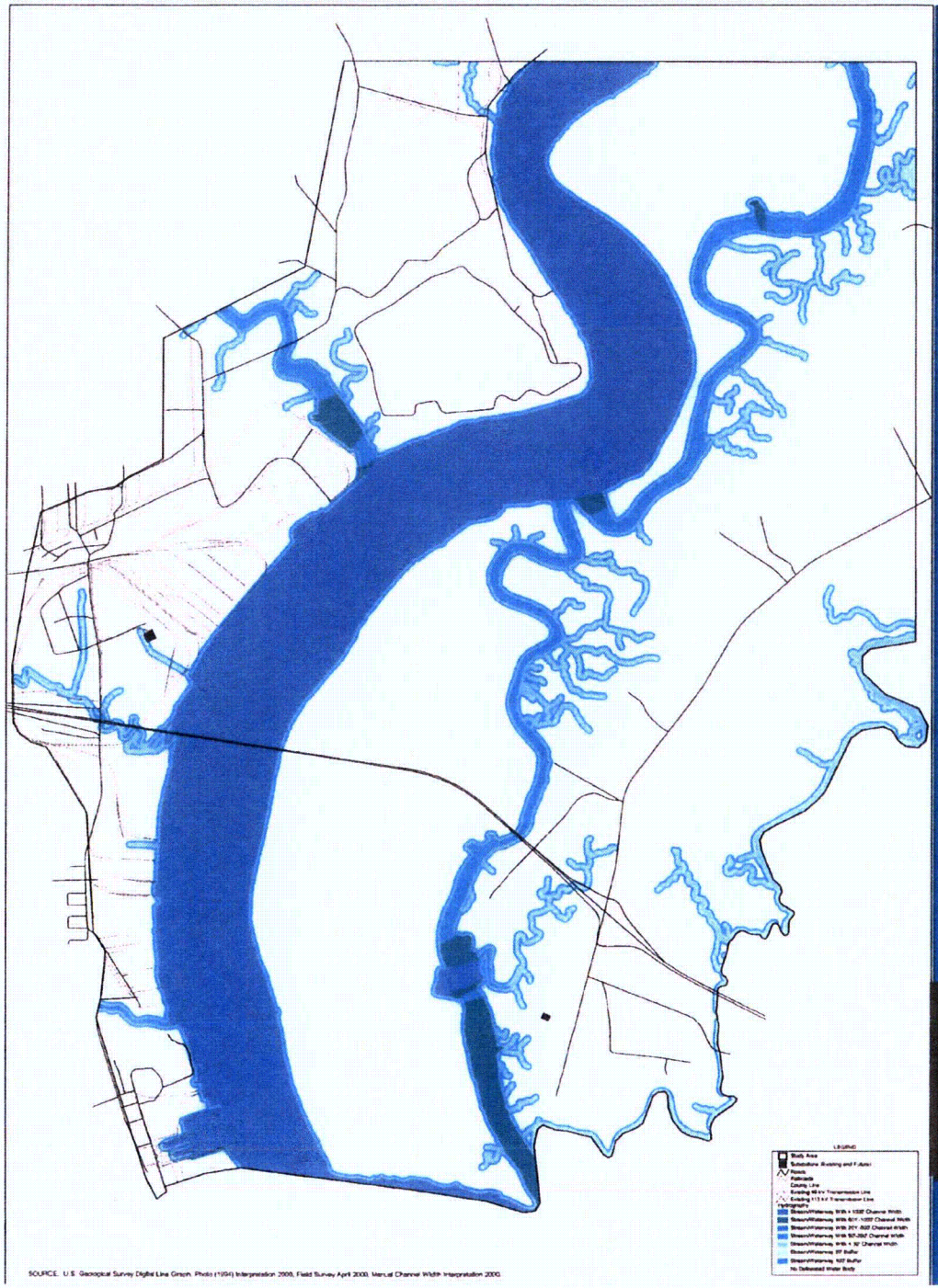
FEMA Flood Zone Data Layer



SOURCE: U.S. Geological Survey Digital Line Graph. Photo (1994) Interpretation 2000, Field Survey April 2000, Manual Channel Width Integration 2000.

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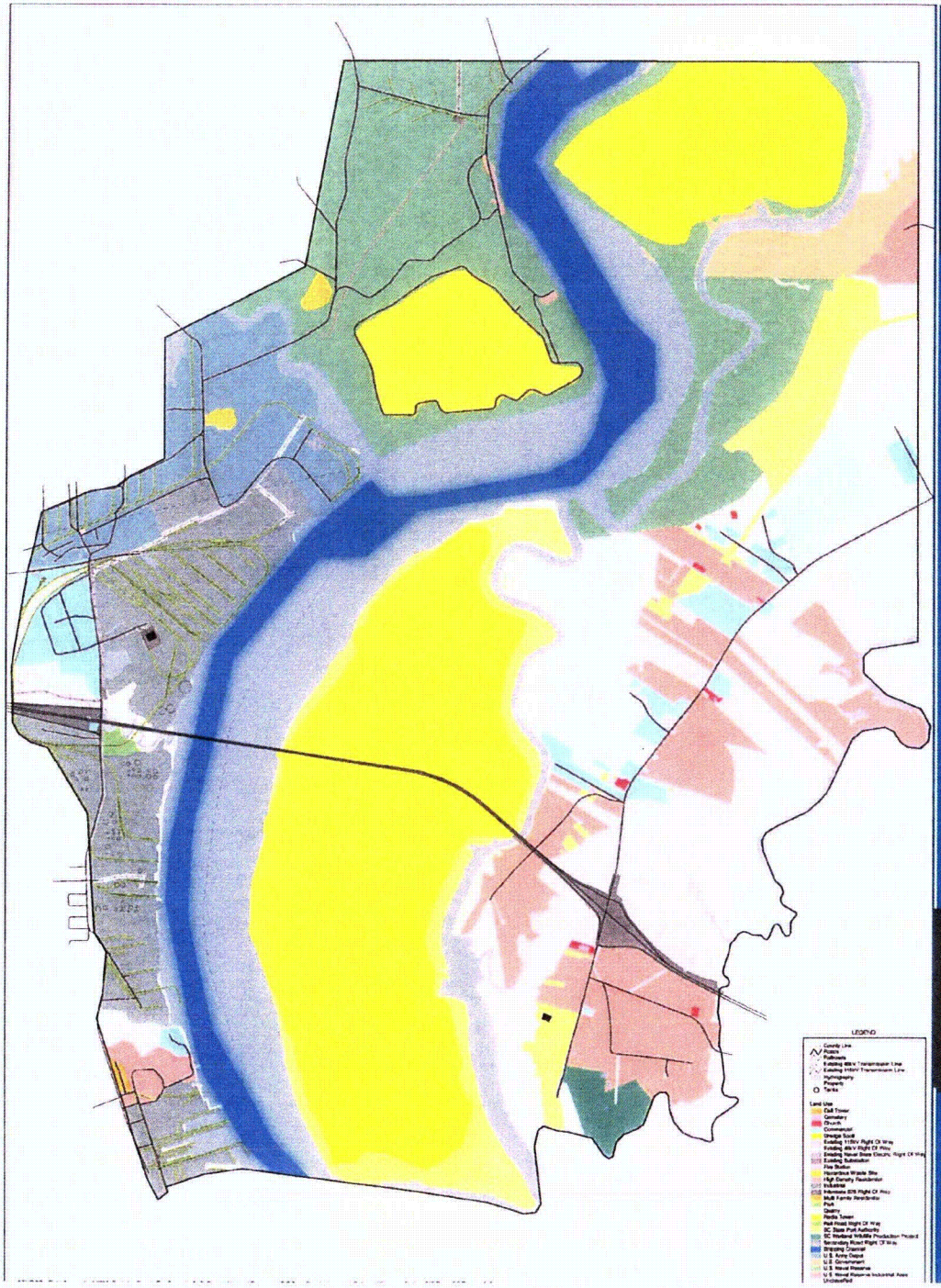
- 115 kV transmission line siting project

Hydrography Data Layer



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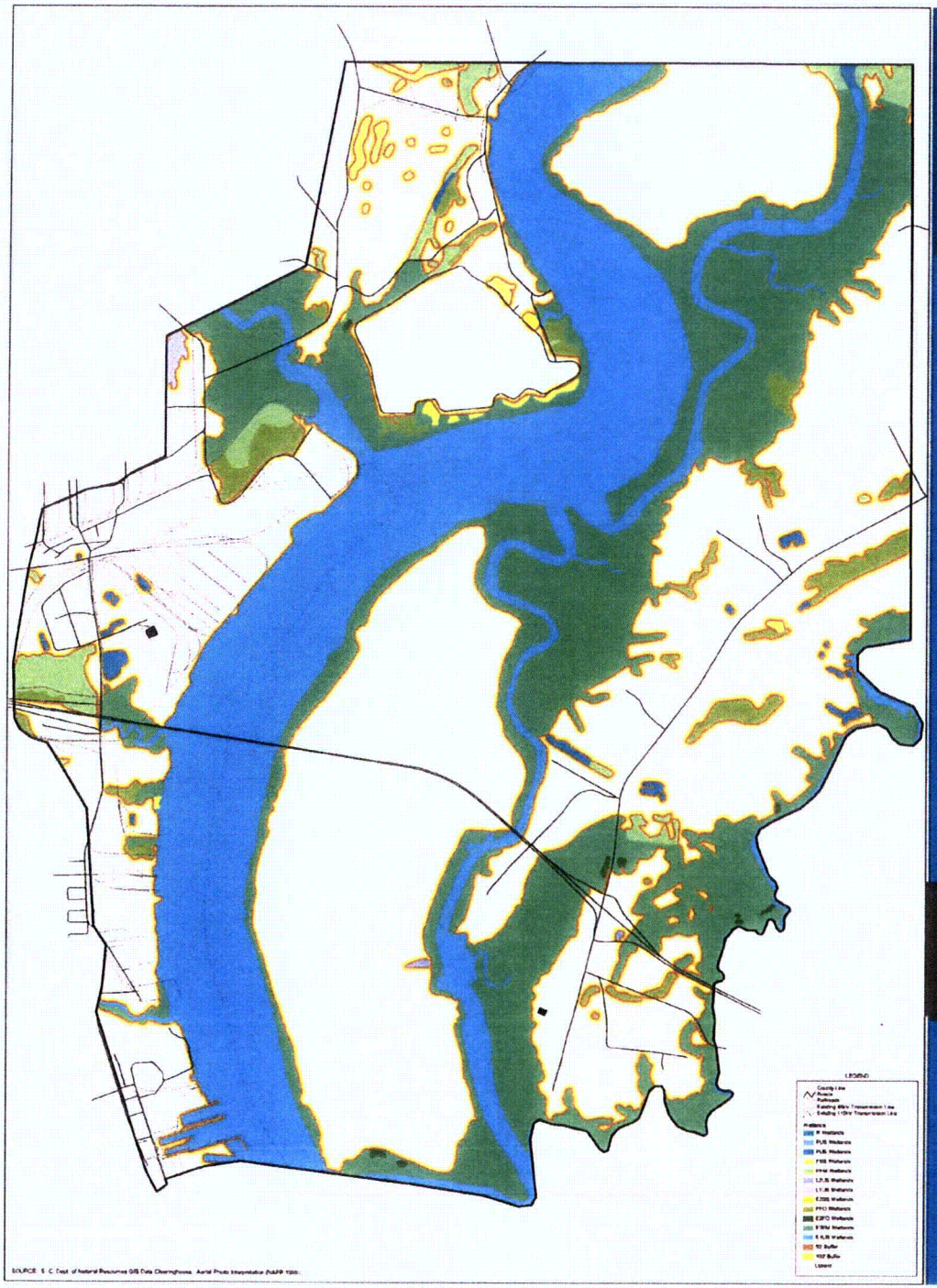
115 kV transmission line siting project

Existing Land Use Data Layer



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- 115 kV transmission line siting project

Wetlands Data Layer

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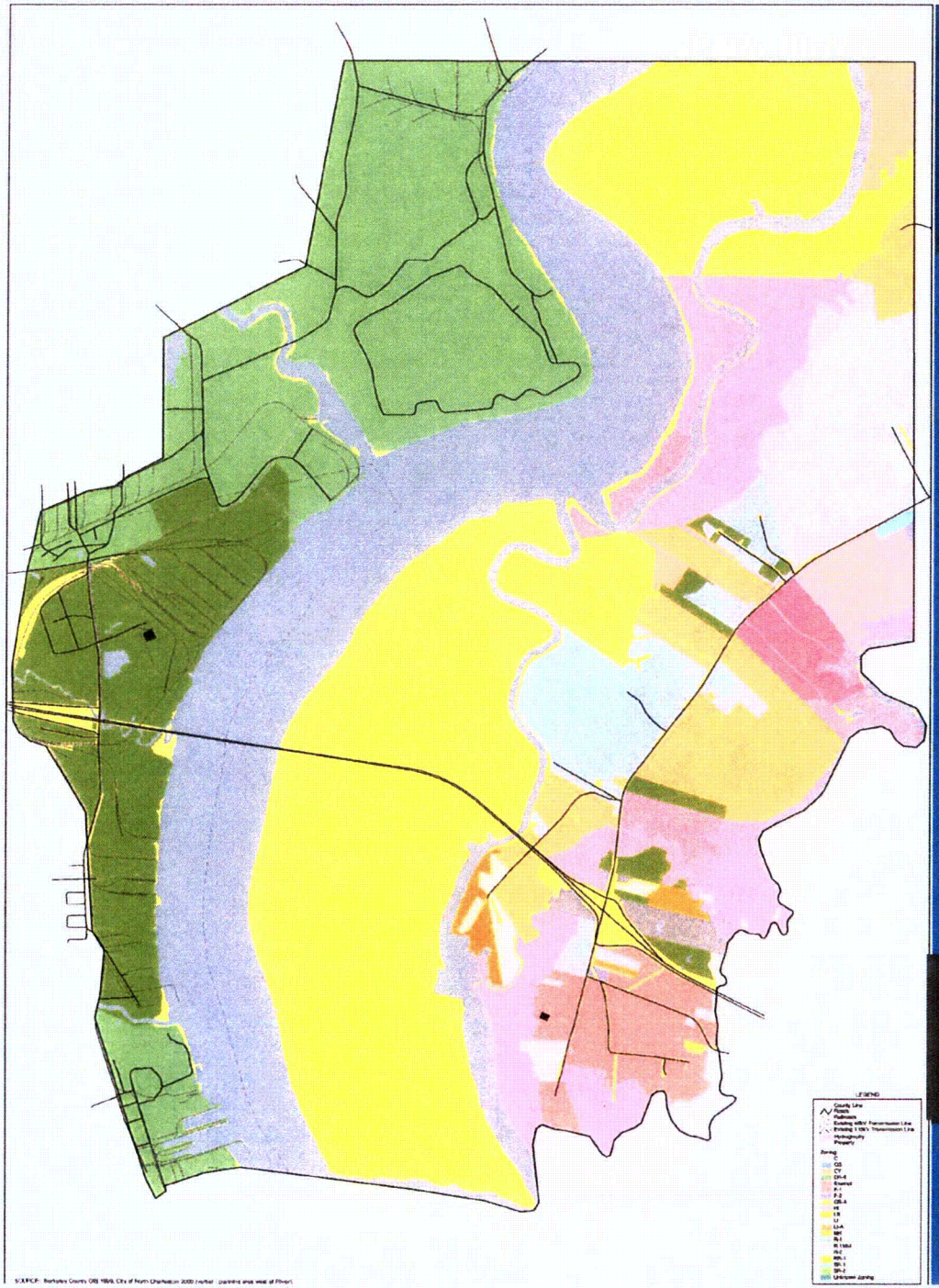
- 115 kV transmission line siting project

Future Land Use Data Layer



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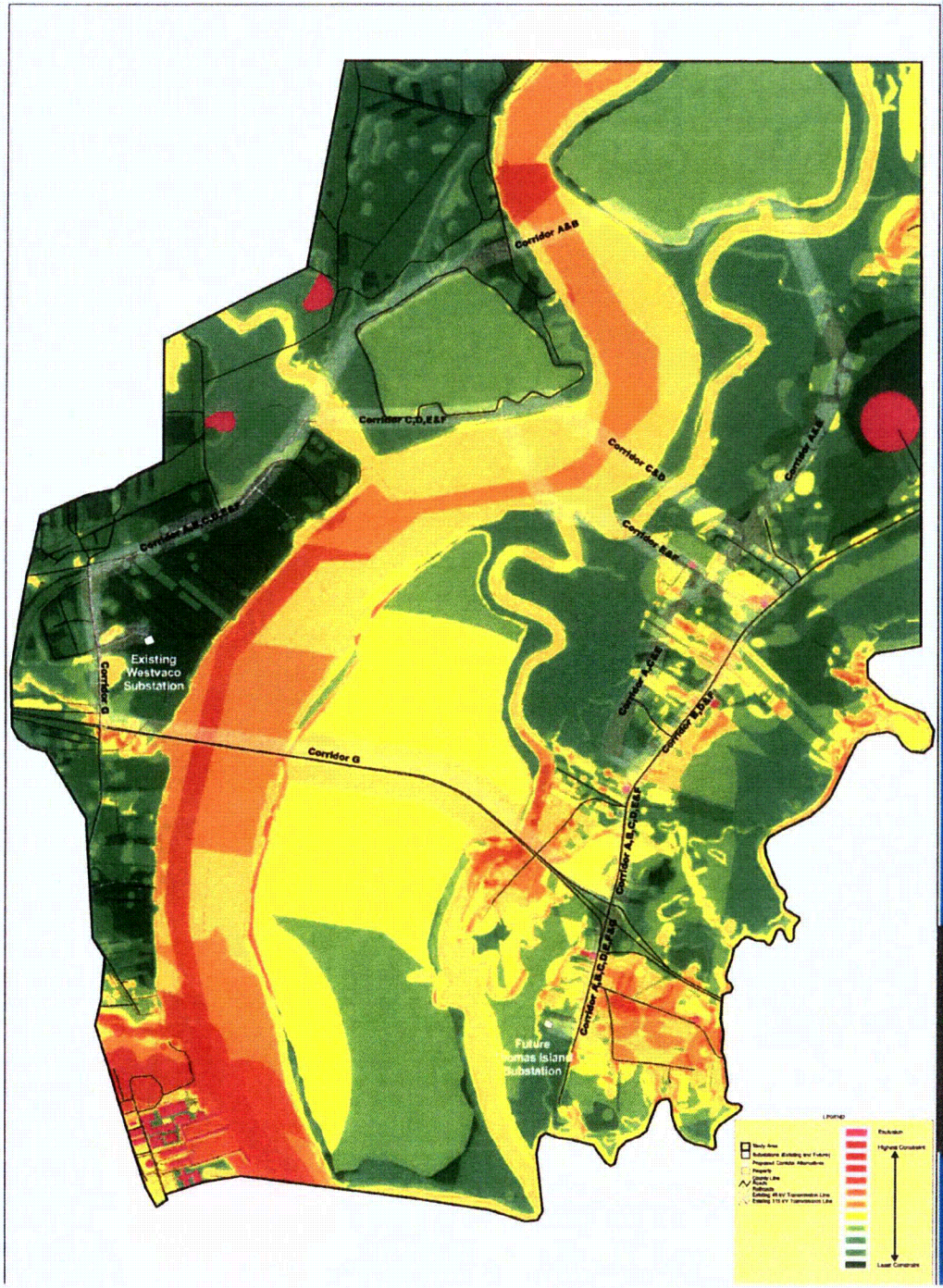
- 115 kV transmission line siting project

Zoning Data Layer



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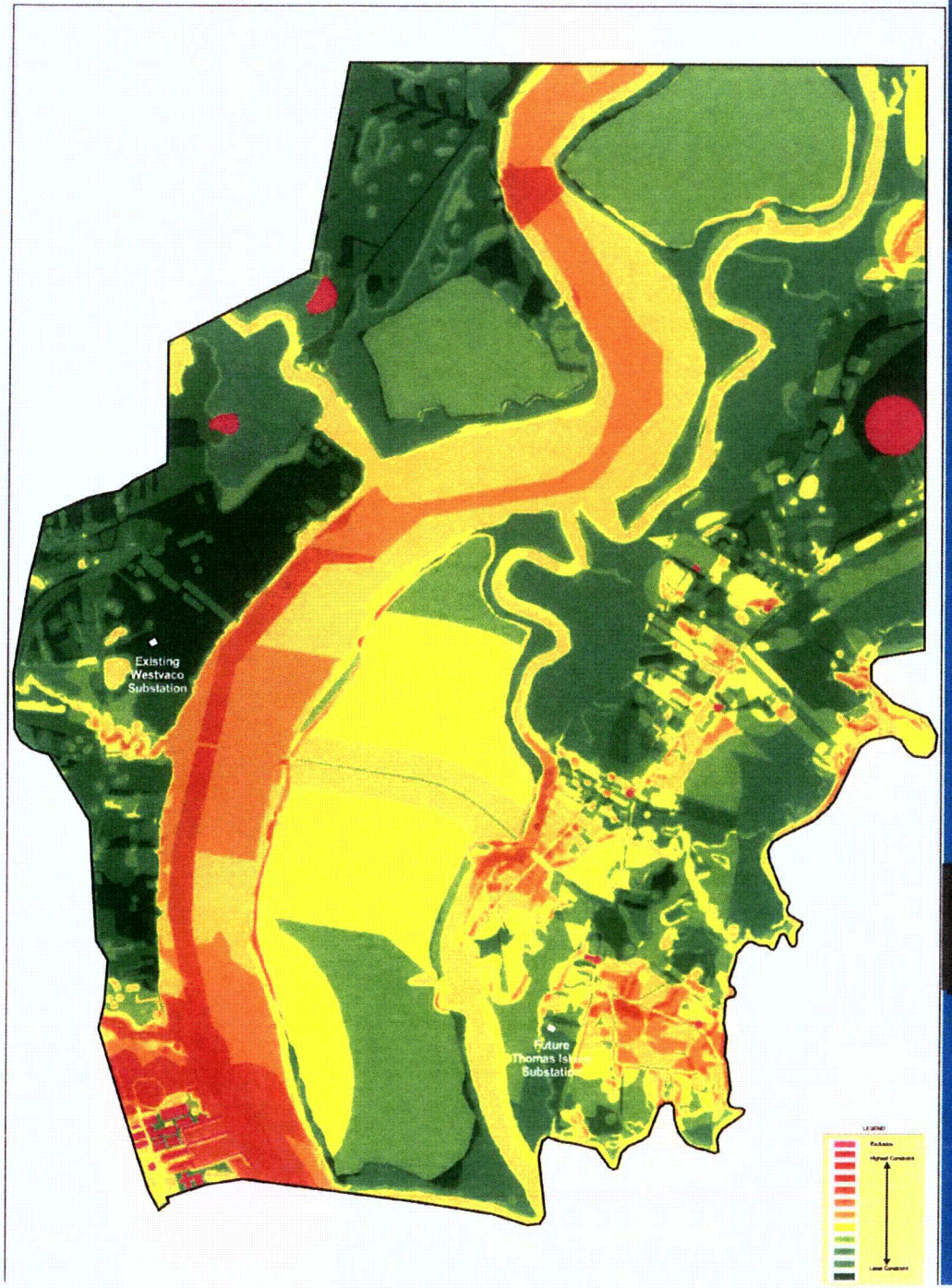
- 115 kV transmission line siting project

Alternate Route Development



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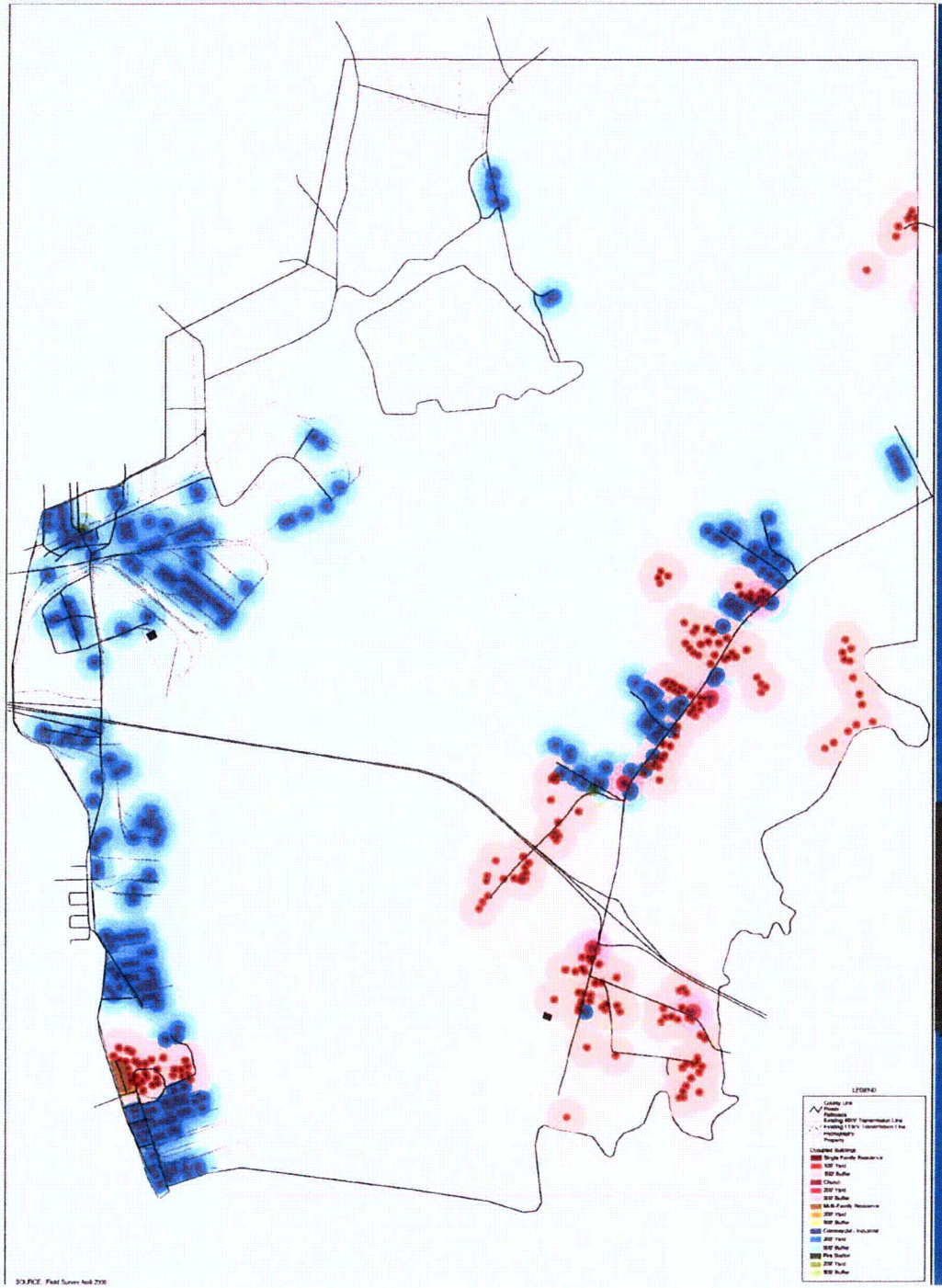
- 115 kV transmission line siting project

Suitability Composite



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- 115 kV transmission line siting project

Occupied Building Data Layer

South Carolina Electric & Gas – Thomas Island Project

Route Evaluation Summary Sheet

	ROUTE							
	A	B	C	D	E	F	G	H
Cultural & Natural Resource Factors	9.02	10.00	3.17	4.15	0.73	1.46	0.98	0.98
Land Cover Factors	10.00	9.24	6.34	5.55	5.32	4.92	3.08	4.04
Property Ownership Factors	10.00	9.62	6.56	6.16	6.35	6.21	5.64	6.15
Land Use Factors	10.00	9.90	7.63	7.54	5.89	5.93	5.65	6.15
Occupied Buildings Factors	6.03	9.84	6.14	10.00	5.74	9.84	4.22	2.56
Visibility Factors (Public)	7.76	9.02	6.64	7.90	6.58	7.68	9.54	10.00
Visibility Factors (Residential)	4.13	10.00	4.13	10.00	4.26	9.80	3.81	0.75
Water Quality Factors	10.00	9.32	4.79	3.63	5.41	4.63	3.04	5.83
Total Normalized Category Scores	66.94	76.94	45.40	54.93	40.28	50.47	35.96	36.46
Route's Rank	7	8	4	6	3	5	1	2

Least Compliance (scored in highest 1/3 of score range)
Second Best Compliance (scored in middle 1/3 of score range
Best Compliance (scored in lowest 1/3 of score range)

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- Visual impact analysis and assessment

View Point and View Shed

Visual Impact Analysis & Assessment

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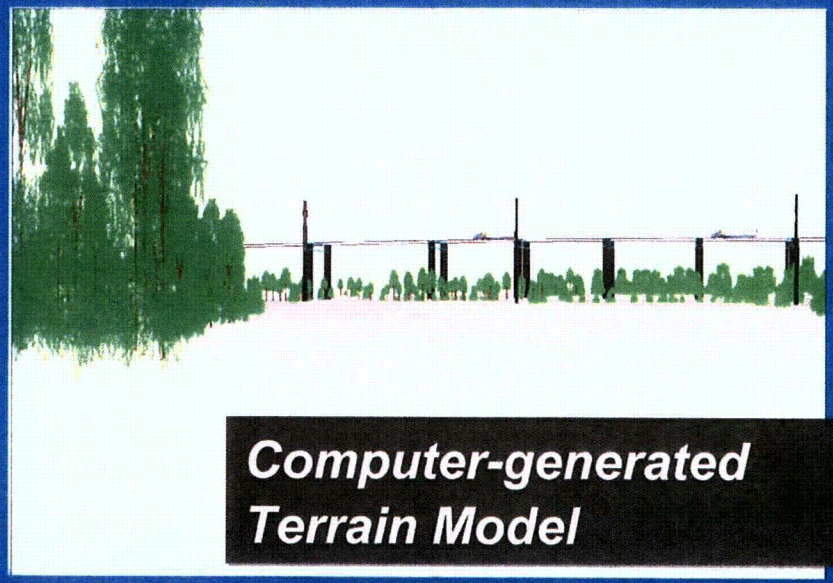
Existing View Condition



Computer-generated Terrain Model

Simulated Post-construction View Condition

Visual Impact Analysis & Assessment

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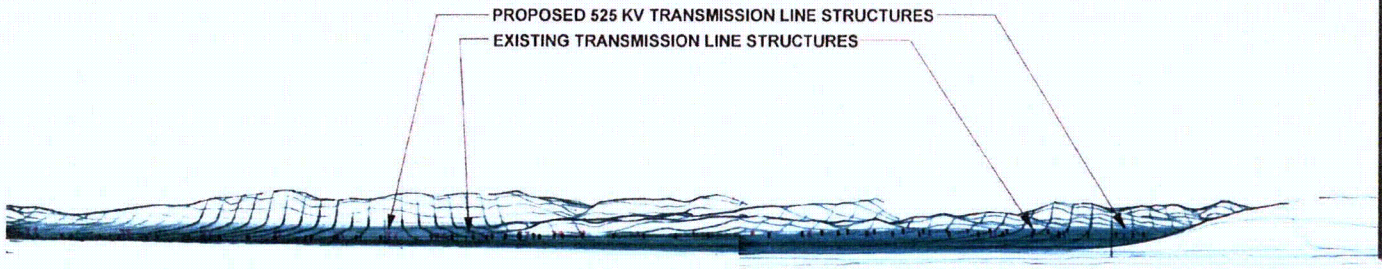
Existing View Condition: *viewpoint #2 looking SE from Hwy 93*



Computer-generated Terrain Model: *same viewpoint*

Simulated Post-construction View Condition

Visual Impact Analysis & Assessment

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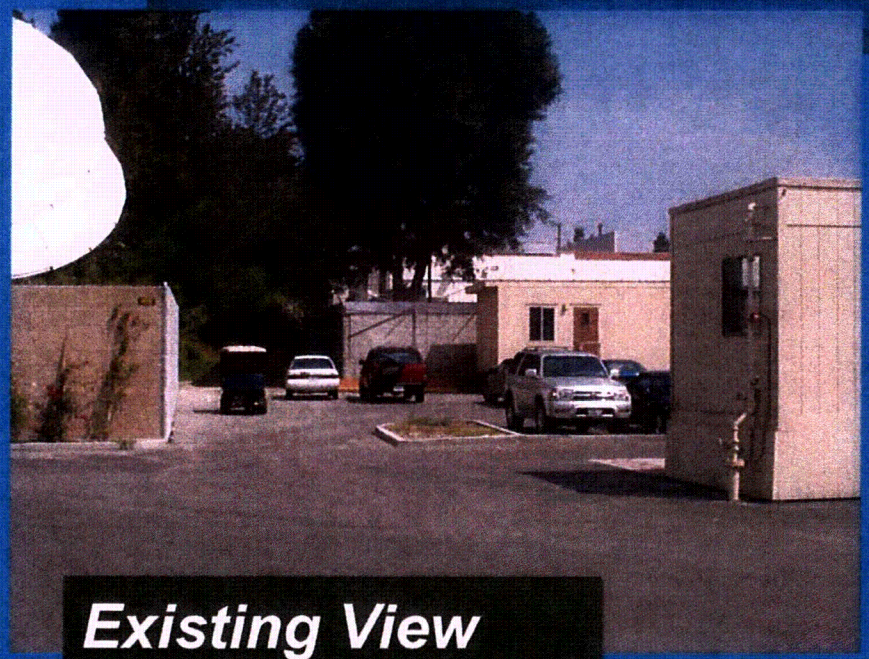
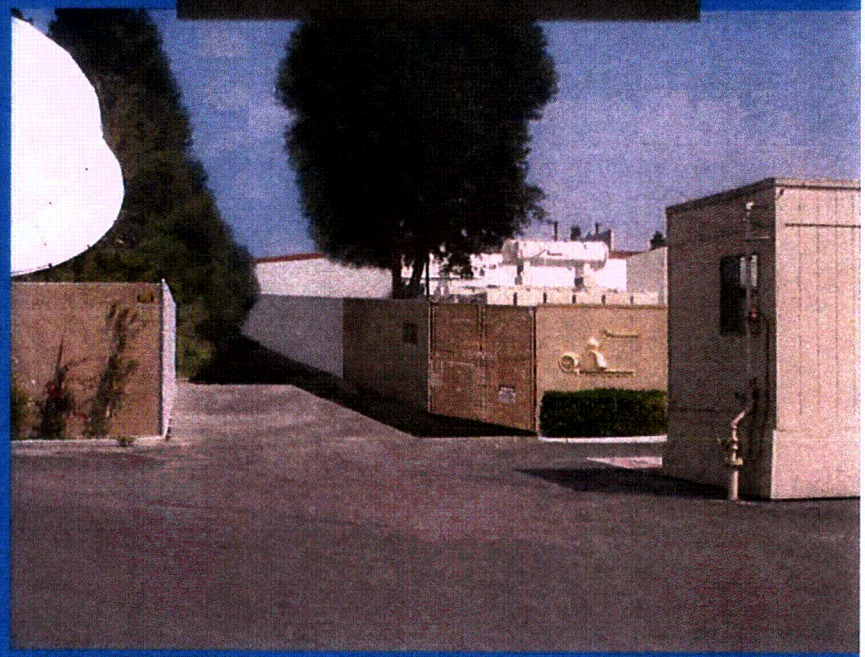


Existing View Condition

Simulated Post Construction View Condition



Public Involvement

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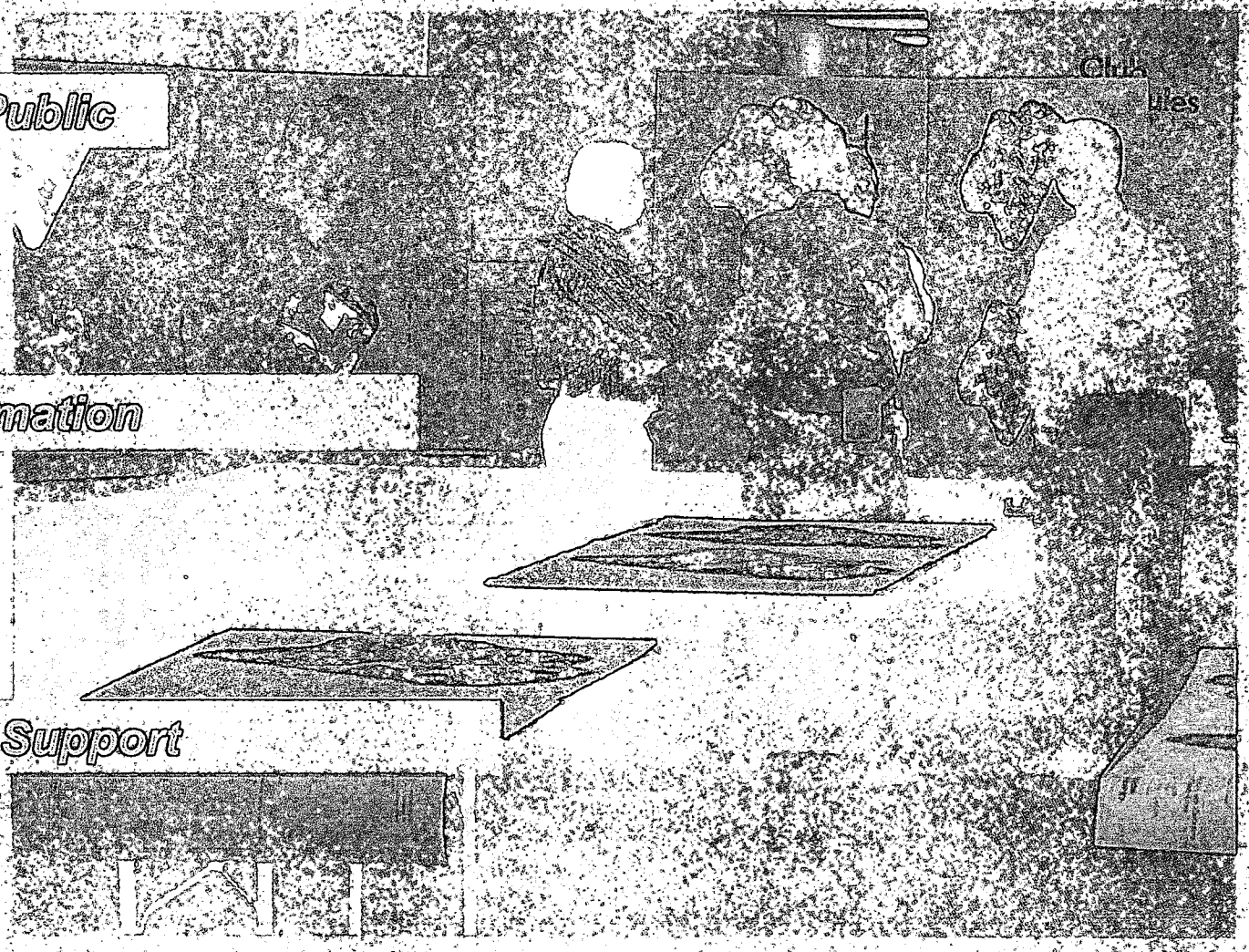
Inform the Public

Solicit Information

Gain Public Support



Sec 4.1 Ref 3

TRANSMISSION LINE STANDARDS REFERENCE MANUAL

Santee Cooper

GENERAL

		DATE	PAGE
1.1 Index	Section 3	06/01/96	1 of 1

TRANSMISSION LINE LOCATION, ENGINEERING SURVEY, AND RIGHT-OF-WAY ACTIVITIES

Page No.

3.1. INTRODUCTION	3-2
3.2. PROJECT ORIGINATION AND WORK SEQUENCE	3-3
3.3. ROUTE SELECTION	3-5
3.4. RIGHT-OF-WAY WIDTH	3-8
3.5. LINE SURVEY	3-25
3.6 DRAWINGS	3-26
3.7 RIGHT-OF-WAY ACQUISITION AND ACCESS	3-27
3.8 STRUCTURE STAKING	3-31
3.9 LINE CONSTRUCTION	3-32
3.10 SELECTED REFERENCES	3-33

3.1.1 This section is intended to discuss the requirements and procedures to be followed by the design engineer for the initial design activities of a transmission line from the project inception to the start of construction. The information presented in this section places emphasis on such aspects of line design as transmission line location, engineering survey, and right-of-way activities.

3.2.1 PROJECT DOCUMENTATION

The design work for a transmission line does not proceed until the project has gained proper approval and documentation. This process begins with a Construction Budget Item Request & Approval (CBIR) from System Planning. After receiving the approved CBIR from System Planning, Forecasting and Operational Analysis (FOA) obtains the necessary approvals. FOA sends one copy of the approved CBIR to Project Management. Project Management originates a Construction Budget System Authorization (CBSA), obtains the necessary approvals, and then Transmission Design proceeds with the line design. For additional information on project documentation, see SECTION 2, TRANSMISSION LINE DOCUMENTATION PROCEDURES.

3.2.2 RIGHT-OF-WAY ACTIVITIES

The following Figure 3.1 shows typical right-of-way activities and the sequence in which they occur using a flow chart form.

TRANSMISSION LINE LOCATION, ENGINEERING SURVEY, AND RIGHT-OF-WAY ACTIVITIES

(1)
- Aerial photos
- U. S. Geological Survey Maps
- County soil, plat, and road maps
- Constraint maps

Corridor Alternatives

Environmental Assessment

Input from Other Depts. At S.C.P.S.A.

(2) Input from State Regulatory Commission

Public Input

Corridor Location

Permission to Enter Property

Route Location Survey

R.O.W. Acquisitions
Easements,
Condemnations
Public Relations

Structure
Design

Permits, Licenses, etc.

Plan-Profile Structure Spotting

R.O.W. Clearing

Construction Damage Settlement

1) Preliminary cost analysis, structure and conductor selection occurs previously (not shown).

(2) Depending on the State, input may occur at different points in the flow diagram.

Figure 3.1
Flow Chart for Right-of-Way Activities

3.3.1 The first phase of the line design is the selection of the route. Line routing requires a thorough investigation of the area through which the line will be traversing. In order to do initial route selection, Transmission Line Design (TLD) acquires county maps, geological maps (quad sheets), county road maps, and aerial photography. By utilizing these documents, the preliminary area investigation is completed and line route is selected. Table 3.1 shows some of the considerations which should be taken into account during the route selection process.

Table 3.1
Line Routing Considerations

Physical		**Sources**
(1)	Highways	USGS, State and County Highway Department Maps
(2)	Streams, Rivers, Lakes	USGS, Army Corps of Engineers, Flood Insurance Maps (H.E.W.), S. C. Dept. of Health & Environmental Control (DHEC)
(3)	Railroads	USGS, Railway Companies
(4)	Airstrips	USGS, Federal Aviation Administration
(5)	Topography (Major Ridge Lines, Floodplains, etc.)	USGS, Army Corps of Engineers, Flood Insurance Maps (H.E.W.)
(6)	Transmission Lines, Buildings	USGS, Local Utility System Maps

Biological		**Sources**
(1)	Woodlands	USGS, USDA - Forest Service
(2)	Wetlands	USGS, Army Corps of Engineers, U.S. Fish and Wildlife Service
(3)	Waterfowl, Wildlife Refuge Areas, Endangered Species & Critical Habitat Areas	USDI - U.S. Fish & Wildlife Service, State Fish and Game Office, DHEC

Table 3.1 (cont.)

	Human Environmental	
(1)	Rangeland	USGS Aerial Survey, Satellite Mapping, County Planning Agencies, State Planning Agencies, State Soil Conservation Service, Mining Bureau, U.S. Bureau of Land Management
(2)	Cropland	
(3)	Urban Development	
(4)	Industrial Development	
(5)	Mining Areas	
(6)	Recreation or Aesthetic Areas	
(7)	Prime or Unique Farmland	USGS Soil Surveys, USDA-Soil Conservation Service, State Development of Agriculture, County Extension Agent
(8)	Irrigation (Existing & Potential)	Irrigation District maps, applications for electrical service, aerial survey, state departments of agriculture and natural resources, water management districts
(9)	Historic and Archeological Sites	National Register of Historic Sites (existing), State Historic Preservation Officer (proposed), State Historic and Archeological Societies
	Other	
	Federal, State and County Controlled Lands	USGS, State Maps, U.S. Park Service, Bureau of Land Management, State Department of Natural Resources, County Maps, etc.

3.3.2 Documentation will be prepared for all route alternatives. The document will include the steps performed in determining the transmission route chosen. The steps will include, as a minimum, the following considerations: the need for the transmission line, the availability of the property, the cost associated with land and construction, the environmental concerns, the safety considerations and reliability and long range planning considerations. Each respective unit (Land Acquisition, Legal, Transmission Design, Project Engineering, and System Planning) will be responsible for completing their portion of the document. Where possible, existing documentation will be used for this purpose. The original document will be filed in Legal with a copy in both the Design Engineering and Project Administration Control Project Files.

3.4.1. GENERAL

For transmission lines, a right-of-way (ROW) is necessary so that an environment can be established and maintained that allows the line to be operated and maintained safely and reliably. Since the line must be located on a right-of-way, the proper width of the ROW must be determined after the route has been selected. Once the width and location of the ROW route is known, the surveying activities and obtaining of easements can then proceed.

The determination of the right-of-way width is a task that requires the consideration of a variety of judgmental, technical, and economic factors. Judgement and economics vary with different persons and with the changing times and design philosophies. The technical aspect of ROW width determination is perhaps more constant, but in any case it is from that standpoint that the following recommended guidelines are presented for the 69-230 kV range of transmission voltages utilized by Santee Cooper.

3.4.2. BASIC PHILOSOPHY

ROW widths are determined using two different approaches or methods relating to certain clearances to the edge of the ROW under certain wind loading conditions. From the width values obtained using both methods, the greater of the two values is used for the line design. The methods are defined as follows:

A. FIRST METHOD

This method provides sufficient width so that if a building or other object such as a bridge, sign, etc., of undetermined height is built at any place directly on the edge of the right-of-way (see Figure 3.2), then the horizontal clearance requirements to objects as given in Table 4.4B, SECTION 4, TRANSMISSION LINE CLEARANCES, would be maintained.

B. SECOND METHOD

This method provides a width of right-of-way sufficiently wide so that the phase conductor does not end up in a position off the ROW when blown out by transverse wind forces at high wind loading conditions.

3.4.3 CALCULATION OF WIDTH

For a single line of structures, the approach is to use a ROW width which is the sum of the outside phase-to-phase spacing, the horizontal distance to the location of the outside phase in the blown out position, any structure deflection, and the appropriate minimum horizontal clearance to object.

A. FIRST METHOD

The NESC minimum acceptable wind pressure for this case is 6 PSF with the conductor at 60 F final sag. It may be necessary to use a higher pressure depending upon how critical the required horizontal clearance is not only for existing objects, but for future additions as well.

Figure 3.2 illustrates the right-of-way width determination for the FIRST METHOD. From the figure it can be seen that the formula for the width is:

$$W = A + 2\,(1_i + S_f)\sin\phi + 2\,(\delta + \chi) \qquad (3\text{-}1)$$

where:

W	=	total right-of-way width required (FT)
A	=	separation between points of suspension insulator strings for outer two phases (FT)
ϕ	=	conductor blow out angle under 6 PSF of wind(DEG)
S_f	=	conductor final sag at 60 F (NESC Rule 234A1 and 2) (FT)
L_i	=	insulator string length (li = 0 for post insulators or restrained suspension insulators) (FT)
δ	=	structure deflection with a 6 PSF wind (FT)
x	=	clearance required per TABLE 4.4B, SECTION 4, TRANSMISSION LINE CLEARANCES (FT)

1. Conductor Blow Out

The conductor blow out angle (ϕ) can be determined from the formula:

$$\phi = \tan^{-1} 2T \sin^{1/2}\theta + HS(P_c)/VS(W_c) + (1/2W_i) \quad (3\text{-}2)$$

where:

θ = line angle (DEG)
T = conductor tension (LBS)
HS = horizontal span (Wind Span) (FT)
VS = vertical span (Weight Span) (FT)
P_C = wind load per unit length of conductor (LBS/FT)
W_C = weight per unit length of base conductor (LBS/FT)
W_i = weight of insulator string (W_i = 0 for Post or Restrained Suspension Insulators) (LBS)

for = $\theta = 0°$ as in a tangent structure Equation (3-2) simplifies to:

$$\phi = \tan^{-1} HS\,(P_c) / (VS)\,(W_c) + (1/2\,W_i)$$

$$P_c = d_c F / 12$$

where:

d_C = conductor diameter (IN)
F = wind force (LBS/FT^2)

2. Deflection

Wood pole deflection can be determined by use of the IBM PC computer program on DEFLECTION. This program uses the Moment Area/Conjugate Beam Method of Analysis. It considers secondary moments and divides the pole above groundline into 10 equal sections to allow for varying moments of inertia due to the tapered shape of the pole. It considers the weight of each section as a vertical load using the moment arm created by secondary moments. Further information on the program and how to run it is available in the ENGINEERING COMPUTER APPLICATIONS - PROGRAM DOCUMENTATION AND PROCEDURES MANUALS.

A typical output display would look like this.

FT FROM TOP OF POLE	DEFLECTION (FT)
0	3.42
5	2.88
10	2.36
15	1.87
20	1.43
25	1.05
30	.73

For informational purposes the percent deflection is defined as the ratio between the horizontal deflection and the pole height above ground.

Steel and concrete pole deflection is dependent on many varying factors such as shape, changing steel thickness, etc. We recommend the manufacturer be asked to supply deflection information for the loading conditions in question.

B. SECOND METHOD

To ensure no damage would occur to conductor or property in the case where a structure or building may be built adjacent to the line, the right-of-way width is based on allowing the phase conductor to blow out to the edge of the right-of-way under high wind loading conditions based on a 50 year return period.

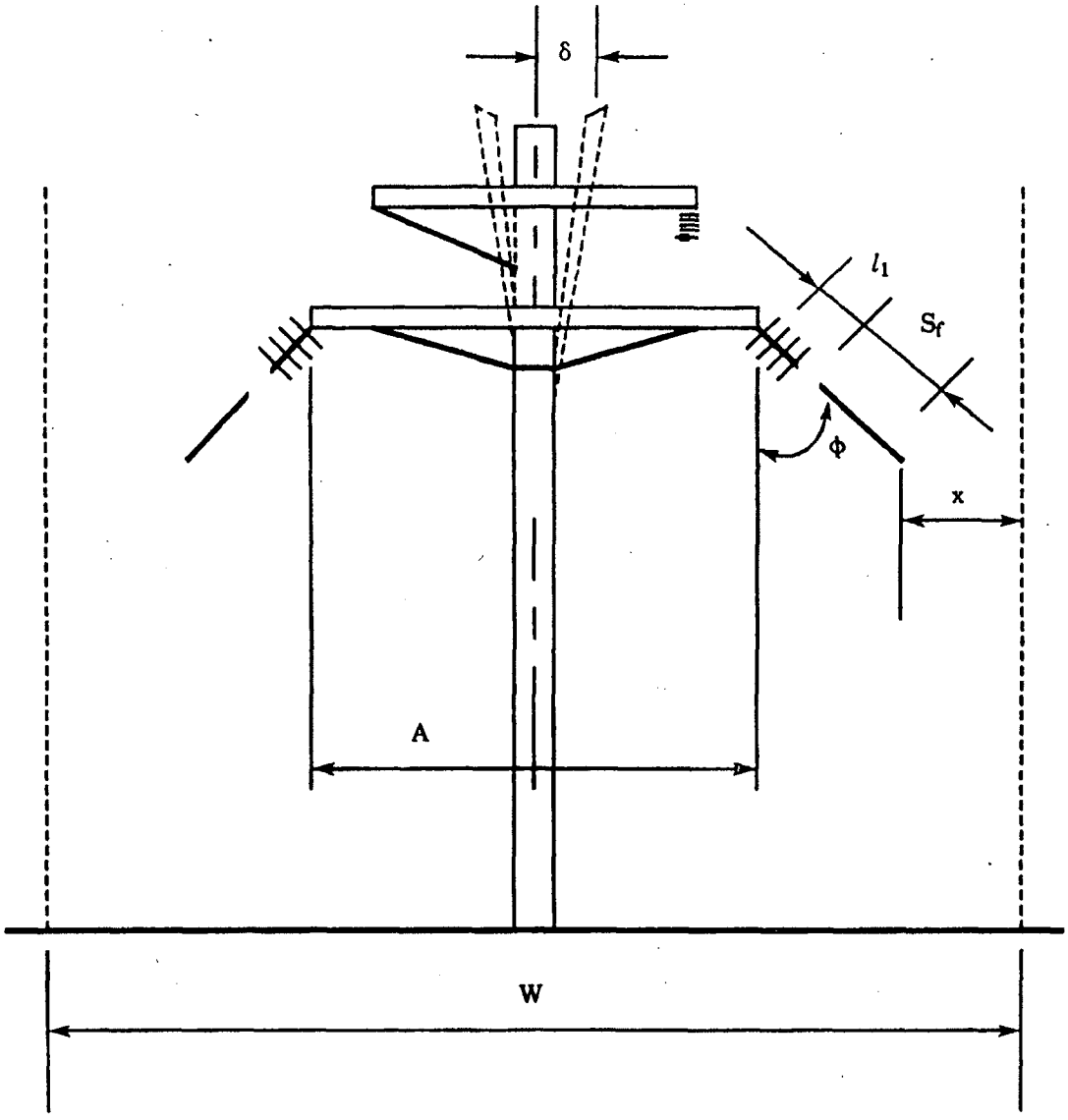
Figure 3.3 illustrates the right-of-way width determination for the SECOND METHOD. From the figure it can be seen that the formula for the width is:

$$W = A + 2\,(1i + Sf)\sin\phi + 2\,\delta \qquad (3\text{-}3)$$

where:

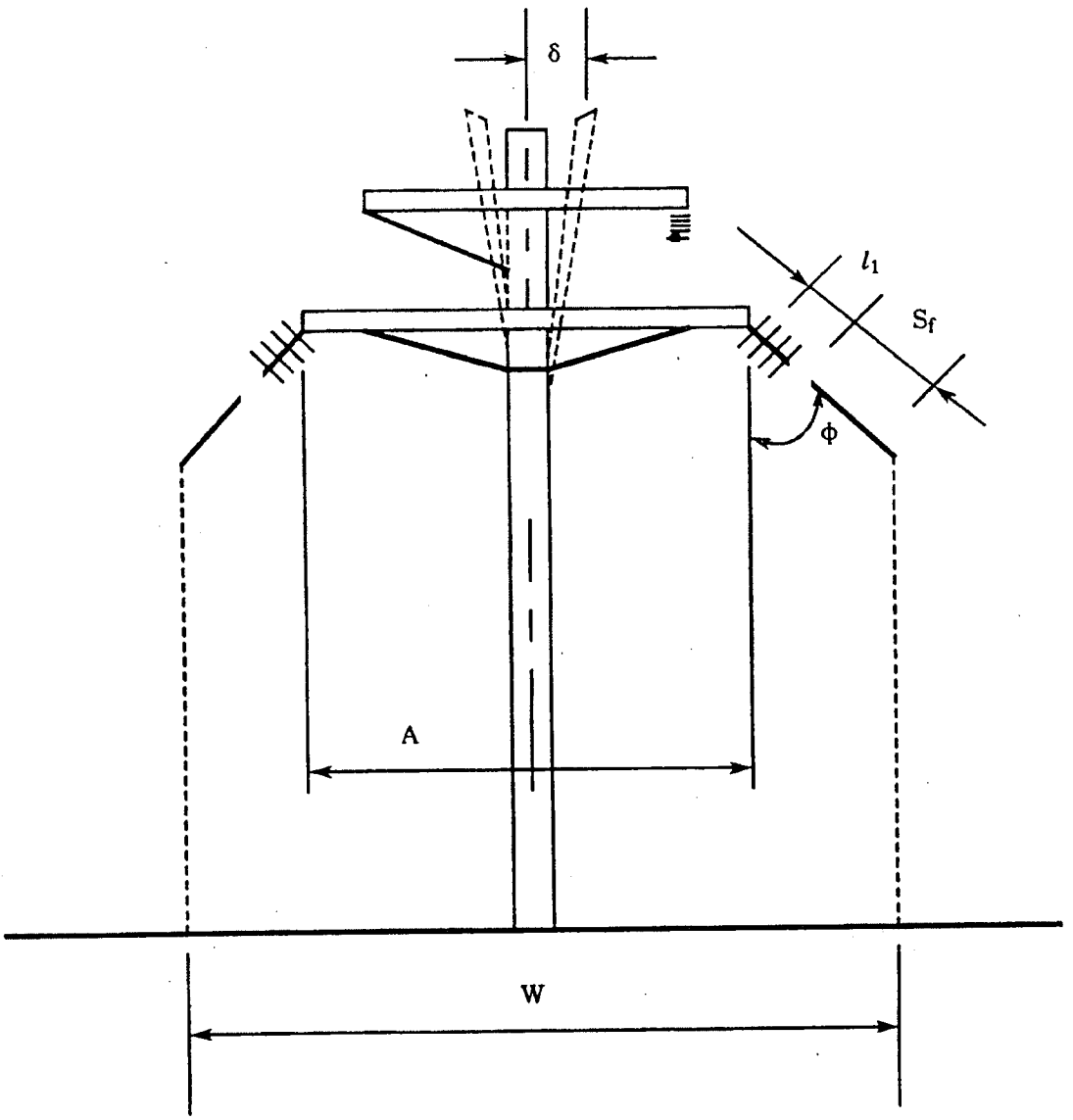
ϕ = conductor blow out angle at high wind loading conditions (DEG)
Sf = conductor final sag at high wind loading conditions at 60 F
δ = structure deflection under high wind loading conditions (FT)

All other symbols are as previously defined.



All symbols are as previously defined.

Figure 3.2
ROW Width for Single Line of Structures
(FIRST METHOD)



All symbols are as previously defined.

Fighue 3.3
ROW Width for Single Line Structures
(SECOND METHOD)

3.4.4 RIGHT-OF-WAY WIDTH FOR A LINE DIRECTLY NEXT TO A ROAD

The right-of-way width requirements for a line next to a road are the same as those given in the two previous sections with the following exception. There is no ROW required on the road side of the line as long as the required clearances to existing or possible future structures on the road side of the line are met and appropriate permits have been received from highway and roadway authorities.

3.4.5. RIGHT-OF-WAY WIDTH FOR TWO OR MORE LINES OF STRUCTURES ON A SINGLE RIGHT-OF- WAY

In discussing the situation for two or more parallel lines located on the same proposed ROW, it can be seen that the determination of the required ROW width can be broken into two parts. For the first part the distance from the outside phases of the lines to the ROW edge is calculated in the same manner as given previously for single lines. The second part is the determination of certain horizontal clearance requirements for conductors. These clearances between lines are usually determined by considering the phase-to-phase and phase-to-structure clearance requirements for phase conductors on adjacent lines. No effort will be made in this section to show the equations used for determination of the appropriate clearance values since they are appropriately given in SECTION 4, TRANSMISSION LINE CLEARANCES. Wind force values used for conductor blow out and structure deflection are essentially the same as those used for ROW edge distance determination as previously discussed for single lines.

It may be desirable or even necessary in the case of multiple-line ROW's to check the line spacing values obtained previously against the requirements due to other factors. Galloping is one such factor, but it is not considered critical to the design and operation of Santee Cooper lines. Another factor to consider is the standard phase spacing. This is obviously the case for any two parallel lines with the same voltage, phase conductors, and structures.

Since the structures of two or more lines in a single ROW rarely ever line up with each other, a worst case assumption should be used to avoid the uneconomical task of determining the proper line separation span-by-span. In other words, the assumption should be used that allows the structure of one line to be located next to the mid-span point of the other line and associated span section that has the most sag.

3.4.6 SELECTION OF GOVERNING SPAN LENGTH

In order to determine the blow out position of the phase, the conductor sag must be known, and consequently an appropriate span length must be determined. The question then arises as to what span length should the right-of-way width be based upon. There are two ways of approaching this question.

One is to use one width for the entire line and to base that width on the maximum span length in the line. The other way is to base the width on a relatively long, but not the longest span (say the ruling span, for instance), and for those spans that exceed the base span, add additional width as appropriate. Although more than one span value can be used, it is suggested that only one value of span length be used for the entire line.

With regard to the magnitude of the appropriate span length, one must consider the conditions which exist presently along the edges of the proposed ROW in conjunction with any future changes. If a significant number of spans in the line are affected by objects along the ROW then the maximum span length of the affected spans should be used for the entire line. This assures compliance with required horizontal clearances for all affected spans and provides for the future addition of objects to span sections not currently affected.

3.4.7. NOMINAL WIDTH VALUES

Before using any calculated overall width values for the situations discussed up to this point, one must compare them to certain nominal (or minimum) values. The REA has established an approximate range of values from 75'-200' for 69 kV-230 kV. These values are derived based upon the past performance of various lines most of which were wood H-frame structures. It should be noted that the REA is somewhat conservative as evidenced by the large value (200') of ROW width suggested for use with 230 kV. A table of recommended values as calculated by the NESC loading and high wind loading method at 26 PSF, for typical Santee Cooper structures, is found in Table 3.2 of this section.

3.4.8 PLANNING FOR THE FUTURE

Future plans for the system may require additional ROW width to be obtained in the present in order to be able to upgrade existing lines or to add one or more lines to the same ROW at a later date. Obviously it would be more convenient with respect to acquisition to obtain a wider ROW the first time through rather than duplicating the effort at some time in the future at a higher price. This may or may not be economically feasible since the analysis is not a simple one and involves unknown investment rates, escalating real estate prices, and the availability of land. Herein it is enough to say that good system planning and proper economic analysis treatment may produce a significant influence on the required width of the ROW.

3.4.9 TYPICAL ROW WIDTHS

Specific values of ROW width would be calculated by the Design Engineer for a specific transmission line. Typical values of ROW widths are shown in Table 3.2 for various transmission design applications and voltage levels typical of Santee Cooper. These values were determined using the calculation methods presented previously and are based upon the design conditions and assumptions as follows:

(a) Conductors Used

1272	kcmil 45/7 ACSR (Bittern)-230 kV	DIA=1.345",1.434 LB/FT
795	kcmil 26/7 ACSR (Drake)-115 kV, 69 kV	DIA=1.108",1.094 LB/FT
7#8	Alumoweld - Shield wire	DIA=0.385",0.262 LB/FT

(b) Span Lengths

850' - 230 kV (Steel)
850' - 230 kV (Wood H-Frame)
850' - 115 kV (Wood H-Frame)
600' - 115 kV, 69 kV (Single Pole, Wood)
700' - 69 kV, (Single Pole, Concrete)

(c) Loading Conditions

FIRST METHOD using NESC loading conditions -6 PSF Wind, Bare Cond., 60 F, Final Sag

SECOND METHOD using High Wind - 26 PSF Wind, Bare cond., 60 F, Final Sag

Sags calculated using Alcoa Sag and Tension Program

Voltage	Tension (at NESC Med. Load)	Sag First Method	Sag Second Method
230 kV (Wood, Steel)	10,000 LB	23.70'	26.46'
115 kV (H-Frame)	10,000 LB	17.47'	21.82'
115 kV, 69 kV (600' span)	6,500 LB	13.64'	15.82'
69 kV (700' span)	6,500 LB	18.28'	20.68'

High wind is 50 YR return period value.

(d) Clearance to Objects

As specified in Table 4.4B of Section 4, Transmission Line Clearances.

10' - 230 kV
7.6' - 115 kV
6.6' - 69 kV

(e) Deflection

230 kV S2A1-2C steel structure
6 PSF, 60 F - = 1.47'
26 PSF, 60 F - = 5.85'
(obtained from manufacturer)

115 kV WHP2-1P wood structure (75' - Class 1)
6 PSF, 60 F - = 4.20'
26 PSF, 60 F - = 15.56'

69 kV WTS1S-6C wood structure (70' - Class 1)
6 PSF, 60 F - = 3.35'
26 PSF, 60 F - = 12.53'

69 kV CDCTHP-6P Concrete Structure
6 PSF, 60 F - = 1.0'
26 PSF, 60 F - = 2.8'

Wood pole deflections were run on the Computer Wood Defection program.
Deflection for H-frame structures is considered negligible. (δ = 0.0')

(f) Poles

Wood

85'-Class 1 - 230 kV (H-frame, Bundle)
85'-Class 2 - 230 kV (H-frame)
70'-Class 2 - 115 kV (H-frame)
75'-Class 1 - 115 kV (Single Pole)
70'-Class 1 - 69 kV (Single Pole)

Steel

115' - 230 kV

Concrete

70' - 69 kV

(g) Recommended Widths

For determining recommended widths, consideration is given to the following:

(1) Actual span values greater than the typical values considered

(2) Upgrading of a given line to the next higher voltage level

(3) Addition of a second line during a rebuild of an initial line

Table 3.2
Typical ROW Widths for Single Lines
(no provisions for future circuits)

Voltage (kV)	Circuit	Conductor	Structure		Minimum ROW Width		Recommended ROW Width (FT)*
			Designation	Type	FIRST METHOD (FT)	SECOND METHOD (FT)*	
230	Single	Single	WTS14-2C	Wood H-Frame	85	95	100
	Single	Bundle	W2T1-2C	Wood H-Frame	90	100	100
	Double	Bundle	S2A1-2C	Steel Single Pole	85	110	110
115	Single	Single	WTS3A-1C	Wood H-Frame	65	80	80
	Single	Single	WHP2-1P	Wood-Horiz. Post	50	70	70
69	Single	Single	WTS1S-6C	Single Pole Wood	45	70	70
	Double	Single	CDCHP-6P	Concrete	45	55	55

* based on 26 PSF wind

3.4.10 SAMPLE CALCULATIONS

The following sample calculations are presented in order to illustrate the calculation methods used to determine ROW width values as given previously in this section.

a. 230 kV WTS14-2C Wood Structure

Using the conditions described for Table 3.2, determine the minimum required ROW width for a tangent 230 kV single circuit, single conductor application for both NESC (FIRST METHOD) and the High Wind (SECOND METHOD) loading conditions.

(1) FIRST METHOD (6 PSF, 60 F)

$$W = A + 2(1_i + S_f) \sin \phi + 2(\delta + \chi)$$

A	=	36'
l_i	=	6.5'
S_f	=	23.7'
δ	=	0
x	=	10'

$$\phi = \tan^{-1} 2T \sin ½ \theta + HS_i(P_c) / VS (W_c) + ½ (W_i)$$

since θ = 0 this simplifies to

$$\theta = \tan^{-1} HS (P_c) / VS (W_c) + ½ W_i$$

$$P_c = d_c F / 12 = 1.345(6) / 12 = .6725$$

$$HS = VS = 850"$$

$$\phi = \tan^{-1} (850) (.6725) / 850 (1.434) + ½ (160)$$

$$\phi = 23.75°$$

$$W = 36 + 2(6.5 + 23.7) \sin 23.75 + 2(0 + 10)$$

W = 80.3' *rounding to the next 5' increment, 85'*

(2) SECOND METHOD (26 PSF, 60° F)

$$W = A + 2(l_i + S_f) \sin \phi + 2 \delta$$

$$S_f = 26.46$$

$$\phi = \tan^{-1} HS(P_c) / VS\ W_c + \tfrac{1}{2} W_i$$

$$P_c = d_c F / 12 = 1.345\ (26) / 12 = 2.91$$

$$\phi = \tan^{-1} 850\ \ (2.91) / 850\ (1.434) + \tfrac{1}{2}\ (160)$$

$$\phi = 62.33^\circ$$

$$W = 36 + 2(6.5 + 26.46)\ \sin 62.33 + 2(0)$$

W = 94.4' rounding to the next 5' increment, 95'

b. <u>69 kV WTS1S-6C Wood Structure</u>

Using conditions described for Table 3.2, determine the minimum required ROW width for a 69 kV single circuit, single conductor, single wood pole application for both the NESC (FIRST METHOD) and the High Wind (SECOND METHOD) loading conditions.

(1) FIRST METHOD (6 PSF, 60 F)

$$W = A + 2(l_i + S_f)\ \sin\phi\ + 2(\ \delta + x)$$

A	=	9'
l_i	=	2.42'
S_f	=	13.64'
δ	=	3.35'
x	=	6.6'

$$\phi\ \tan^{-1} HS\ (P_c) / VS\ (W_c) + \tfrac{1}{2}\ \ (W_i)$$

$$P_c = d_c F / 12 = 1.108\ (6) / 12 = .55$$

$$\phi = \tan^{-1} 600\ (.55) / 600\ (1.094) + ½\ (48)$$

$$\phi = 26.04°$$

$$W = 9' + 2(2.42 + 13.64)\ \mathit{sin}\ 26.04 + 2(3.35 + 6.6)$$

W = 43.00' *rounding to the next 5' increment, 45'*

(2) SECOND METHOD

$$W = A + 2(l_i + S_f)\ \mathit{sin}\ \phi + 2\ \delta$$

$$S_f = 15.82'$$

$$\delta = 12.53'$$

$$\phi = \tan^{-1} HS\ (P_c) / VS\ (W_c) + ½\ (W_i)$$

$$P_c = d_cF\ /12 = 1.108\ (26) / 12 = 2.40$$

$$\phi\ \tan^{-1} 600\ (2.40) / 600\ (1.094) + ½\ (48)$$

$$\phi = 64.72°$$

$$W = 9 + 2(2.42) + 15.82\ \mathit{sin}\ 64.72 + 2(12.53')$$

W = 67.04' *rounding to next 5' increment, 70'*

(c) <u>69 kV CDCHP-6P Concrete Structure</u>

Using conditions described for Table 3.2, determine the required ROW width for a 69 kV double circuit, single conductor, single concrete pole using horizontal post insulators, for both the NESC (FIRST METHOD) and the High Wind (SECOND METHOD) loading conditions.

(1) FIRST METHOD (6PSF, 60° F)

$$W = A + 2(1_i + S_f)\sin\phi + 2(8 + x)$$

A	=	10'
l_i	=	0
S_f	=	18.28'
δ	=	1.0'
x	=	6.6'

$$\phi = \tan^{-1} HS\ (P_c) / VS\ (W_c) + ½\ (W_i)$$

$$P_c = d_cF / 12 = 1.108\ (6) / 12 = 0.55$$

$$\phi\ \tan^{-1} 700\ (0.55) / 700\ (1.094) + ½\ (0)$$

$$\phi = 26.85°$$

$$W = 10 + 2(0 + 18.28)\sin\ 26.85° + 2\ (1.0 + 6.6)$$

W = 41.72' rounding to the next 5' increment = 45'

(2) SECOND METHOD

$$W = A + 2(l_i + S_f)\sin\phi + 2\delta$$

S_f	=	20.68'
δ	=	2.8'

$$\phi\ \tan^{-1} HS\ (P_c) / VS\ (W_c) + ½\ (W_i)$$

$$P_c + dc\ (F) / 12 = 1.108\ (26) / 12 = 2.40$$

$$\phi = \tan^{-1} 700\ (2.40) / 700\ (1.094) + ½\ (0)$$

$$\phi = 65.50$$

$$w = 10 + 2\ (0+20.68)\ \sin 65.5° + 2\ (2.8')$$

w = 53.24" rounding to the nearest 5" increment = 55"

3.5.1 SURVEY PERMITS

Project Engineering (PE) issues a Construction Order to Lands Rights Acquisition (LRA) to obtain survey permits for the selected line route. If during the process of acquiring survey permits, difficulties are encountered from the land owners, the Design Engineer (TLD) is informed. The Design Engineer (TLD) determines if it is feasible to relocate the line. If deemed unfeasible, LRA is instructed to go ahead to gain legal entry for the surveying. LRA informs PE when all the survey permits have been obtained.

3.5.2 CONTRACT WORK

After receiving survey permits, PE issues a Construction Order to the Surveying Section to survey the proposed line route. The Surveying Section, based on their work load, determines if the line survey is to be done "in-house" or will be contracted out. If the line survey is to be done "in-house", aerial photography is contracted out if it cannot be obtained from the Geographic Information System Unit. The Surveying Section is responsible for preparing specifications for bids, for evaluating the bids, and for requesting Purchasing to issue a purchase order. The line survey is performed in accordance with the Technical Specifications for Transmission Line Survey, Specification No. 08-002.

3.5.3 CONTROL SURVEY

The line survey activities begin with the control survey. The purpose of the control survey is to establish a base line so that the predetermined center line can be precomputed and surveyed in a designated location. In order to maintain accuracies for mapping and for the establishment of points on the profile line, a traverse of third order Class 1 accuracy, according to General Specifications of Geodetic Control Survey Publication No. QB261037, is established. The details followed are in accordance with Specification No. 08-002.

3.5.4 CENTERLINE STAKING

After the control survey is completed, the line is surveyed and the center line is cut. Standard survey stakes are placed along the center line with its appropriate station number. The details followed are in accordance with Specification No. 08-002.

3.6.1 TYPES OF DRAWINGS

After completing the line survey, the Surveying Section or the contractor performing the work, prepares the following types of drawings in the sequence shown below:

(1) Survey data on disk or electronic file for use with PLS.CADD

(2) Plats for obtaining easements

(3) Drawings for the Dept. of Health and Environmental Control (DHEC), if applicable

(4) P. I. Topographic Maps

(5) R/W Monumentation Data sheets with sketches

(6) Horizontal Control Diagram

(7) County Highway Map showing the centerline of the route

TLD prepares any miscellaneous drawings which may be required to obtain permits for railroad crossings, river crossings, etc. The Survey Section prepares drawings, when required, such as those represented by Figures 3.4 and 3.5. These are normally prepared only in the cases of disputed property claims.

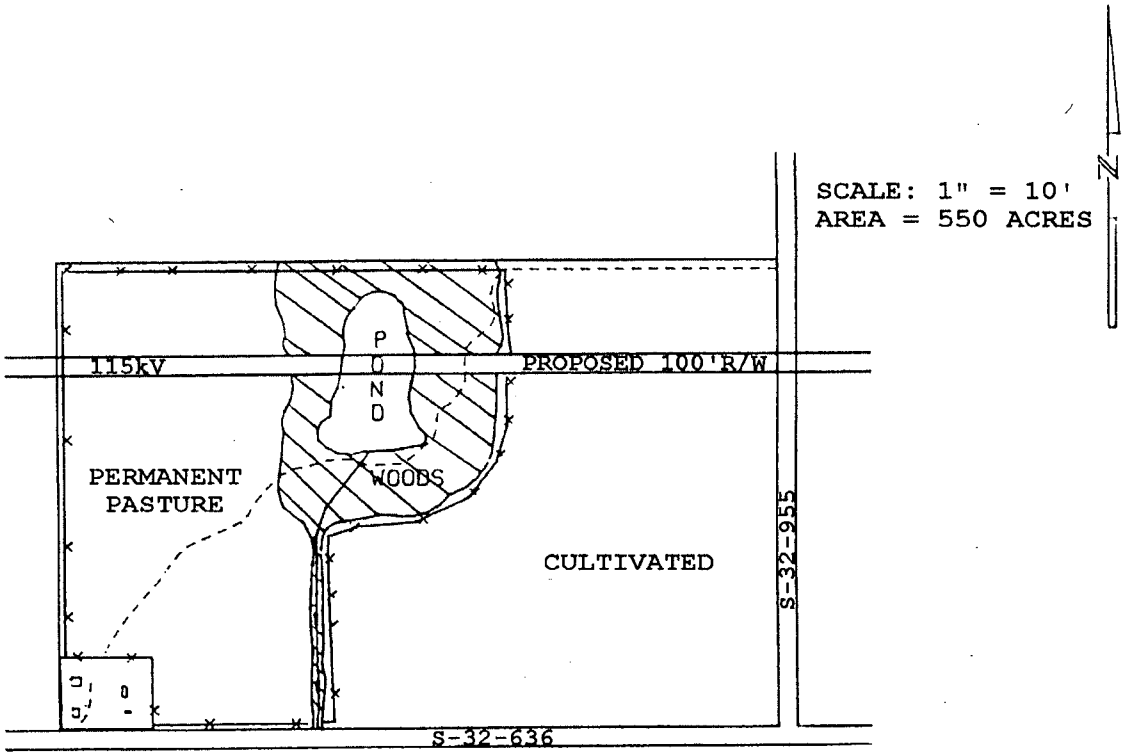
3.6.2 DISTRIBUTION OF DRAWINGS

After the property lines have been added by the Survey Section, the disk/file is returned to TLD for finalizing the PLS.CADD generated plan and profile drawing. When the Horizontal Control Diagrams, River Crossing Plats, P.I. Topograhic Maps and Easement Plats are completed, they are given to Reproduction to obtain a drawing number. The Survey Section places the drawing number on the drawings. Five (5) signed and sealed copies of the property plats will be sent to the PE for disbursement to Land Rights Acquisition (LRA). The original easement plats, original horizontal control diagrams and the original P.I. topographic maps are filed in Reproduction. The Surveying Section retains, for future reference, a copy of the plats and the plan and profile, when the project is surveyed by an outside contractor, along with the original R/W Data sheets and the original County Highway Maps marked to show the centerline routing.

The PE sends five (5) sealed and five (5) working copies of the plats and two (2) copies of the plan and profile drawing along with a construction order to LRA to acquire R/W.

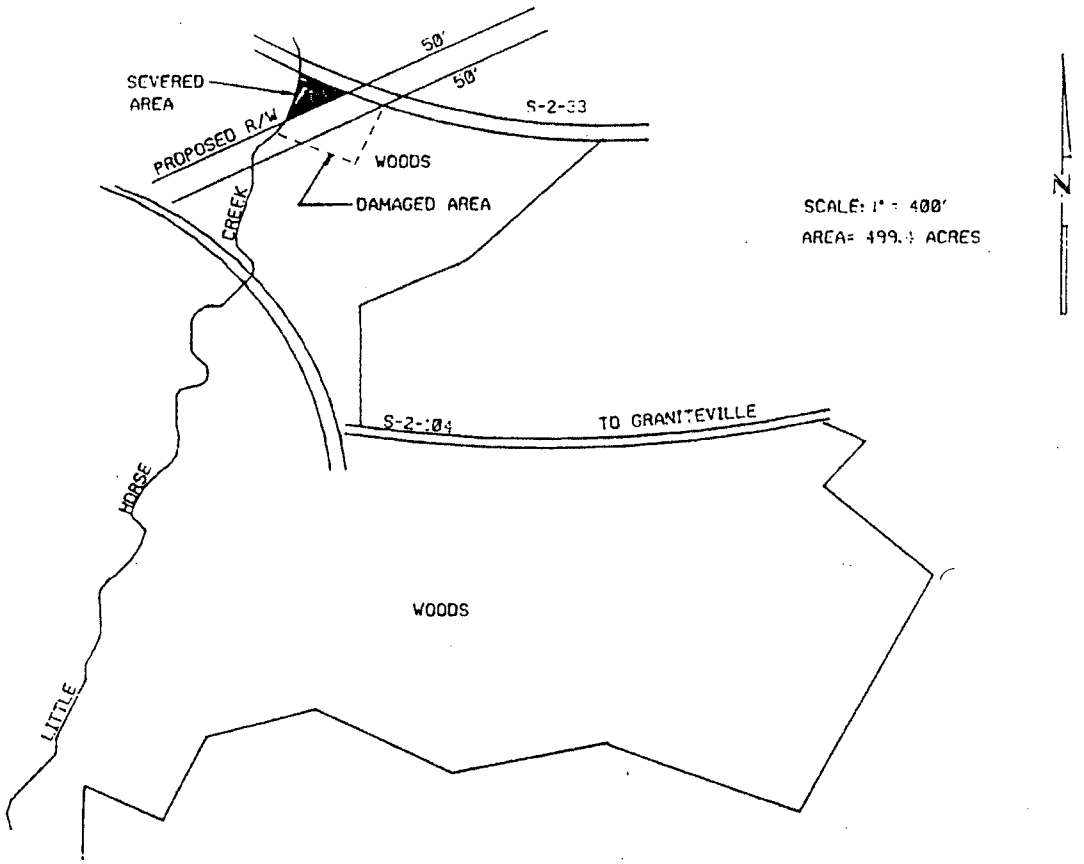
3.7.1 PROPERTY EVALUATION

LRA determines the legal property owners and the status of all parcels of land by researching the titles and deeds. After completing the research, LRA proceeds with acquiring the right-of-way by negotiating with the landowners. Figures 3.4 and 3.5 illustrate typical cases of land crossing situations as they affect classification of land for evaluation.



ANALYSIS OF SUBJECT		LAND USE IN EASEMENT AREA		ANALYSIS OF SALES IN ARE	
FARMSTEAD -	5.0 AC.	CULTIVATED –	4.85 AC.	RURAL HOMESITES -	$ 1,500./AC.
CULTIVATED -	250.0 AC	PASTURE -	4.36 AC.	CULTIVATED -	$ 600./AC.
PASTURE -	215.0 AC	WOODLAND -	3.86 AC.	PER. PASTURE -	$ 600./AC.
WOODLAND -	70 AC.	POND -	.70 AC.	HIGH WOODLAND -	$ 350./AC
POND -	10 AC.	TOTAL	13.77 ACRES	LOW WOODLAND -	$ 225./AC.
TOTAL	550.0 ACRES				

Figure 3.4
Land Evaluation – Simple Crossing



ANALYSIS OF EASEMENT AREA

EASEMENT AREA	-	0.60 ACRES
SERVED AREA	-	0.14 ACRES
DAMAGED AREA	-	0.50 ACRES
	TOTAL	1.24 ACRES

Figure 3.5
Land Evaluation - Served Area

3.7. 2. TIMBER CRUISE

PE sends a Construction Order, with the necessary drawings, to property Management for a timber cruise. The purpose of the timber cruise is to determine the value of the timber which will be cut during both the right-of-way clearing operation and the danger tree cutting operation.

3.7 .3 REROUTING

During survey or acquisition, occasions may arise where considerations should be given to rerouting small segments of the line due to the inability of the LRA agent to satisfy the demands of a property owner. In such instances, the Design Engineer (TLD) ascertains the feasibility and cost of all reasonable alternatives. The Design Engineer (TLD) in conjunction with Project Engineering and LRA, determine the feasibility of the relocation by satisfying the property owner's demands, relocating the line, initiating condemnation proceedings, or taking other action as appropriate.

3.7 .4 SECURING THE RIGHT-OF-WAY

Once established on paper, the right-of-way must be secured by following certain legal procedures. The following is a list of permits, easements, licenses, franchises, and authorizations that may be necessary.

(1) Private property: Easement from owner for the property with danger tree rights.

(2) Railroad: Permit or agreement

(3) Highway: Permit from state, county

(4) Other public bodies: Authorization

(5) City, County or State: Permit

(6) Joint and common use pole: Permit or agreement

(7) Wire crossing: Permission of utility

(8) All navigable streams: Permit from U.S. Army Corps of Engineers

(9) Navigable stream governed by the State: Permit from S.C. Dept. of Health &

Environmental Control

(10) U.S. Government property: Permit

(11) Airport and airways: Coordinate with Federal Aviation Agency

(12) Federal Energy Regulatory Commission, DOE: License

(13) U.S. Forest Service: Permit

(14) National Park Service: Permit

(15) Indian Tribal Reservation: Easement

3.8.1 FINAL STAKING

Prior to construction, PE issues a Construction Order for final staking of the transmission line to the Surveying Section. If the line is to be constructed by a Contractor, the final structure staking is performed in accordance with Engineering Procedure No. 10A, "Procedure for Final Staking of Transmission Line Structures (for Erection by a Contractor)". If the line is to be constructed by System Operations, then the structure staking is performed in accordance with Engineering Procedure No. 11A, "Procedure for Final Staking of Transmission Line Structures (for Erection by System Operations)".

3.8.2 FIELD CHECK

After final structure staking, TLD examines each structure location. Any correction or modification, if required, is made on the plan and profile drawings.

3.8.3 MONUMENTATION

Right-of-way monumentation is the responsibility of the Survey Section. If the line is a rebuild line, the monumentation is done between the time of completing the plan and profile drawings and the final structure staking. If the line is a new line, the monumentation is done during the final structure staking.

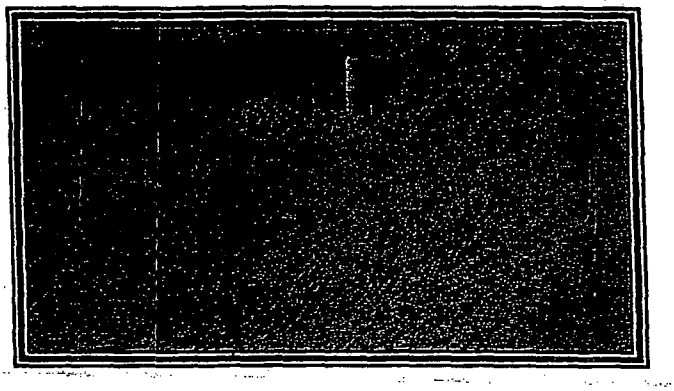
3.9.1 After the previously mentioned activities are completed, PE issues a Construction Order to Construction Management to start the construction of the transmission line. The first actual work to be done on the line is usually clearing the right-of-way. When clearing, it is important that the environment be considered. It is also important that the clearing be done in such a manner that will not interfere with the construction, operation or maintenance of the line. Preferably, all right-of-way for a given line should be secured before starting construction.

1. National Electrical Safety Code (ANSI C2), American National Standard, 1997 edition.

2. Design Manual for High Voltage Transmission Lines (REA Bulletin 1742E-200), Rural Electrification Administration, Dept. of Agriculture, August 1992.

SCE&G COL 4.1 Land Use - (SCDHEC 2005) Sec 4.1 Ref 4

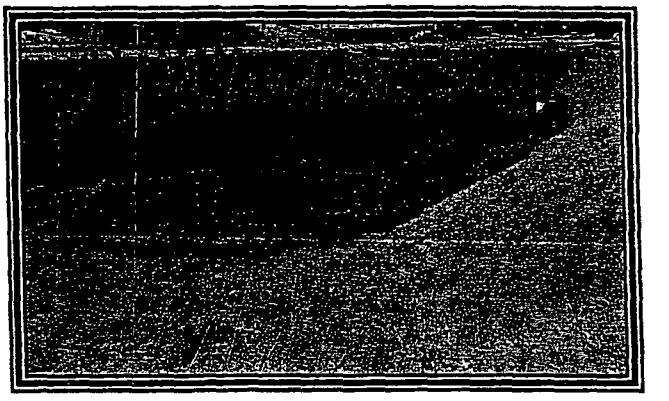
SC DHEC South Carolina Department of Health and Environmental Control



D H E C

PROMOTE PROTECT PROSPER

Ocean and Coastal Resource Management



South Carolina DHEC Storm Water Management BMP Handbook

August 2005

South Carolina Electric & Gas – Thomas Island Project

Route Evaluation Summary Sheet

	ROUTE							
	A	B	C	D	E	F	G	H
Cultural & Natural Resource Factors				[illegible]			[illegible]	[illegible]
Land Cover Factors			6.34	5.56		[illegible]	[illegible]	4.84
Property Ownership Factors			[illegible]		[illegible]	[illegible]	[illegible]	6.15
Land Use Factors			7.63	7.54	[illegible]	[illegible]	6.05	6.15
Occupied Buildings Factors	6.03		6.14		5.74		[illegible]	2.56
Visibility Factors (Public)	7.76		[illegible]	7.90	[illegible]	7.68	[illegible]	[illegible]
Visibility Factors (Residential)	4.13		4.13		4.26		3.81	0.75
Water Quality Factors			[illegible]	[illegible]	5.41	[illegible]	3.04	5.83
Total Normalized Category Scores	66.94	76.94	45.40	54.93	40.28	50.47	35.96	36.46
Route's Rank	7	8	4	6	3	5	1	2

Compliance (scored in highest 1/3 of score range)

Second Best Compliance (scored in middle 1/3 of score range

Best Compliance (scored in lowest 1/3 of score range)

South Carolina Department of Health and Environmental Control - www.scdhec.gov

OCRM: Publications Clearinghouse

Technical Documents - Water Resources

The SC OCRM Information Clearinghouse is a National Oceanic Atmospheric Administration Coastal Management Fellowship project funded by NOAA and the State of South Carolina.

General Environmental Quality

In South Carolina, the State's Pollution Control Act serves to implement the provisions of the Federal Clean Water Act. The quality of natural resource based planning should be enhanced as water quality can be assessed, and programs developed, on a watershed basis where natural system boundaries are utilized to limit planning areas.

- Overview of Water Quality Management Components in the Charleston Harbor Project Area by Milt Rhodes; 1996; Details of SC-DHEC different departments & their responsibilities, laws and histories.
  Citizens Guide to Clean Water by the Palmetto Conservation Foundation and SC-DHEC; 51 pp. Excellent description of water basics from rain to water bodies to the sea. Discusses point and nonpoint source pollution, wetlands, watersheds and regulations. (on the SC Bureau of Water site)
- The Facts on Groundwater a SC-DHEC Bureau of Water pamphlet; 2 pp. Defines and explains the where, what and how of groundwater, its uses and potential contamination sources. (on the SC Bureau of Water site)

Marina Dredging and Spoil Disposal

Depending on how and where it is accomplished, the disposal of dredged material may have substantial effects upon natural resources in the disposal area. Currently, more than 3.8 million cubic meters of material are removed annually from the channels of the estuary to maintain adequate water depths for Charleston's ship traffic.

- Dredging and Spoil Disposal Needs Assessment (123 pages, 5.5 MB)
- Questionnaire for marina owners and operators
- Dredging and Disposal Alternatives and Techniques for South Carolina Coastal Marinas
- A Cultural Resources Reconnaissance of Possible Dredge Disposal by Paul Brockington and E.C. Poplin; 1992; 60 pp. Analyzes the potential impacts of dredging and dredged material on known or suspected cultural resources.
- Environmental Assessment for Alternative Dredged Material for Disposal Sites in Charleston Harbor by Fred A. Holland, D.E. Porter, R.F. Van Dolah, R.H. Dunlap, G.A. Steele and S.M. Upchurch; 1993; 144 pp. Very well written, Threatened & Endangered Habitats listed in appendix.
- Spawning Locations Determined by Acoustic Sampling for Spotted Seatrout, Red Drum and Black Drum in Charleston Harbor by W.A. Roumillat; 1999; 18 pp. Looks at the spawning locations, particularly in regard to dredging and makes policy recommendations.

Chemical Contamination

In some cases, metal leachates may accumulate in sediments and oysters immediately adjacent to pilings, but do not appear to become concentrated in sediments or oysters elsewhere in the same creeks.

- A Study of Wood Preservative Leachates from Docks in an Estuarine Environment by P.H. Wendt, R. F. Van Dolah, M. Y. Bobo, T. D. Mathews and M. V. Levisen; 1995; 43 pp. Discusses variety of chemical pollutants.

Golf Courses

Maintain non-chemically treated vegetative buffer zones of at least fifty feet adjacent to all natural watercourses to assist in filtering nutrients and pesticides in runoff and to moderate water temperatures.

- Golf Course Best Management Practices Literature Review by Steve Klaine; 1994; 16 pp. with 8 pp. references. Introduction to basic golf best management practices. Easy to read.
- Environmentally Sensitive Techniques in Golf Course Management: A Model Study at the Ocean Course Kiawah Island, SC by Steve Klaine, Vincent A. Leopold, Michael J. Hooper, Ronald J. Kendall, James L. Cowles, Frank C. Bailey, Barry L. Forsythe II, Carol P. Weiskopf, Thomas W. Lapoint, Landon C. Miller, AA Fouts and Thomas R. Rainwater; 1995; 250 pp. A research study that is also interesting reading. Well done research of pesticides upon fish and birds.
- An Environmentally Friendly Coastal Golf Course: An Architect and Supertindents's Manual by Steve Klaine, Thomas Rainwater and Barry Forsythe; 1995; 47 pp. Easy to read, well organized.

Point Source Pollution

Lower flushing rates make the smaller tidal creeks more susceptible to human induced changes in water quality, including more frequent extreme fluctuations in salinity, changes in bottom sediments, and alterations in dissolved oxygen dynamics. Creeks draining relatively developed watersheds showed significantly more frequent violations of existing dissolved oxygen standards and appeared to have the greatest exposure to low dissolved oxygen conditions.

- Enforcement of NPDES Permits by G. I. Scott, T. Shearer and R.E. Thompson; 1998; 14 pp. Discusses Charleston Harbor Project estuary industries and the National Pollution Discharge Elimination System.

Nonpoint Source Pollution

Nonpoint source pollutants in runoff include pesticides, heavy metals, excess nutrients, suspended solids, and fecal coliform bacteria.

- Storm Water Impacts on Creeks, Variability of Secondary Estuarine Watershed Creeks by Phillip Dustin; 51 pp. & appendix of charts and maps; Compares developed & undeveloped watershed water quality in tidal creeks. (Part 1/Part 2/Part 3)
- 1994 Report of the Isle of Palms Connector Study for the Charleston Harbor Project by Philippe E. Ross and Paige A. Leitman; 1994; 57 pp. Good discussion of road contaminants and how to test, suggests better testing methodologies while using other relevant research.
- Building A Better Bridge: A Study of the Isle of Palms Connector by Philippe E. Ross; 1995; 24 pp. A continuation of the 1994 study.
- The Center for Watershed Protection A link to an excellent source for stormwater management and water quality planning. (a non-SC DHEC site)
- Stormwater Strategies: Community Responses to Runoff Pollution-Strategies in the South East by the Natural Resource Defense Council; 1999; html. This covers the most effective strategies being employed by communities in the South East to control urban runoff. It is intended to serve as a guide for local decisionmakers and municipal officials. It is also a resource for citizens concerned about the quality of their local environment. (a non-SC DHEC site)
- Maintaining Water Quality Through Stormwater Controls a SC-DHEC Bureau of Water pamphlet; 4 pp. Briefly outlines nonpoint source pollution concerns affecting the assimilative capacity of water bodies and the need for best management practices to deal with stormwater runoff. (on the SC Bureau of Water site)
- Polluted Runoff: Lessons Learned from the National Estuarine Research Reserve System (NERR) by the NERR/NOAA; 2000; 28 pp. Water quality research from the NERRs, summarized to apply at the local level. Easy to read. (a non-SC DHEC site)
- Review of Nonpoint Source Pollution and Best Management Practices Along the SC Coast by D. Mac Kelley, Jr.; 1993; 82 pp. Discusses Fed & State laws, BMPs; Gives design stats for detention and retention ponds, trench systems, porous pavement, vegetative strips and constructed wetlands. (Part 1/Part 2/Part 3)

On-Site Septic Systems

- Field Evaluation of Four Onsite Disposal Systems and Their Impacts to Shallow Ground Water in the Coastal Zone of SC by Lisa Hajjar. A good study to determine if septic systems installed under the current regulations protect shallow groundwater and closely connected surface waters. (Part 1/ Part 2)
- An Examination of Onsite Wastewater Disposal Policy in the Coastal Zone: Implications for the Charleston Harbor Project Area by David M. Szymanski; 1994; 70 pp. Gives Federal & State laws, and local framework suggestions. (Part 1/Part 2)
- Septic Tank Absorption System Design Aid and Site Suitability Evaluation Tool for South Carolina Coastal Soils by Michael E. Meadows; 1997; 14 pp. A technical research paper with useful examples. (Part 1/Part 2)
- Evaluation of Analytical Profile Indexing, Fatty Acid Profiling Analysis and Pulsed Field Gel Electrophoresis Analysis of E. Coli Bacteria in Environmental Samples to Identify Pollution Sources by G.P. Richards, G. Seaborn, B.C. Thompson & G.I. Scott, NMFS; 1997; 37 pp. A technical research paper to assess different methods of distinguishing human from non-human fecal coliform bacteria. (Part 1/Part 2)

Best Management Practices

The control of nonpoint pollution in the U.S. is based on the identification and promotion of best management practices or BMPs, including retention ponds (contain permanent water storage), detention and extended detention ponds (dry out between storms), vegetative filter strips or buffers, and infiltration BMPs, such as infiltration trenches, medians and swales.

- Review of Nonpoint Source Pollution and Best Management Practices Along the SC Coast by D. Mac Kelley, Jr.; 1993; 82 pp. Discusses Fed & State laws, BMPs; Gives design stats for detention and retention ponds, trenchs systems, porous pavement, vegetative strips and constructed wetlands. (Part 1/Part 2/Part 3)
- Stormwater Pond Maintenance by Ward Reynolds, Lisa Hajjar & Tess Rodgers; 2000; 20 pp. Descriptions of stormwater ponds function, maintenance and various problems with solutions.
- Maintaining Water Quality Through Stormwater Controls a SC-DHEC Bureau of Water pamphlet; 4 pp. Briefly outlines nonpoint source pollution concerns affecting the assimilative capacity of water bodies and the need for best management practices to deal with stormwater runoff. (on the SC Bureau of Water site)
- **New! DHEC OCRM Stormwater BMP Handbook**
  - Complete Handbook
  - Erosion Prevention Measures
  - Sediment Controls
  - Runoff Control and Conveyance Measures
  - Alternative Erosion Prevention and Sediment BMPs & Post Construction Water Quality Controls
  - Non Structural Low Impact Development Controls
  - Structural Controls
  - Innovative Technologies and Ideal Model
  - Appendices (zip)
  - Standard Details (zip)
  - Figures (zip)
- **New! DHEC OCRM BMP Field Manual**
  - Complete Handbook
  - Erosion Prevention BMPs
  - Sediment Control BMPs
  - Runoff Control and Conveyance Measures
  - Alternative Erosion Prevention and Sediment BMPs
  - Post Construction Water Quality Controls

- Non Structural Low Impact Development Controls
- Structural Controls
- Special Construction Operation BMPs
- Waste Management BMPs
- Standard Details Guide
- Standard Details
- References
- Autocad Files (zip)

Nutrient Loads

- Spatial and Temporal Patterns of Inorganic Nitrogen and Phosphorus Distributions in the Goose Creek Estuary: Cooper River/Charleston Harbor Estuary System by Adriene P. Douglas; 1995; 19 pp. Well-organized research outlines the cause and effects of nutrient pollution. This thesis is a basic example concerning watershed management effects on water resources.
- Harmful Algal Blooms in US Waters by the National Science and Technology Council Committee on Environment and Natural Resources; 2000; 47 pp. Easy to read, excellent description of "red tides". Discusses a variety of studies of the probable causes, the impacts, preventive measures, and management necessary when the toxins appear. (a non-SC DHEC site)
- Clean Coastal Waters: Understanding and Reducing the Effects of Nutrient Pollution by the National Research Council; 2000; 428 pp. A book the discusses the causes and effects of nutrient pollution on the coastal environment. (a non-SC DHEC site)

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WMA Regulations

WMA Public Drawing Hunts

The SCDNR offers a variety of WMA hunts through computerized drawings. Hunt fees range from $10 to $100 per hunter and must be submitted at the time of application. Applications for deer hunts are available in July, waterfowl and quail hunts in September, and youth/adult only turkey hunts in February. Deadlines to apply for draw hunts are generally mid-August (deer), mid-October for quail and waterfowl and early March for youth turkey hunts. Applications are available at SCDNR offices statewide (refer to directory on page 58) or write SCDNR Public Drawing Hunts, PO Box 167, Columbia, SC 29202 or visit our web site at http://www.dnr.state.sc.us.

GENERAL REGULATIONS

On all DNR owned WMA lands the removal of artifacts or ecofacts (including arrowheads) from the surface or subsurface is prohibited except when approved by the State Historic Preservation Office and carried out in accordance with their guidelines.

See page 35 for regulations on private lands in Game Zones 1, 2 & 4.

Statutes 50-11-2200 and 50-11-2210 authorizes the promulgation of WMA regulations. See specific game zones for seasons.

2.1 Except as provided in these regulations, it is unlawful to hunt or take wildlife on areas designated by the South Carolina Department of Natural Resources (SCDNR) as Wildlife Management Area (WMA) lands.

2.2 Entry onto WMA land is done wholly and completely at the risk of the individual. Neither the landowner or the State of South Carolina nor the South Carolina Department of Natural Resources accepts any responsibility for acts, omissions, or activities or conditions on these lands which cause or may cause personal injury or property damage.

2.3 Entry onto WMA land constitutes consent to an inspection and search of the person, game bag or creel.

2.4 It is unlawful for anyone to hunt or take wildlife on WMA land unless an individual is in possession of a valid South Carolina license; a valid WMA permit; and other applicable federal or state permits, stamps, or licenses.

2.5 No Sunday hunting is permitted on any WMA lands.

2.6 On all WMA lands, baiting or hunting over a baited area is prohibited.

As used in this section, "bait" or "baiting" means the placing, depositing, exposing, distributing, or scattering of shelled, shucked, or unshucked corn, wheat, or other grain or other food stuffs to constitute an attraction, lure, or enticement to, on, or over any area. "Baited area" means an area where bait is directly or indirectly placed, deposited, exposed, distributed, or scattered and the area remains a baited area for ten (10) days following the complete removal of all bait.

2.7 On WMA lands construction or use of tree stands is prohibited if the tree stand is constructed by driving nails or other devices into trees or if wire is wrapped around trees. Other tree stands and temporary screw-in type climbing devices are permitted provided they are not permanently affixed or embedded in the tree.

2.8 On WMA lands any hunter younger than sixteen (16) years of age must be accompanied by an adult (21 years or older) who is validly licensed and holds applicable permits, licenses or stamps for the use of WMA lands. Sight and voice contact must be maintained.

2.9 Notwithstanding any other provision of these regulations, the Department may permit special events on any day during the regular hunting season.

2.10 No person may release or attempt to release any animal onto Department-owned WMA lands without approval from the Department.

2.11 While hunting on Department-owned WMA's, no person may consume or be under the influence of intoxicants, including beer, wine, liquor or drugs.

2.12 On WMA lands, during the designated statewide youth deer hunt day, still hunting only, two deer, either-sex.

WEAPONS

3.1 On WMA lands hunters may use any shotgun, rifle, bow and arrow or hand gun except that specific weapons may be prohibited on certain hunts. Small game hunters may possess or use shotguns with shot no larger than No. 2 or .22 rimfire rifles/handguns or primitive muzzle-loading rifles of .40 caliber or smaller. Small game hunters may not possess or use buckshot, slugs or shot larger than No. 2. Blow guns, dart guns or drugged arrows are not permitted. Small game hunters using archery equipment must use small game tips on the arrows (judo points, bludgeon points, etc.). The use of crossbows during any archery only season is unlawful except as allowed by 50-11-565 (see page 30).

3.2 For Special Primitive Weapons Seasons, primitive weapons include bow and arrow and muzzle-loading shotguns (20 gauge or larger) and rifles (.36 caliber or larger) with open or peep sights or scopes, which use black powder or a black powder substitute that does not contain nitrocellulose or nitro-glycerin components as the propellant charge; ignition at the breech must be by the old type percussion cap which fits on a nipple or by flintstone striking frizzen or a "disk" type ignition system. The use of in-line muzzleloaders and muzzleloaders utilizing a shotgun primer including "disk" type ignition systems is permitted. During primitive weapons season, no revolving rifles are permitted. Crossbows may be used on WMA and private lands only during firearms and muzzleloader seasons for deer and bear. Use of crossbows during archery only seasons for deer requires special exemption (see page 30 Crossbows).

3.3 On WMA lands, big game hunters are not allowed to use military or hard-jacketed bullets or .22 or smaller rimfire. Buckshot is prohibited during still hunts for deer or hogs on the Santee Coastal Reserve, Bucksport, Pee Dee Station Site, Lewis Ocean Bay, Great Pee Dee, Crackerneck, Webb Center, Marsh Furniture, Manchester State Forest, Palachucola, Waccamaw River Heritage Preserve, Donnelley, Francis Marion, Moultrie, Edisto River, Bonneau Ferry and McBee WMA lands.

3.4 On DNR-owned WMA's during periods when hunting is permitted, all firearms transported in vehicles must be unloaded. On the Francis Marion Hunt Unit during deer hunts with dogs, loaded shotguns may be transported in vehicles. Any shotgun, centerfire rifle or rimfire rifle or pistol with a shell in the chamber or magazine or muzzleloader with a cap on the nipple or flintlock with powder in the flash pan is considered loaded.

3.5 No target practice is permitted on Department-owned WMA lands except in specifically designated areas.

3.6 On WMA lands during still gun hunts for deer or hogs there shall be no hunting or shooting from, on or across any road open to vehicle traffic. During any deer or hog hunt there shall be no shooting from, on or across any railroad right-of-way or designated recreational trail on U.S Forest Service or S.C. Public Service Authority property.

DEER

NOTE: *The regulations for hunting deer on private lands in Game Zones 1, 2, & 4 are contained on page 35 of the Brochure.*

4.1 On WMA lands with designated check stations, all deer bagged must be checked at a check station. Deer bagged too late for reporting one day must be reported the following day. Unless otherwise specified by the department, only bucks (male deer) may be taken on all WMA lands. Male deer must have antlers visible two (2) inches above the hairline to be legally bagged on "bucks only" hunts. Male deer with visible antlers of less than two (2) inches above the hairline must be taken only on either-sex days or pursuant to permits issued by the department. A point is any projection at least one inch long and longer than wide at some location at least one inch from the tip of the projection. Antler spread is the greatest outside measurement (main beam or points) on a plane perpendicular to the skull. On WMA lands, man drives for deer are permitted between 10:

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00 a.m. and 2:00 p.m. only, except that no man drives may be conducted on days designated by the department for taking deer of either sex. On WMA lands, drivers participating in man drives are prohibited from carrying or using weapons. On WMA lands, in Game Zones 1, 2 and 4, man drives will be permitted on the last four (4) scheduled either-sex days. A man drive is defined as an organized hunting technique involving two (2) or more individuals whereby an attempt is made to drive game animals from cover or habitat for the purpose of shooting, killing, or moving such animals toward other hunters.

4.2 Deer either-sex days for gun hunts are as follows (*See Game Zone sections beginning on page 40 for specific dates)*:

•Game Zone 1: The first two sets of Fridays and Saturdays in November.

•Game Zones 2 - 11: (except Dillon, Horry and Marlboro counties) Saturday after October 3; every Friday and/or Saturday from October 11 to Thanksgiving day inclusive; Saturdays in December beginning 23 days after Thanksgiving day; and the last day of the open season.

•Dillon, Horry and Marlboro counties: Saturday after October 3; beginning October 11, the next 2 Fridays and Saturdays, inclusive, and the Friday and Saturday before Thanksgiving.

DOGS

5.1 On all WMA lands, dogs may be used for small game hunting unless otherwise specified.

5.2 On all WMA lands in Game Zones 1, 2 and 4, dogs may not be used for rabbit hunting during still gun hunts for deer. Dogs may be used from the close of the gun season for deer until the close of the rabbit season. Dogs may be trained for rabbit hunting from September 1 through September 30 (no guns).

5.3 On WMA lands, dogs may be used for hunting foxes, coyotes, raccoons, bobcats or opossums only between thirty (30) minutes after official sunset and 30 minutes before official sunrise.

5.4 The Department may permit deer hunting with dogs on WMA areas not located in Game Zones 1, 2, and 4. For the purposes of tracking a wounded deer, a hunter may use one dog which is kept on a leash.

5.5 Dogs may be used to hunt bear on WMA lands in Game Zone 1 during the special bear season.

VEHICLES

All terrain vehicles (ATV's) are not allowed on any heritage preserve.

6.1 On all WMA lands, no hunter may shoot from a vehicle except that paraplegics and single or double amputees of the legs may take game from any stationary motor driven land conveyance or trailer which is operated in compliance with these rules. For purposes of this regulation, paraplegic means an individual afflicted with paralysis in the lower half of the body with involvement of both legs, usually due to disease of or injury to the spinal cord.

6.2 On Department-owned WMA lands, motor driven land conveyances must be operated only on designated roads or trails. Designated roads and trails on Forest Service lands are those designated with either a name and/or numbered sign. On Forest Service land ATV's can be used only on designated ATV or motorcycle trails. Unless otherwise specified, roads or trails which are closed by barricades and/or signs, either permanently or temporarily, are off limits to motor-driven land conveyances. Enhanced Hunter Access: In Central and Western Piedmont only hunters will be allowed to use "All Terrain Vehicles" (ATVs) behind gates on certain designated roads closed to regular vehicular traffic from September 15, 2005 through March 1, 2006 ONLY. Roads for this use will be indicated by a stenciled statement "ATV hunting Access Permitted - Primary Roads Only" on the cross piece of the gate. Hunters using ATVs are cautioned not to leave designated primary roads and to avoid damage to trees and highly erodible areas. Hunters are also encouraged to help clean up litter along these roads.

6.3 It is unlawful to obstruct travel routes on Department-owned WMA lands.

VISIBLE COLOR CLOTHING

7.1 On all WMA lands during any gun and muzzleloader hunting seasons for deer, bear and hogs, all hunters must wear either a hat, coat, or vest of solid visible international orange, except hunters for dove, turkey and duck are exempt from this requirement while hunting for those species.

CAMPING

8.1 Camping is not permitted on DNR-owned WMA lands except in designated camp sites.

TRAPPING

9.1 Trapping on WMA lands is not permitted.

WATERFOWL & DOVE REGULATIONS

Dates, times, locations and regulations for hunts on designated Dove Management Areas (public dove fields) are printed annually. The Public Dove Field List is available August 2 by calling 803-734-3886. Specific seasons, limits and regulations for waterfowl hunting are printed annually in the SC Migratory Bird Regulations available September 10th.

10.1 Unless specially designated by the Department as a Wildlife Management Area for Waterfowl or a Wildlife Management Area for Dove, all Wildlife Management Areas are open during the regular season for hunting and taking of migratory birds except where restricted to special small game seasons within the regular migratory bird framework.

10.2 The Department may designate sections of Wildlife Management Areas and other lands and waters under the control of the Department as Designated Waterfowl Management Areas or Designated Dove Management Areas. All laws and regulations governing Wildlife Management Areas apply to these special areas. In addition, the Department may set special shooting hours, bag limits, and methods of hunting and taking waterfowl and doves on those areas. All State and Federal migratory bird laws and regulations apply. Regulations pertaining to the use of Dove Management Areas will be filed annually.

10.3 On areas where blinds are not provided, only temporary blinds of native vegetation may be constructed, and once vacated become available for others.

10.4 On Designated Waterfowl Areas, no species other than waterfowl may be taken during waterfowl hunts. On Designated Dove Management Areas no species other than doves may be taken during dove hunts. On dove hunting is allowed at Lake Wallace WMA.

10.5 No fishing is permitted in any Category 1 Designated Waterfowl Management Area during scheduled waterfowl hunts.

10.6 The Clarks Hill Waterfowl area is closed to hunting except for waterfowl hunting and other special hunts as designated by the SCDNR.

10.7 Santee Cooper WMA is closed to public access from October 20 until March 1, except for special hunts designated by the SCDNR.

10.8 Sandy Beach Waterfowl Area and impoundments on Bonneau Ferry WMA are closed to public access during the period 01 Nov.-01 Mar. except for special hunts designated by the Department.

10.9 Broad River Waterfowl Management Area is closed to hunting access during the period 01 Nov.-01 Feb. except for special hunts designated by the Department.

10.10 Impoundments on Bear Island, Donnelly, Samworth, Santee Coastal Reserve and Santee Delta WMAs are closed to all public access during the period 15 Oct.-31 Jan. except during special hunts designated by the Department. All public access during the period 01 Feb.-14 Oct. is limited to designated areas.

10.11 Potato Creek Hatchery Waterfowl Area is closed to all access one week prior to opening of waterfowl season through January 31, except for scheduled waterfowl hunts. No fishing one week prior to opening of waterfowl season through January 31. All hunters must enter and leave the Potato Creek Hatchery Waterfowl Area through the designated public landing on secondary road 260 and complete a data card and deposit card in receptacle prior to leaving the area. Hunting hour are from 30 minutes before legal sunrise to legal sunset (including the special youth hunt). Hunters may not enter the area prior to 3:00 a.m. on hunt days. Each hunter is limited to twenty-five nontoxic shot shells (steel, bismuth/tin, bismuth, tungsten-polymer, tungsten-iron) per hunt and no buck allowed. No airboats are allowed for hunting or fishing and no hunting from secondary road 260.

10.12 Hunters may not enter Hatchery WMA prior to 3 AM and must leave the area by 1 PM. Each hunter is limited to twenty-five nontoxic shot

shells (steel, bismuth/tin, bismuth, tungsten-polymer, tungsten-iron) per hunt and no buckshot allowed. Hunters must enter and leave Hatchery WMA through the Hatchery Landing and accurately complete a data card and deposit card in receptable prior to leaving the area. No airboats are allowed in the Hatchery WMA for hunting or fishing during the period Nov. 15-Jan. 31. No fishing is allowed during scheduled waterfowl hunts.

10.14 The Francis Marion National Forest, Crackerneck WMA, Palachucola, Tillman Sand Ridge WMA and Webb Wildlife Center are open during special small game seasons within the regular migratory bird seasons; Fant's Grove WMA is open AM only on Wednesdays and Saturdays during the regular migratory bird seasons.

10.15 Category I Designated Waterfowl Areas include Beaverdam, Bonneau Ferry, Broad River, Clemson, Santee Cooper, Sandy Beach, Samworth, Santee Coastal Reserve, Santee-Delta, Tibwin, Bear Island, and Donnelley Wildlife Management Areas. Hunting in Category I Designated Waterfowl Areas is by special permit obtained through annual computer drawing.

10.16 Category II Designated Waterfowl Areas include Biedler Impoundment, Lake Cunningham, Russell Creek, Monticello Reservoir, Parr Reservoir, Duncan Creek, Dunaway, Dungannon, Enoree River, Moultrie, Hatchery, Hickory Top, Hickory Top Greentree Reservoir, Lancaster Reservoir, Turtle Island, Little Pee Dee River Complex (including Ervin Dargan, Horace Tilghman), Great Pee Dee River, Oak Lea, Potato Creek Hatchery, Samson Island Unit (Bear Island), Tyger River, Marsh and Wee Tee Waterfowl Management Areas. Hunting on Category II Designated Waterfowl Areas is in accordance with scheduled dates and times.

DESIGNATED WATERFOWL AREAS

Area	Open dates inclusive	Bag Limits
Biedler Impoundment (Sumter Co.)	Sat. AM only during regular season.	Federal Limits
Bear Island (Colleton Co.)	Hunters selected by drawing during regular season.	Federal Limits
Beaverdam (Anderson Co.)	Hunters Selected by drawing during regular season.	Federal Limits
Bonneau Ferry (Berkeley Co.)	Hunters selected by drawing.	Federal Limits
Broad River (Fairfield Co.)	Hunters selected by drawing.	Federal Limits
Donnelley (Colleton Co.)	Hunters selected by drawing.	Federal Limits
Dunaway (Union Co.)	Sat. AM only during regular season.	Federal Limits
Duncan Creek (Laurens Co.)	Sat. AM only during regular season.	Federal Limits
Dungannon (Charleston Co.)	Wed. AM only during regular season.	Federal Limits
Enoree River (Newberry Co.)	Sat. AM only during regular season.	Federal Limits
Clemson (Anderson Co.)	Hunters selected by drawing.	Federal Limits
Hatchery (Berkeley Co.)	Sat. AM only and until sunset on the last Sat. of the regular waterfowl season.	Federal Limits
Hickory Top (Clarendon Co.)	Federal waterfowl seasons.	Federal Limits
Hickory Top Greentree Reservoir (Clarendon Co.)	Sat. AM 'til 11:00am only during regular season.	Federal Limits
Lake Cunningham (Greenville Co)	Wed. AM only during during the regular season.	Federal Limits
Lancaster Reservoir	Mon. & Fri. AM only during the regular season.	Federal Limits
Marsh (Marion Co)	Wed. and Sat. AM only during the regular season.	Federal Limits
Monticello Reservoir (Fairfield Co.)	Wed. and Sat. AM only during the regular season.	Federal Limits
Moultrie (Berkeley Co.)	Mon. through Sat. during regular season.	Federal Limits
Oak Lea WMA (Clarendon Co.)	Wed. AM only during regular season after Jan. 1.	Federal Limits
Parr Reservoir (Fairfield/Newberry Co.)	Mon. through Sat. during the regular season.	Federal Limits
Potato Creek Hatchery (Clarendon Co.)	Wed. and Sat. only during regular season.	Federal Limits
Russell Creek (McCormick Co.)	Wed. and Sat. AM only during the regular season.	Federal Limits
Samson Island Unit (Bear Island) (Colleton Co.)	Thurs. and Sat. am only during the regular season.	Federal Limits
Samworth (Georgetown Co.)	Hunters selected by drawing	Federal Limits
Sandy Beach (Berkeley Co.)	Hunters selected by drawing.	Federal Limits
Santee Coastal Res. (Charleston/Georgetown Co.'s)	Hunters selected by drawing.	Federal Limits
Santee Cooper (Orangeburg Co.)	Hunters selected by drawing.	Federal Limits
Santee-Delta (Georgetown Co.)	Hunters selected by drawing	Federal Limits
Tibwin	Special hunts by drawing.	Federal Limits
Turtle Island (Jasper Co.)	Wed. and Sat. AM only during the regular season.	Federal Limits
Tyger River (Union Co.)	Sat. AM only during regular season.	Federal Limits
Great Pee Dee (Darlington Co.)	Wednesdays during federal waterfowl season. From legal shooting hours until 12:00 noon.	Federal Limits
Little Pee Dee River Complex	Wednesdays during Federal waterfowl season. From legal shooting hours until 12:00 noon.	Federal Limits
Wee Tee	Wed. and Sat. AM only during the regular season.	Federal Limits

10.17 On Hickory Top WMA public waterfowl hunting without a Wildlife Management Area(WMA) permit is allowed on all land and water below 76.8'. Waterfowl hunting at or above elevation 76.8' requires a WMA permit. A WMA permit is required for waterfowl hunting in Hickory Top Greentree Reservoir

10.18 Designated Dove Management Areas include all dove management areas as published by the Department in the annual listing of WMA public dove fields and are subject to regulations filed annually.

10.19 Hickory Top Greentree Reservoir is closed to all public access November 1 until March 1, except for special hunts designated by SCDNR. All hunters must accurately complete a data card and deposit card in receptacle prior to leaving the area. Hunting hours are from 30 minutes before legal sunrise until 11:00 am. Hunters may not enter the area prior to 5:00 am on hunt days. Each hunter is limited to 25 non-toxic shot shells per hunt and no buck shot is allowed. No hunting from roads or the dike system. Only electric motors on boats are allowed.

10.20 On Enoree River Waterfowl Area each hunter is limited to 25

non-toxic shot shells per hunt and no buckshot is allowed.

AMPHIBIANS AND REPTILES

11.1 Taking of any amphibian or reptile, except the bullfrog, is prohibited on any Department-owned Wildlife Management Areas without written permission of the Department.

123-52.DEER HUNTING ON PRIVATE LANDS IN GAME ZONES 1, 2 AND 4 (50-11-310, 50-11-350, 50-11-390).

1. Seasons as filed and listed in this brochure.
2. Hunters may use any shotgun, rifle, bow and arrow or hand gun except that specific weapons may be prohibited on certain hunts.
3. For Special Primitive Weapons Seasons, primitive weapons include bow and arrow and muzzle-loading shotguns (20 gauge or larger) and rifles (.36 caliber or larger) with open or peep sights or scopes, which use black powder or a black powder substitute that does not contain nitro-cellulose or nitro-glycerin components as the propellant charge; ignition at the breech must be by the old type percussion cap which fits on a nipple or by flintstone striking frizzen or a "disk" type ignition system. The use of in-line muzzleloaders and muzzleloaders utilizing a shotgun primer including "disk" type ignition systems is permitted. During primitive weapons season, no revolving rifles are permitted.
4. Hunters are not allowed to take deer with military or hard-jacketed bullets or .22 or smaller rimfire.
5. It is unlawful to hunt deer with dogs in Game Zones 1, 2 and 4.
6. On all private lands(in Game Zones 1,2,&4), baiting or hunting over a baited area is prohibited. As used in this section, "bait" or baiting" means the placing, depositing, exposing, distributing, or scattering of shelled, shucked, or unshucked corn, wheat, or other grain or other food stuffs to constitute an attraction, lure, or enticement to, on, or over any area. "Baited area" means an area where bait is directly or indirectly placed, deposited, exposed, distributed, or scattered and the area remains a baited area for ten (10) days following the complete removal of all bait.

123-53. BEAR HUNTING RULES AND SEASONS (50-11-430)

1. The open season for taking bears by still hunting in Game Zone 1 is Monday through Saturday the 3rd week in October. 1 bear, no bears 100 lbs. or less, no sow with cubs at her side.
2. The open season for taking bears with the aid of dogs by a party permitted by the Department in Game Zone 1 is Monday through Saturday the 4th week in October. 3 bears per party, no bears 100 lbs. or less, no sow with cubs at her side. Maximum party size is 25. Groups hunting together are considered 1 party.
3. All parties must register with SCDNR, 153 Hopewell Road, Pendleton, SC 29670 by September 15. All harvested bear must be reported tothe Clemson Wildlife Office @ 864-654-1671 ext. 19 within 24 hours of harvest.

The Heritage Trust Program: Heritage Preserves

The Heritage Trust Program

The Heritage Trust Program is part of the Habitat Protection Section of the SCDNR's Land, Water and Conservation Division. The Heritage Trust Program has acquired and manages 69 Heritage Preserves encompassing 81,294 acres statewide. Heritage Preserves protect cultural resources such as archaeological and historic sites, plus threatened species and ecosystems. Public recreation -- including boating, hiking, nature observation, photography, hunting or fishing -- is allowed on many preserves.

Twenty-four preserves (52,032 acres: 64% of the total acreage in the Heritage Trust Program) are also Wildlife Management Areas and are therefore open to public hunting in accordance with certain guidelines. The remaining preserves are not hunted because of their small acreage, public safety factors, or other legal, security, or biological factors.

Many roads are gated and open only for management or law enforcement purposes because Heritage Preserves contain unique, sensitive, and rare elements vulnerable to vehicular and inordinate foot traffic, and because the Heritage Trust Act emphasizes "on-foot" access. All terrain vehicles are prohibited on all Heritage Preserves. Bag limits and season lengths on Heritage Preserves are set with the aim of restoring or maintaining ecological integrity, which consists of natural processes (such as human predation), natural structure, and native species composition. Hunting, besides being an important cultural and recreational activity, is an important management tool on and near certain heritage preserves. The Heritage Trust Program has followed the lead of several other WMAs and prohibited hunting of fox squirrels.

Cultural resources are strictly protected on heritage preserves. All projectile points (e.g. arrowheads) are protected. It is illegal to take or otherwise disturb any cultural resource or to possess a metal detector on any Heritage Preserve.

All snakes (including venomous snakes) and other reptiles and amphibians, as well as any non-game plant or animal, are protected on all Heritage Preserves. It is illegal to harm or harass any of these animals or disturb plants.

SCDNR Heritage Preserve Regulations

1. Visitation and use of Heritage Preserves are governed by regulations to promote public enjoyment of the land while preserving the features that make them special.
2. Heritage preserves are open for public use from one hour before sunrise to one hour after sunset unless otherwise posted or publicized. Exceptions may occur for a special hunting season or field trip, in designated camping areas, or for approved research or other project.
3. Parking is allowed only for preserve visitors and only in designated areas (which may be parking lots and/or roadsides, depending on the preserve). Any other parking is prohibited. No vehicle shall block any road, regardless of whether the road is gated.
4. Collection, removal, or possession of, or damaging or destroying any nongame animal, plant, rock, fossil, artifact, or ecofact, or the possession of a metal detector on a Heritage Preserve are all prohibited without written permission from the SCDNR.
5. No person shall abuse, damage, deface or destroy land, structures, signs, or improvements on a Heritage Preserve.
6. There shall be no placement of trash, debris, rubbish, waste, or chemicals on preserves.
7. The consumption or display of any alcoholic beverage while operating or riding as a passenger in any vehicle and public drunkenness are not allowed. Alcoholic beverages may only be consumed by a person of lawful age only while camping at a designated campsite.
8. Camping and fires are not permitted unless areas have been designated or special written permission from SCDNR has been granted.
9. All terrain vehicles (ATVs) are prohibited on all Heritage Preserves.
10. Motorized vehicles are allowed only on designated roadways. Bicycles, horses, and other conveyances are allowed only on designated trails of specified preserves.
11. Hunting is allowed only on designated preserves and only in accordance with Wildlife Management Area regulations.
12. Firearms are not allowed, except on heritage preserves designated as Wildlife Management Areas and then only in accordance with Wildlife Management Area regulations, or as otherwise provided by state law. Target and other practice shooting are prohibited.
13. No plants, animals, or other organisms may be introduced on property.
14. All or part of a Heritage Preserve may be closed to the public to protect a species, or natural, cultural, historical, or archaeological features.
15. Violators will be prosecuted.

Wildlife Management Areas

WMA Program

Through the cooperative effort of private landowners, the U.S. Forest Service and the SCDNR, Wildlife Management Areas (WMAs) are provided for the enjoyment of all wildlife enthusiasts. Funds generated from the sale of WMA permits enables DNR to lease approximately 1.2 million acres of land for wildlife conservation and management.

Heritage Preserves are properties acquired by SCDNR for the primary purpose of protecting habitat for rare and endangered species. Some Heritage Preserves offer game hunting opportunities, and, therefore, are included in the WMA Program.

All persons using WMA lands are reminded that only U.S. Forest Service lands and those areas marked by WMA signs are open to the public. Lands not posted with these signs are the property of private individuals, and landowner permission must be obtained.

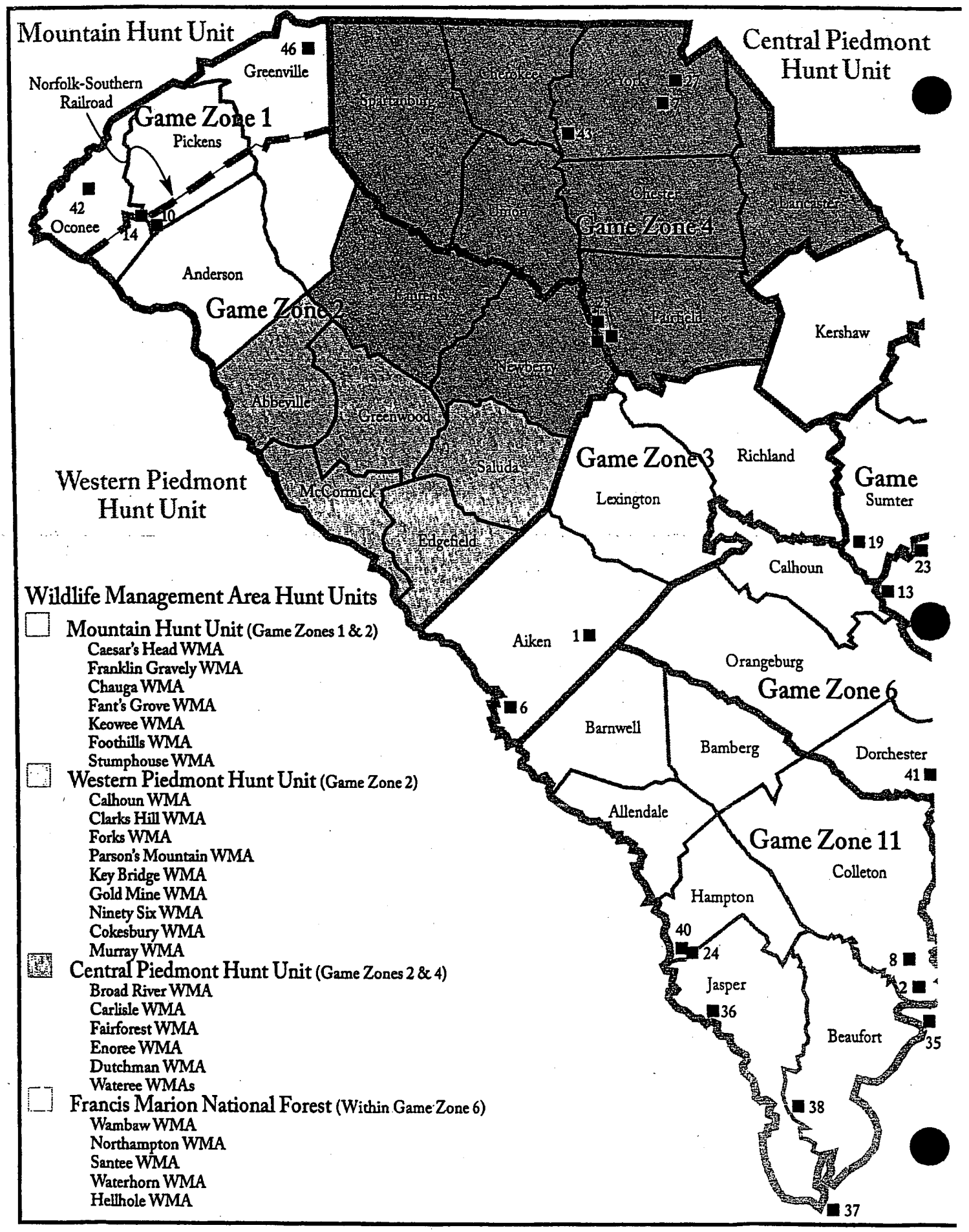
General locations of the areas described below are shown on the map on pages 38 and 39. For detailed maps showing these and other WMA lands write WMA MAPS, SCDNR, P.O. Box 167, Columbia, SC, 29202 or call 803-734-3886.

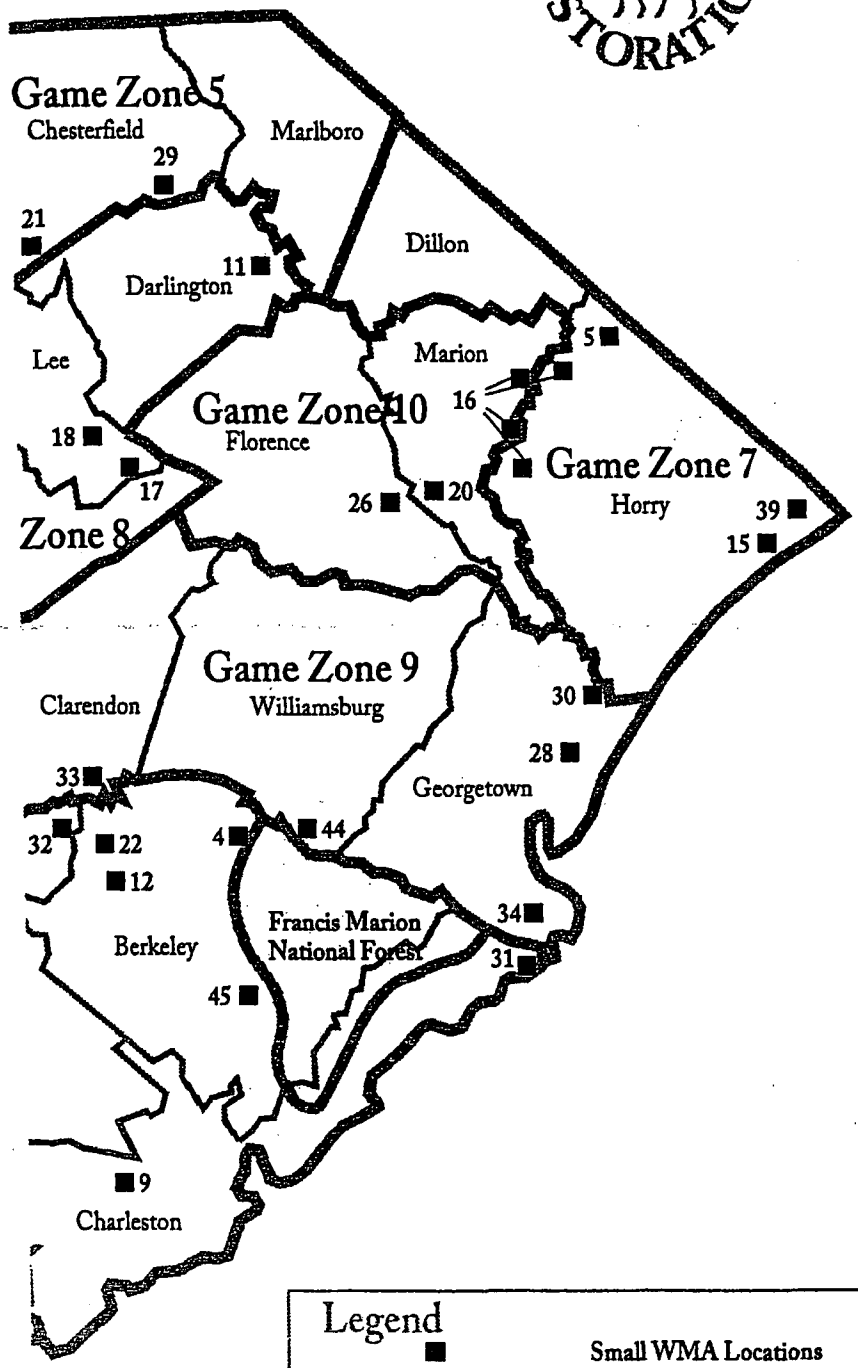
Wildlife Management Area Properties

WMA properties should be marked with these yellow and black signs.

*Open dates for each season are listed in the Hunt Seasons section beginning on page 40 of this book. Note: * indicates SCDNR Property.*

Wildlife Management Area	Acreage	County	Telephone	Deer	Hogs	Bear	Turkey	Dove	Waterfowl	Quail	Squirrel	Rabbit	Raccoon	Fox
				Hunting Opportunities Available										
Bear Island*	12,021	Colleton	843-844-8957	x	x			x	x	x	x	x	x	
Bonneau Ferry*	10,700	Berkeley	843-825-3387	x	x		x		x	x	x	x	x	
Canal	2,491	Berkeley	843-825-3387					x		x				
Cartwheel Bay Heritage Preserve*	568	Horry	843-546-9489	x			x			x		x	x	
Central Piedmont Hunt Unit	183,706	Cherokee, Chester, Fairfield, Lancaster, Laurens, Newberry, Spartanburg, Union, York	803-734-3886	x			x	x	x	x	x	x	x	x
Crackerneck	10,470	Aiken	803-725-3663	x	x		x	x	x	x	x	x	x	
Donnelley*	8,048	Colleton	843-844-8957	x	x		x	x	x	x	x	x	x	
Draper*, McConnells*, Ross*	1,360	York	843-661-4768	x			x	x		x	x	x	x	x
Dungannon Heritage Preserve*	643	Charleston	843-844-8957	x					x					
Edisto River*	1,375	Dorchester	843-844-8957	x	x		x	x	x	x	x	x	x	
Francis Marion National Forest	250,000	Berkeley, Charleston	843-825-3387	x	x		x	x	x	x	x	x	x	
Great Pee Dee Heritage Preserve*	2,725	Darlington	843-661-4768	x	x		x		x		x		x	
Hatchery	2,400	Berkeley	843-825-3387	x					x					
Hickory Top	1,105	Clarendon	843-825-3387	x			x	x	x	x	x	x	x	x
Lewis Ocean Bay Heritage Preserve*	9,393	Horry	843-546-9489	x			x			x	x	x	x	x
Little Pee Dee Heritage Preserve* Complex	10,226	Horry, Marion	843-546-9489	x	x		x		x	x	x	x	x	x
Longleaf Pine Heritage Preserve*	843	Lee	843-661-4768	x						x	x	x		
Lynchburg Savannah Heritage Preserve*	291	Lee	843-661-4768							x		x		
Manchester State Forest	23,135	Sumter	803-734-3609	x	x		x	x	x	x	x	x	x	x
Marsh Furniture	8,231	Marion	843-661-4768	x	x		x		x	x	x	x	x	x
McBee*, Angelus*, Crossroads*	1,194	Chesterfield	843-661-4768	x			x	x		x	x	x	x	x
Moultrie	9,480	Berkeley	843-825-3387	x			x	x	x	x	x	x	x	x
Mountain Hunt Unit	167,472	Anderson, Greenville, Oconee, Pickens	864-654-1671	x	x	x	x	x	x	x	x	x	x	x
Oak Lea WMA	2,000	Clarendon	843-825-3387	x			x	x	x		x	x	x	x
Palachucola	6,757	Hampton, Jasper	803-625-3569	x	x		x	x	x		x	x	x	x
Parr Hydroelectric Project	4,400	Fairfield, Newberry	843-661-4768	x					x			x	x	
Pee Dee Station Site	2,701	Florence	843-661-4768	x			x			x	x	x	x	x
Rock Hill Blackjacks Heritage Preserve*	291	York	843-661-4768	x										
Samworth*	1,588	Georgetown	843-546-9489	x	x			x	x					
Sand Hills State Forest	46,000	Chesterfield, Darlington	843-661-4768	x			x	x	x	x	x	x	x	x
Sandy Island	9,165	Georgetown	843-546-9489	x	x									
Santee Coastal*	24,000	Charleston, Georgetown	843-546-8665	x	x		x		x	x	x	x	x	
Santee Cooper	3,144	Orangeburg	843-825-3387	x			x	x	x	x	x	x	x	x
Santee Dam	575	Clarendon	803-825-3387	x	x		x	x		x	x	x	x	x
Santee-Delta*	1,722	Georgetown	843-546-9489	x	x				x					
St. Helena Sound Heritage Preserve*	10,302	Beaufort	843-844-8957	x					x					
Tillman Sand Ridge Heritage Preserve*	1,422	Jasper	803-625-3569	x	x		x	x	x	x	x	x	x	x
Turtle Island*	1,700	Jasper	803-625-3569						x					
Victoria Bluff Heritage Preserve*	1,111	Beaufort	803-625-3569	x			x	x	x	x	x	x	x	x
Waccamaw River Heritage Preserve*	5,347	Horry	843-546-9489	x			x	x	x		x		x	
Webb*	5,866	Hampton	803-625-3569	x	x		x	x	x	x	x	x	x	x
Wee Tee	12,439	Williamsburg, Georgetown	843-825-3387	x			x				x		x	x
Western Piedmont Hunt Unit	146,561	Abbeville, Edgefield, Greenwood, McCormick, Saluda	864-223-2731	x			x	x	x	x	x	x	x	x
Worth Mountain	1,643	York	843-661-4768	x			x	x		x	x	x	x	x


Mountain Hunt Unit
Central Piedmont Hunt Unit
Western Piedmont Hunt Unit
Norfolk-Southern Railroad
Game Zone 1
Game Zone 2
Game Zone 3
Game Zone 4
Game Zone 6
Game Zone 11
Greenville
Pickens
Oconee
Anderson
Spartanburg
Cherokee
York
Chester
Lancaster
Union
Laurens
Fairfield
Kershaw
Newberry
Abbeville
Greenwood
Saluda
McCormick
Edgefield
Lexington
Richland
Sumter
Calhoun
Aiken
Orangeburg
Barnwell
Bamberg
Dorchester
Allendale
Colleton
Hampton
Jasper
Beaufort
46
42
10
14
27
7
43
19
23
13
1
6
41
40
24
8
2
36
35
38
37
Wildlife Management Area Hunt Units
Mountain Hunt Unit (Game Zones 1 & 2)
Caesar's Head WMA
Franklin Gravely WMA
Chauga WMA
Fant's Grove WMA
Keowee WMA
Foothills WMA
Stumphouse WMA
Western Piedmont Hunt Unit (Game Zone 2)
Calhoun WMA
Clarks Hill WMA
Forks WMA
Parson's Mountain WMA
Key Bridge WMA
Gold Mine WMA
Ninety Six WMA
Cokesbury WMA
Murray WMA
Central Piedmont Hunt Unit (Game Zones 2 & 4)
Broad River WMA
Carlisle WMA
Fairforest WMA
Enoree WMA
Dutchman WMA
Wateree WMAs
Francis Marion National Forest (Within Game Zone 6)
Wambaw WMA
Northampton WMA
Santee WMA
Waterhorn WMA
Hellhole WMA



Wildlife Management Areas

1) Aiken Gopher Tortoise HP WMA
2) Bear Island WMA
4) Canal WMA
5) Cartwheel Bay HP WMA
6) Crackerneck WMA
7) Draper WMA
8) Donnelley WMA
9) Dungannon HP WMA
10) Fant's Grove WMA
11) Great Pee Dee HP WMA
12) Hatchery WMA
13) Hickory Top WMA
14) Keowee WMA
15) Lewis Ocean Bay HP WMA
16) Little Pee Dee River HP Complex including: Little Pee Dee River HP, Tilghman HP, Dargan HP, Ward HP, Upper Gunter's Island and Huggins Tract
17) Longleaf Pine HP WMA
18) Lynchburg Savannah HP-WMA
19) Manchester State Forest WMA
20) Marsh Furniture WMA
21) McBee WMA
22) Moultrie WMA including: Bluefield and Greenfield WMAs, Hall and Porcher WMAs, & North Dike WMA
23) Oak Lea WMA
24) Palachucola WMA
25) Parr Hydroelectric Project including: Broad River WMA, Parr Reservoir WMA, Monticello Reservoir WMA
26) Pee Dee Station Site WMA
27) Rock Hill Blackjacks HP WMA
28) Samworth WMA
29) Sand Hills State Forest WMA
30) Sandy Island WMA
31) Santee Coastal Reserve WMA
32) Santee Cooper WMA
33) Santee Dam WMA
34) Santee-Delta WMA
35) St. Helena Sound HP WMA: Otter, Ashe, Beet, Warren, Big & South Williman Is.
36) Tillman Sand Ridge HP WMA
37) Turtle Island WMA
38) Victoria Bluff HP WMA
39) Waccamaw River HP WMA
40) Webb WMA
41) Edisto River WMA
42) Stumphouse WMA
43) Worth Mountain WMA
44) Wee Tee
45) Bonneau Ferry
46) Glassy Mountain Archery Only Area

Legend

Small WMA Locations

Game Zone Boundaries

Hunt Unit Boundaries

WMA properties should be marked with these yellow and black signs.

A chart showing the acreage, county of location, telephone contact number, and hunting opportunities available for certain species is located on page 36.

A vast amount of WMA lands are located in the Mountain, Central and Western Piedmont Hunt Units. The areas on this map show the approximate locations for the major Wildlife Management Areas in South Carolina. For detailed maps showing all WMAs contact your local DNR Wildlife Management Office (see page 58) or write: WMA MAPS, P.O. Box 167, Columbia, SC, 29202 (803)734-3886. Request by county of interest.

Sec 4.1 Ref 6

SOUTH CAROLINA ELECTRIC & GAS COMPANY

COLUMBIA, SC

TRANSMISSION LINE AND SUBSTATION SITING PROCESSES:

A DISCUSSION OF THE SCOPE OF WORK ASSOCIATED WITH EACH STEP IN THE PROCESSES

January 2000

1.0 SCE&G LINE SITING PROCESS

SITING PHASE I: Alternate Route Development

Step 1 Project Scoping / Team Member Responsibility Assignments

Held at a location agreed to by SCE&G, this meeting will include the Contractor project manager and key Contractor team members. It will be beneficial and productive to have all key project personnel for SCE&G available at this meeting. The goals of the meeting will be:

- Introduce Contractor team members to SCE&G's contact personnel;
- Discuss and refine siting process and schedule milestones for the project;
- Address significant project issues (if known) and discuss approaches;
- Clarify and agree on data and information to be provided by SCE&G; and,
- Define key communication channels among the Contractor team members and SCE&G's contacts.

Step 2 Substation Site Selection

On projects requiring the siting and acquisition of substation sites, SCE&G's comprehensive substation siting process will be fully executed at this stage in Siting Phase I. The continuation Siting Phase I will be suspended until a site for the substation has been placed under an option to purchase.

Step 3 Delineation of Routing Study Area

During the scoping meeting, the project ***study area*** will be delineated. Generally, the boundary of the study area is set broadly enough to include all practical routing opportunities. For example, a compelling case could be made that routing a line beyond the study area would lead to a clear increase in overall impacts due to increased length. In some cases, geographic features or political boundaries (where there are obvious restrictions to routing) can serve to define study area boundaries that are easily defensible.

Step 4 Schedule Development

The Contractor will develop a schedule showing all activities that lead up to having the right-of-way purchased and ready for construction. The schedule will include all key siting steps, permitting/licensing activity, surveying, and real estate acquisition.

Step 5 Agency Notification / Initial Data Gathering

Federal, state and local agencies will be contacted by the Contractor to gain information about the study area. This agency contact will be to determine significant constraints and opportunities for siting this transmission line. Land use and zoning information will be obtained from the local planning agency. Current aerial photography and/or satellite imagery obtained at the inception of the siting study will be used during this phase.

Step 6 Regional, Environmental, Land Use and Community Data Collection and Entry

Data collection will be dictated by the character of the study area. Unless determined not to be needed, the following data layers will be compiled in a Geographic Information System to fully characterize factors in the study area that will influence siting decisions:

Land Cover: Depending on the study area, land cover will be developed from aerial photography or satellite imagery. These data will be classified to an appropriate level (woodland types, agricultural lands, grasslands, etc.) using Remote Sensing software augmented by field reconnaissance.

Land Use: Agencies (county planning, county engineering, economic development, etc.) will be solicited for information about present and future land uses in the study area that may affect siting decisions. A field study will be conducted during which existing land uses (subdivisions, churches, schools, commercial properties, federal properties, state properties, etc.) that might affect the routing of a transmission line will be noted. All of this information will be compiled with county tax parcel information throughout the study area. The Contractor will collect sufficient information to precisely determine classes and boundaries of ownership (private, federal, state, municipal, and other).

Roads and existing utilities will be mapped using Global Positioning System (GPS) technology. Railroad locations will be taken from aerial photography and United States Geological Survey (USGS) 7.5' Quadrangle Sheets. Appropriate buffers will be applied to the locations to indicate rights-of-way.

Radio towers will be located. If needed, the Contractor will check background radio levels and map areas of possible interference.

Occupied Building Locations: Using aerial photography for base mapping, building locations will be field verified and their locations mapped. These locations will be buffered at an appropriate level to indicate the building and surrounding property that would come under the building's influence.

Public Visibility: A combination of field reconnaissance and computer models will be used to predict those areas from which a line will be visible to the public. (This may be from public roads, key viewpoints, etc.) These data will be combined with other factors (distance to structures, vegetative screening conditions, landscape context, etc.) to establish visual impact values throughout the study area as a result of the proposed line.

Hydrography: The locations of waters of the US will be obtained from aerial photography, USGS 7.5' Quads, or USGS DLG's (digital line graphs). These data will be buffered to indicate areas of constraint to transmission line siting.

Wetlands: Wetlands will be entered from USFWS National Wetlands Inventory Maps if they are available. If they are not, wetland locations will be derived by the Contractor's environmental scientist from a combination of USGS 7.5' Quads, aerial photography interpretation, and field reconnaissance. These data will be classified, and buffered to indicate surrounding areas of constraint to transmission line siting.

Cultural Resources: State and local records will be researched and augmented by field reconnaissance to indicate areas of cultural significance. In particular, historic architectural resources will be identified. If areas of high potential exist, the Contractor will develop a model to predict areas most likely to contain significant archeological resources.

Natural Resources: State and federal protected species and significant natural community records will be researched and interpreted by the Contractor's staff biologist to delineate areas of constraint to line routing. Buffers and topological models will be applied as needed.

All data will be mapped to a level appropriate for the source and data type. GPS data will be corrected to five-meter accuracy. All data will be rectified to the same coordinate system, UTM, NAD27, used for the Siting Study allowing it to be integrated, if so desired.

Step 7 Community Workshops / Agency Comments / Analysis of Comments

The Contractor's project team, in close collaboration with the SCE&G project team, will organize and facilitate a community workshop. The Contractor will invite all property owners and residents within the project study area to the workshop by a direct mailing. The direct-mail invitation will include a map of the study area and a community survey that will allow public comments regarding the project to be mailed directly to the Contractor for a specified period of time ("Comment Period"). The community survey will be carefully designed to gain substantive information that should be considered while siting the line and to gain insight into community values and priorities. During the workshop, project need will be fully explained, the study area location will be communicated, and the siting approach will be discussed. Attendees will be encouraged to share information they deem relevant to the siting study.

The workshop will follow an informal format to give attendees an opportunity to arrive at their convenience, spend as little or as much time as they wish, and focus on specific areas that may interest them. For example, subject matter experts from the project team will be available at individual information stations to discuss EMF, project need, real estate acquisition, visual issues (including line structure and substation considerations), environmental issues, the siting process, etc. The team has a proven track record of working with the public to communicate and build consensus for controversial projects.

The key objectives of the workshop will be:

- To give the affected community an opportunity to participate in the planning process;
- To gather information that should be considered when developing, evaluating, and comparing alternative routes;
- To gain insight into community priorities;
- To identify issues that need on-going attention so that crisis management can be avoided later in the siting process; and,
- To instill a sense of confidence and trust in the siting process and SCE&G.

The structure of the meeting, i.e., decentralized presentations/discussions at subject matter information stations as individuals and small groups move from one information station to another, provides significant benefits. First, it is conducive to personalized communications with

project decision-makers who can "drill down" into issues or concerns raised and provide explanations tailored to individual expectations.

Second, this format minimizes the possibility that the concerns of one person will feed off similar concerns of another. And finally, it is an effective method of understanding and documenting public concerns, listening to ideas, and giving appropriate consideration to each.

Federal, state and local agencies and other organizations with an interest in the project will be contacted and invited to a VIP session just prior to the public community workshop. They will be provided a map showing the study area as well as an explanation of how the routes were identified. Their comments will be incorporated in the evaluation.

Following the close of the public Comment Period, the information received at the workshop and from the community surveys will be analyzed and a Public Involvement Report will be issued that fully describes all information received from the public that will be considered in the siting process.

Step 8 Analyze Data / Determine Areas of Constraint and Opportunity

After all the data have been collected and compiled in the GIS, each individual data factor will be assigned a "constraint weight" by the Contractor and SCE&G siting team, based on team experience, legislative guidelines, agency comments, community priorities (as communicated in the community surveys), and sensitivity to the planned action. The weighted data will be compiled in the GIS to display the overlaying cumulative effect of all the data. The product will be a single map of the study area, color-coded to display the areas with highest constraint to routing, the areas with lowest constraint, and the full range of conditions between the two extremes.

Step 9 Identify Alternate Routes

Using the constraint opportunity mapping developed during Step 6, and working with SCE&G transmission line engineers, the Contractor's team will identify all practical transmission line route corridors. Once identified, each alternate route corridor will be closely field checked to confirm that no factors have been overlooked that could influence the viability of the route.

SITING PHASE II: Alternate Route Evaluation and Comparison

Step 1 Community Workshops / Agency Comments

The Contractor's project team, in close collaboration with SCE&G, will organize and facilitate a second community workshop. Again, all property owners and residents within the project study area will be invited by a direct mailing. This invitation will include a map showing the alternate route corridors developed during Phase I. During this workshop, the alternative routes will be displayed and how they were developed will be discussed at the siting workstation. As in the first workshop, the 2nd one will include workstations that will address project need, EMF, real estate considerations, construction and environmental concerns, and visual issues. Attendees will again be encouraged to share information they deem relevant to the siting study and any of the alternate routes.

As before, the workshop will follow an informal format to give attendees an opportunity to arrive at their convenience, spend as little or as much time as they wish, and focus on specific areas that may interest them.

The key objectives of this workshop are the same as the first. Allow the public a chance to participate in the process, instill confidence in SCE&G and their decisions, gather information relevant to the routing of the line, and identify issues that may affect the project.

Step 2 Field Review of Alternate Routes and Adjustments (if needed)

If comments are received during the community meeting about factors that were overlooked that might affect a route's viability, the Contractor's siting team will follow up and determine their validity. If needed, minor alignment adjustments will be made during this step.

Step 3 Develop Alternate Route Evaluation Criteria

Using data gathered during Siting Phase I, both community workshops, and meeting with regulatory agencies, the Contractor and SCE&G project team will have a basis to establish specific factors by which a quantifiable comparison of the alternate routes can be conducted. Typically, these factors include acres of woodland, pasture, etc., in the right-of-way; number of houses within 100' of the line,100'-200' etc; acres of right-of-way within 100', 100'-200', etc., of streams; the number of recorded archaeological sites within 100 feet of the line, etc.

Step 4 Alternate Route Evaluation and Ranking

The evaluation factors developed in Step 3 will be grouped into major categories, assigned weights (from 1-10) to reflect their relative importance within each category, and then applied to each alternate route. For example, a residence within 100' of the proposed line would be given a weight of 10; a residence within 200' of the line might be given a weight of 7 or 8 to reflect the lessened impact of the line to the residence due to the increased distance. Next, factor weights will be multiplied by their quantity (12 residences within 100' of route A = 120; 15 within 100' of route B = 150, etc.).

The routes will then be scored *in each category* by adding the individual factor totals. The total category score for each route will be normalized on a scale of 0-10 to give each category equal influence on the final route evaluation scoring and decision. The route with the highest category score will be given a normalized score of 10; routes with lower scores will be calculated based on their percentage of the highest score. The normalized route scores for each category and route will be carried forward to a Route Evaluation Score Summary sheet where the normalized category scores for each route will be totaled. Routes with lowest scores will be those with lowest impacts when measured against the evaluation criteria within the major evaluation categories.

Step 5 Cost and Engineering Evaluation

The Contractor's siting team will work closely with SCE&G engineers to evaluate each alternate route in terms of its engineering feasibility and constructability using approved structures and design parameters. This evaluation will include preliminary structure selection based on a careful field inspection of the alternate routes under consideration. The Contractor – SCE&G team will prepare a cost estimate for each route. Each estimate will include costs of real estate acquisition, right-of-way preparation, line engineering, line materials costs and line construction. The cost estimate will be a significant factor in the final route selection decision. If, for example, the two top-ranked routes (see Step 4) were practically equal in terms of overall environmental and land use effects, but the top-ranked route's total cost was significantly higher than the second-ranked route's, then SCE&G would probably have defensible reasons to select the lower cost, 2nd ranked route.

For each route on which cost estimates are prepared, a full listing of environmental studies associated with permitting and licensing will be prepared.

Step 6 Route Selection and Development of Ownership List

Upon SCE&G's final selection of a preferred route, the Contractor's Siting Team will prepare and deliver an ownership map (showing the selected route and a listing of property ownership within 500' of the selected route) to SCE&G. The ownership list can be used to conduct survey notification. A copy of this map will be delivered to SCE&G within three working days of the final route selection. The Contractor will be available to conduct the survey notification on behalf of SCE&G, and will submit a proposal to do so, if directed.

SITING PHASE III: Study Documentation and Agency Approval of the Preferred Route

Step 1 Agency Contact / Survey Notification / Community Notification

The Contractor assumes that property owners who will be crossed by the selected route will be notified by SCE&G in a manner that fulfills statutory requirements regarding survey notification. If SCE&G desires, the Contractor will be available to issue survey notification on their behalf to all property owners who will likely be crossed by the selected route.

Following the issuance of survey notification to directly affected property owners, a general notification regarding the selected route will be issued by the Contractor to everyone who was invited to the community workshop. This notification will be in the form of personal letters and will include a map showing the selected route.

Agencies and organizations with whom ongoing contact has been maintained regarding the project will be notified by methods deemed appropriate at the time.

Step 2 Additional Studies if Required by Agencies

This step often includes only the necessary field studies, which follow right-of-entry waivers or survey permission. Site-specific studies are performed as indicated from agency responses. This may include cultural resources, protected species, and wetland inventories and delineation to address individual property owner or agency concerns not resolved in earlier components of the siting study and analysis. Occasionally, two or more routes will be included in this step; however, it is common for only one route, the preferred route, to be examined in this detail. Features such as vegetation, archaeological resources, wetlands, geological hazards, or protected species will be mapped using GPS, if a high degree of point data accuracy is required prior to the physical survey.

Step 3 Develop Mitigation Measures

The Contractor's siting team will focus on the selected route and consider mitigation and construction practices that may lessen overall impacts within acceptable cost parameters. The siting team will consider issues such as right-of-way access, use of right-of-way clearing technique, erosion control design, and structure type and then make recommendations to SCE&G.

The Contractor, if requested by SCE&G, will conduct a comprehensive visual-impact analysis. As part of this step, three-dimensional computer-generated terrain models will be developed to show what might be seen from selected points along the line. If needed, visual analysis experts will use 7.5' U.S. Geological Survey digital elevation models (DEMs) or hand-digitized topography to determine ground elevations and develop the models. These terrain models will show post-construction conditions from major viewpoints (e.g., road locations, residences, scenic overlooks, schools, churches, etc.) with the proposed line's supporting structures added, based on preliminary engineering. The Contractor's siting team will determine the relative level of visual impact from each viewpoint, using a formula that considers landscape content, distance from the viewpoint to the structures, vegetative modification, and numbers of structures seen against background and/or skyline. This analysis process has been extremely effective in completing visual implication studies associated with gaining special use permits for transmission lines across U.S. Forest Service lands, addressing concerns associated with historic resources, etc.

Step 4 Produce A Siting Report That Fully Documents The Siting Process And The Project's Environmental Effects

The Contractor will produce a Siting Report that that fully documents the siting process. The report will clearly describe existing environmental and land use characteristics and conditions and will quantify any effects of a transmission line over the selected route. This report, which will include a full discussion relating to project need, will serve as the "centerpiece" of all project permit applications.

The format of the report will follow National Environmental Policy Act guidelines and will include the following sections:

- Executive Summary
- Chapter 1 - Facility Description
- Chapter 2 - Need for the Project
- Chapter 3 - Alternatives to the Project (Including the Proposed Action)
- Chapter 4 - The Affected Environment
- Chapter 5 - Environmental Consequences
- Chapter 6 - Mitigation and Monitoring Measures
- Chapter 7 - Correspondence and Other Project Coordination / Agencies Consulted
- Chapter 8 - Newspaper Advertisement and Legal Notices (if any)
- Chapter 9 - Community / Public Outreach (in applicable)
- Bibliography
- Tables and Figures

Step 5 Submit to Review Agencies / Licensing Authorities

Applications for all required permits and licenses will be prepared by the Contractor's project team on a time-and-materials basis, as directed by SCE&G.

SCE&G
Distribution Substation Siting Process

Step 1

SCE&G will designate a siting contractor ("Contractor") that will facilitate the substation site selection process through participation with Electric Transmission, Electric Distribution, and Real Estate project team representatives. The Contractor will meet local distribution planners to review each future project in their respective planning regions. The Contractor and planners will inspect the areas where substations are needed (e.g., the load center) and preliminarily identify sites that appear suitable. This preliminary site identification effort will be heavily weighted on distribution circuitry requirements, the apparent availability of undeveloped acreage of sufficient size, and observations regarding site development factors.

Step 2

The Contractor will acquire tax mapping and ownership records for the area that encompasses the alternate sites and conduct the following investigations for each:

1. Overlay the property with available topographical data acquired from various sources (U.S. Geodetic Survey data or topography available from local planning agencies);
2. Add the future substation's "footprint" onto the topographical mapping and prepare a preliminary grading plan for the purpose of determining if the subject lot is large enough to accommodate the future station. In cases where the acreage tracts are involved, the mapping will be used to determine what size lot would be needed from the acreage tract;
3. Determine the implications of zoning requirements, if any;
4. Preliminarily assess the ability to reach the site with a transmission line;
5. Determine if the site contains documented archaeological resources, natural heritage sites (Rare, Threatened, or Endangered Species), or sensitive resources such as wetlands;
6. Review the Environmental Protection Agency records to determine if the site is known to contaminated;
7. Assess the ability to gain department of transportation permits for the future access drive; and,
8. Estimate the cost to prepare the site for substation construction.

Step 3

The Contractor will review each alternate site with the real estate professional that will be responsible for acquisition. The real estate professional will be requested to estimate the cost to purchase each alternate site. (For schedule efficiency, it is anticipated that

local real estate firms having extensive knowledge and data regarding sales in the local area will be engaged to provide this information).

Step 4

The Contractor will prepare a brief management summary report for each alternate site that will contain all relevant information needed to characterize the site, including a map showing the site with the topography and substation added.

Step 5

The Contractor will notify SCE&G's project manager that alternate sites for the future substation have been identified and evaluated. The project manager will be requested to arrange a meeting with key project team members from SCE&G, Electric Distribution (including the district manager), and Real Estate Services. During this meeting, the distribution planner and Contractor will present detailed information about each alternate site, and the project team will be asked to participate in a process to rank the sites from the most desirable to the least. It should be noted that the ranking process is relative and comparative among the sites. It is the intent of the substation siting process to present only alternate sites that will be suitable for the future substation.

Step 6

It is assumed that the real estate professional responsible for acquisition will be instructed by a representative from Electric Distribution to pursue the execution of an **Option to Purchase** on the selected site at the conclusion of the meeting described in Step 5. If it is ultimately determined that the selected site cannot be acquired, it is assumed that an inquiry will proceed regarding availability of the 2nd most desirable site, etc. If it is determined that none of the acceptable, evaluated sites are available from willing sellers based on the fair market value of the property needed, SCE&G will be well-positioned to return to the first-choice site and pursue acquisition through an eminent domain process if all other reasonable means of acquiring are first exhausted.

Step 7

Once SCE&G takes possession of the site through an Option to Purchase or by other means, the Contractor and Real Estate Services will cooperate to conduct a thorough due diligence investigation (title investigation, Phase I Environmental Assessment, topographic survey, pre-final grading plan, zoning approvals, etc.).

Step 8

If no problems are revealed during the due diligence investigation, the real estate professional will be authorized by Electric Distribution to order a final boundary survey and acquire the property.

SCE&G®
A SCANA COMPANY

TRANSMISSION LINE SITING PROCESS

PHASE I
Alternate Route Development

- Project Scoping / Team Member Responsibility Assignments
- Delineation of Routing Study Area and Initial Data Collection
- Community Workshop(s) / Agency Contact
- Final Regional, Environmental, Land Use and Community Data Collection and Entry
- Analyze Data / Determine Areas of Constraint and Opportunity
- Identify Alternate Routes

PRODUCT → Identification of Alternate Routes

PHASE II
Alternate Route Evaluation and Comparison

- Community Workshop(s) / Agency Comments
- Compile and Analyze Community Comments and Information
- Field Review of Alternate Routes and Adjustments (if needed)
- Develop Alternate Route Evaluation Criteria
- Alternate Route Evaluation and Ranking
- Cost and Engineering Evaluation; Schedule Development

Preferred Route

PHASE III
Study Documentation & Agency Approval

- Agency Contact / Community Notification
- Additional Studies (If Required By Agencies)
- Develop Mitigation Measures
- Produce Environmental Report or Other Routing Study Documentation
- Submit to Review Agencies / Licensing Authorities As Needed

Approved Route

Sec 4.1 Ref 7

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South Carolina Code of Laws
(Unannotated)
Current through the end of the 2006 Regular Session

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Title 58 - Public Utilities, Services and Carriers

CHAPTER 33.

UTILITY FACILITY SITING AND ENVIRONMENTAL PROTECTION

ARTICLE 1.

SHORT TITLE; DEFINITIONS

SECTION 58-33-10. Short title.

This chapter shall be known, and may be cited, as the "Utility Facility Siting and Environmental Protection Act".

SECTION 58-33-20. Definitions.

The following words, when used in this chapter, has the following meanings, unless otherwise clearly apparent from the context:

(1) The term "commission" means Public Service Commission.

(2) The term "major utility facility" means:

(a) electric generating plant and associated facilities designed for, or capable of, operation at a capacity of more than

seventy-five megawatts.

(b) an electric transmission line and associated facilities of a designed operating voltage of one hundred twenty-five kilovolts or more; provided, however, that the words "major utility facility" shall not include electric distribution lines and associated facilities, nor shall the words "major utility facility" include electric transmission lines and associated facilities leased to and operated by (or which upon completion of construction are to be leased to and operated by) the South Carolina Public Service Authority.

(3) The term "commence to construct" means any clearing of land, excavation, or other action that would adversely affect the natural environment of the site or route of a major utility facility, but does not include surveying or changes needed for temporary use of sites or routes for nonutility purposes, or uses in securing geological data, including necessary borings to ascertain foundation conditions.

(4) The term "municipality" means any county or municipality within this State.

(5) The term "person" includes any individual, group, firm, partnership, corporation, cooperative, association, government subdivision, government agency, local government, municipality, any other organization, or any combination of any of the foregoing, but shall not include the South Carolina Public Service Authority.

(6) The term "public utility" or " utility" means any person engaged in the generating, distributing, sale, delivery, or furnishing of electricity for public use.

(7) The term "land" means any real estate or any estate or interest therein, including water and riparian rights, regardless of the use to which it is devoted.

(8) The term "certificate" means a certificate of environmental compatibility and public convenience and necessity.

(9) The term "regulatory staff" means the executive director or the executive director and the employees of the Office of Regulatory Staff.

ARTICLE 3.

CERTIFICATION OF MAJOR UTILITY FACILITIES

SECTION 58-33-110. Certificate required before construction of major utility facility; transfer and amendment of certificate; exceptions; emergency certificates.

(1) No person shall commence to construct a major utility facility without first having obtained a certificate issued with respect to such facility by the Commission. The replacement of an existing facility with a like facility, as determined by the Commission, shall not constitute construction of a major utility facility. Any facility, with respect to which a certificate is required, shall be constructed, operated and maintained in conformity with the certificate and any terms, conditions and modifications contained therein. A certificate may only be issued pursuant to this chapter; provided, however, any authorization relating to a major utility facility granted under other laws administered by the Commission shall constitute a certificate if the requirements of this chapter have been complied with in the proceeding leading to the granting of such authorization.

(2) A certificate may be transferred, subject to the approval of the Commission, to a person who agrees to comply with the terms, conditions and modifications contained therein.

(3) A certificate may be amended.

(4) This chapter shall not apply to any major utility facility:

(a) The construction of which is commenced within one year after January 1, 1972; or

(b) For which, prior to January 1, 1972, an application for the approval has been made to any Federal, State, regional or local governmental agency which possesses the jurisdiction to consider the matters prescribed for finding and determination in subsection (1) of Section 58-33-160.

(c) For which, prior to January 1, 1972, a governmental agency has approved the construction of the facility and

indebtedness has been incurred to finance all or part of the cost of such construction; or

(d) Which is a hydroelectric generating facility over which the Federal Power Commission has licensing jurisdiction.

(5) Any person intending to construct a major utility facility excluded from this chapter pursuant to subsection (4) of this section may elect to waive the exclusion by delivering notice of the waiver to the Commission. This chapter shall thereafter apply to each major utility facility identified in the notice from the date of its receipt by the Commission.

(6) The Commission shall have authority to waive the normal notice and hearing requirements of this chapter and to issue a certificate on an emergency basis if it finds that immediate construction of a major utility facility is justified by public convenience and necessity; provided, that the Public Service Commission shall notify all parties concerned under Section 58-33-140 prior to the issuance of such certificate; provided, further, that the Commission may subsequently require a modification of the facility if, after giving due consideration to the major utility facility, available technology and the economics involved, it finds such modification necessary in order to minimize the environmental impact.

(7) The Commission shall have authority, where justified by public convenience and necessity, to grant permission to a person who has made application for a certificate under Section 58-33-120 to proceed with initial clearing, excavation, dredging and construction; provided, however, that in engaging in such clearing, excavation, dredging or construction, the person shall proceed at his own risk, and such permission shall not in any way indicate approval by the Commission of the proposed site or facility.

SECTION 58-33-120. Application for certificate; service on and notice to municipalities, government agencies and other persons of application.

(1) An applicant for a certificate shall file an application with the commission, in such form as the commission may prescribe. The application must contain the following information:

(a) a description of the location and of the major utility facility to be built;

(b) a summary of any studies which have been made by or for applicant of the environmental impact of the facility;

(c) a statement explaining the need for the facility; and

(d) any other information as the applicant may consider relevant or as the commission may by regulation or order require. A copy of the study referred to in item (b) above shall be filed with the commission, if ordered, and shall be available for public information.

(2) Each application shall be accompanied by proof of service of a copy of the application on the Office of Regulatory Staff, the chief executive officer of each municipality, and the head of each state and local government agency, charged with the duty of protecting the environment or of planning land use, in the area in the county in which any portion of the facility is to be located. The copy of the application shall be accompanied by a notice specifying the date on or about which the application is to be filed.

(3) Each application also must be accompanied by proof that public notice was given to persons residing in the municipalities entitled to receive notice under subsection (2) of this section, by the publication of a summary of the application, and the date on or about which it is to be filed, in newspapers of general circulation as will serve substantially to inform such persons of the application.

(4) Inadvertent failure of service on, or notice to, any of the municipalities, government agencies, or persons identified in subsections (2) and (3) of this section may be cured pursuant to orders of the commission designed to afford them adequate notice to enable their effective participation in the proceeding. In addition, the commission may, after filing, require the applicant to serve notice of the application or copies thereof, or both, upon such other persons, and file proof thereof, as the commission may deem appropriate.

(5) An application for an amendment of a certificate shall be in such form and contain such information as the commission shall prescribe. Notice of the application shall be given as set forth in subsections (2) and (3) of this section.

SECTION 58-33-130. Hearings.

(1) Upon the receipt of an application complying with Section 58-33-120, the Commission shall promptly fix a date for

the commencement of a public hearing, not less than sixty nor more than ninety days after the receipt, and shall conclude the proceedings as expeditiously as practicable. The testimony presented at the hearing may be presented in writing or orally, provided that the Commission may make rules designed to exclude repetitive, redundant or irrelevant testimony.

(2) On an application for an amendment of a certificate, the Commission shall hold a hearing in the same manner as a hearing is held on an application for a certificate if the proposed change in the facility would result in any significant increase in any environmental impact of the facility or a substantial change in the location of all or a portion of the facility; provided, that the Public Service Commission shall forward a copy of the application to all parties upon the filing of an application.

SECTION 58-33-140. Parties to certification proceedings; limited appearances; intervention.

(1) The parties to a certification proceeding shall include:

(a) the applicant;

(b) the Office of Regulatory Staff, the Department of Health and Environmental Control, the Department of Natural Resources, and the Department of Parks, Recreation and Tourism;

(c) each municipality and government agency entitled to receive service of a copy of the application under subsection (2) of Section 58-33-120 if it has filed with the commission a notice of intervention as a party within thirty days after the date it was served with a copy of the application; and

(d) any person residing in a municipality entitled to receive service of a copy of the application under subsection (2) of Section 58-33-120, any domestic nonprofit organization, formed in whole or in part to promote conservation or natural beauty, to protect the environment, personal health, or other biological values, to preserve historical sites, to promote consumer interest, to represent commercial and industrial groups, or to promote the orderly development of the area in which the facility is to be located; or any other person, if such a person or organization has petitioned the commission for leave to intervene as a party, within thirty days after the date given in the published notice as the date for filing the application, and if the petition has been granted by the commission for good cause shown.

(2) Any person may make a limited appearance in the sixty days after the date given in the published notice as the date for filing the application. No person making a limited appearance shall be a party or shall have the right to present oral testimony or argument or cross-examine witnesses.

(3) The commission may, in extraordinary circumstances for good cause shown, and giving consideration to the need for timely start of construction of the facility, grant a petition for leave to intervene as a party to participate in subsequent phases of the proceeding, filed by a municipality, government agency, person, or organization which is identified in paragraphs (b) or (c) of subsection (1) of this section, but which failed to file a timely notice of intervention or petition for leave to intervene, as the case may be.

SECTION 58-33-150. Record of proceedings; consolidation of representation of parties.

A record shall be made of the hearing and of all testimony taken and the cross-examination thereon. Upon request of a party, either before or after the decision, a State agency which proposes to or does require a condition to be included in the certificate as provided for in Section 58-33-160 shall furnish for the record all factual findings, documents, studies, rules, regulations, standards, or other documentation, supporting the condition. The Commission may provide for the consolidation of the representation of parties having similar interests.

SECTION 58-33-160. Decision of Commission.

(1) The Commission shall render a decision upon the record either granting or denying the application as filed, or granting it upon such terms, conditions or modifications of the construction, operation or maintenance of the major utility facility as the Commission may deem appropriate; such conditions shall be as determined by the applicable State agency having jurisdiction or authority under statutes, rules, regulations or standards promulgated thereunder, and the conditions shall become a part of the certificate. The Commission may not grant a certificate for the construction, operation and maintenance of a major utility facility, either as proposed or as modified by the Commission, unless it shall find and determine:

(a) The basis of the need for the facility.

(b) The nature of the probable environmental impact.

(c) That the impact of the facility upon the environment is justified, considering the state of available technology and the nature and economics of the various alternatives and other pertinent considerations.

(d) That the facilities will serve the interests of system economy and reliability.

(e) That there is reasonable assurance that the proposed facility will conform to applicable State and local laws and regulations issued thereunder, including any allowable variance provisions therein, except that the Commission may refuse to apply any local law or local regulation if it finds that, as applied to the proposed facility, such law or regulation is unreasonably restrictive in view of the existing technology, or of factors of cost or economics or of the needs of consumers whether located inside or outside of the directly affected government subdivisions.

(f) That public convenience and necessity require the construction of the facility.

(2) If the Commission determines that the location of all or a part of the proposed facility should be modified, it may condition its certificate upon such modification, provided that the municipalities and persons residing therein affected by the modification shall have been given reasonable notice.

(3) A copy of the decision and any opinion shall be served by the Commission upon each party.

SECTION 58-33-170. Opinion of Commission.

In rendering a decision on an application for a certificate, the Commission shall issue an opinion stating its reasons for the action taken. If the Commission has found that any regional or local law or regulation, which would be otherwise applicable, is unreasonably restrictive pursuant to paragraph (e) of subsection (1) of Section 58-33-160, it shall state in its opinion the reasons therefor.

ARTICLE 5.

JUDICIAL REVIEW

SECTION 58-33-310. Appeal from final order or decision.

Any party may appeal, in accordance with Section 1-23-380, from all or any portion of any final order or decision of the commission, including conditions of the certificate required by a state agency under Section 58-33-160 as provided by Section 58-27-2310. Any appeals may be called up for trial out of their order by either party. The commission must not be a party to an appeal.

SECTION 58-33-320. Jurisdiction of courts.

Except as expressly set forth in Section 58-33-310, no court of this State shall have jurisdiction to hear or determine any issue, case, or controversy concerning any matter which was or could have been determined in a proceeding before the commission under this chapter or to stop or delay the construction, operation, or maintenance of a major utility facility, except to enforce compliance with this chapter or the provisions of a certificate issued hereunder, and any such action shall be brought only by the Office of Regulatory Staff. Provided, however, nothing herein contained shall be construed to abrogate or suspend the right of any individual or corporation not a party to maintain any action which he might otherwise have been entitled.

ARTICLE 7.

MISCELLANEOUS PROVISIONS

SECTION 58-33-410. Authority of other agencies or local governments; application of other laws.

Notwithstanding any other provision of law, no State or regional agency, or municipality or other local government may require any approval, consent, permit, certificate or other condition for the construction, operation or maintenance of a major utility facility authorized by a certificate issued pursuant to the provisions of this chapter; provided, that nothing herein shall prevent the application of State laws for the protection of employees engaged in the construction, operation or maintenance of such facility; provided, however, that State agencies shall continue to have authority to enforce

compliance with applicable State statutes, rules, regulations or standards promulgated within their authority.

SECTION 58-33-420. Joint hearings with agencies from other states; agreements and compacts; joint investigations.

The commission, in the discharge of its duties under this chapter or any other statute, is authorized to hold joint hearings within or without the State and issue joint or concurrent orders in conjunction or concurrence with any official or agency of any other state of the United States, whether in the holding of any hearings, or in the making of such orders, the commission shall function under agreements or compacts between states or under the concurrent power of states to regulate interstate commerce or as an agency of the United States, or otherwise. The commission, in the discharge of its duties under this chapter, is authorized to enter into agreements or compacts with agencies of other states, pursuant to any consent of Congress, for cooperative efforts in certificating the construction, operation, and maintenance of major utility facilities in accord with the purposes of this chapter and for the enforcement of the respective state laws regarding same. The commission may request the Office of Regulatory Staff to make joint investigations with any official board or commission of any state or of the United States.

SECTION 58-33-430. Annual reports shall be furnished by public utilities.

Each public utility shall annually furnish a report to the commission and provide to the Office of Regulatory Staff for its review containing a ten-year forecast of loads and resources; provided, however, this section shall not apply to any electric cooperative. The report shall list the major utility facilities which, in the judgment of such utility, will be required to supply system demands during the forecast period. The forecast shall cover the ten-year period next succeeding the date of the report, shall be made available to the public, and furnished upon request to municipalities and government agencies charged with the duty of protecting the environment or of planning land use.

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(0.5 mi), it shares the corridor with the Summer-Parr No. 1 and No. 2 and the Graniteville lines. For the next 4 km (2.5 mi) it shares the corridor with the Summer-Graniteville line. For the remaining 24 km (15 mi), it occupies the 30-m (100-ft) right-of-way alone.

In total, for the specific purpose of connecting V.C. Summer to the transmission system, SCE&G and Santee Cooper have constructed approximately 250 km (160 mi) of transmission lines (over 190 km [120 mi] of corridor because of co-located lines) that occupy approximately 800 ha (2000 ac) of corridor.

2.2 Plant Interaction with the Environment

Sections 2.2.1 through 2.2.8 provide general descriptions of the environment near V.C. Summer as background information. They also provide detailed descriptions where needed to support the analysis of potential environmental impacts of refurbishment and operation during the renewal term, as discussed in Chapters 3 and 4. Section 2.2.9 describes the historic and archaeological resources in the area, and Section 2.2.10 describes possible impacts associated with other Federal project activities.

2.2.1 Land Use

The V.C. Summer site covers approximately 909 ha (2245 ac), an area that includes portions of Monticello Reservoir and FPSF. Approximately 348 ha (860 ac) are covered by the waters of Monticello Reservoir. A portion of the property (approximately 150 ha [370 ac]) consists of generation and maintenance facilities, supply areas, parking lots, roads, and mowed grass. Some functions, such as the truck equipment and maintenance facility, serve both V.C. Summer and the FPSF. Some 50 ha (125 ac) are dedicated to transmission line rights-of-way. However, much of the V.C. Summer property consists of forested areas (approximately 360 ha [890 ac]). The primary terrestrial habitats at V.C. Summer are pine forest, deciduous forest, and mixed pine-hardwood forest (SCANA 2000). The pine forests at V.C. Summer include planted pines and naturally vegetated pines. Most of the deciduous forests at the site are located along stream bottoms and surrounding slopes. Streamside management zones at the site are protected in accordance with best management practices established by the South Carolina Forestry Commission.

The lands at V.C. Summer are designated for industrial development in the Fairfield County Comprehensive Plan (Fairfield County 1997), which states that these lands are intended to encourage industrial growth that provides quality employment opportunities and make effective use of the County's resources. These are the only industrial lands in western Fairfield County.

The lands surrounding Monticello Reservoir are designated by the Plan for Residential Conservation and Development and Rural Development. Several commercial clusters are also depicted along SC 215 near V.C. Summer on the Comprehensive Land Use and Development Plan. The Fairfield County Comprehensive Plan observes the unfulfilled development potential of Monticello Reservoir and designates it for Resource Preservation. Monticello Reservoir has experienced less development than other lakes in the region.

2.2.2 Water Use

Monticello Reservoir, a 2630 ha (6500 ac) impoundment, was built in the Frees Creek Valley to serve as the upper pool for the FPSF and the source of make-up cooling water for V.C. Summer. Cooling water is drawn from Monticello Reservoir at a rate of approximately 32 m^3/s (1143 cfs), passed through the condensers, and ultimately returned to Monticello Reservoir. The primary consumption of water from the Monticello Reservoir by the nuclear station is only attributable to evaporative loss. V.C. Summer Quarterly Water Use Reports indicate the theoretical maximum loss of cooling system water to evaporation is 0.6 m^3/s (22 cfs) (SCE&G 1998, 1999b). Ultimately, these losses are made up from water acquired from the Parr Reservoir on the Broad River. Water is withdrawn from Monticello Reservoir for potable use and other noncooling-related uses at V.C. Summer. This water is treated at the water treatment plant prior to use. For the year 2002, the total rate of water withdrawal from Monticello Reservoir by the water treatment plant was 0.01 m^3/s (0.045 cfs).

Pursuant to the Federal Water Pollution Control Act of 1977, also known as the Clean Water Act, the water quality of the plant effluents is regulated through the NPDES. The SCDHEC is the agency delegated to issue NPDES permits. The current permit (SC0030856) was issued in December 2002 and is due to expire in April 2007. Any new regulations promulgated by the U.S. Environmental Protection Agency (EPA) and SCDHEC would be included in future permits.

The Broad River was impounded in 1914 for a small, run-of-the-river hydroelectric plant (Parr Hydro). The impoundment is known as Parr Reservoir. In 1977, the surface area of Parr Reservoir was expanded from 750 ha (1850 ac) to 1780 ha (4400 ac) by raising the level of the dam by 2.7 m (9 ft) (SCE&G 1978). This modification was necessary to support the development of the FPSF. Parr Reservoir, which had historically been the source of water for Parr Hydro, assumed a dual function, providing a headwater pool for Parr Hydro and a tailwater pool for FPSF.

The daily cycle of operation at the FPSF transfers up to 416 m^3/s (14,700 cfs) of water from Parr Reservoir to Monticello Reservoir and back (NRC 1981). Operations vary, depending on the season and system needs. In summer, FPSF generally pumps water from Parr Reservoir

SCE&G's review of historical data on releases and the resultant dose calculations revealed that the calculated doses to maximally exposed individuals in the vicinity of V.C. Summer were a small fraction of the limits specified in the SCE&G ODCM (SCE&G 1999a) to meet EPA radiation standards in 40 CFR Part 190 as required by 10 CFR 20.1301(d). For 2001 (the most recent year that data were available), dose estimates were calculated based on actual liquid and gaseous effluent release data (SCE&G 2002b). Dose estimates were performed by SCE&G using the plant effluent release data, onsite meteorological data, and appropriate pathways identified in the ODCM.

An assessment of doses to the maximally exposed individual from gaseous and liquid effluents was performed by SCE&G for locations representing the maximum dose. In all cases, doses were well below the technical specification limits as defined in the ODCM (SCE&G 2002d). A breakdown of the calculated maximum dose to an individual located at the V.C. Summer boundary from liquid and gaseous effluents released during 2001 is summarized as follows:

- Total body dose from liquid effluents at the site discharge was 3.96×10^{-5} mSv (3.96×10^{-3} mrem), which is about 0.13 percent of the 0.03 mSv (3 mrem) dose limit specified in 10 CFR Part 50, Appendix I. The critical organ dose due to the liquid effluents at the site discharge was 4.71×10^{-5} mSv (4.71×10^{-3} mrem). This dose was about 0.05 percent of the 0.10 mSv (10 mrem) dose limit (SCE&G 2002b).

- The air dose due to noble gases in gaseous effluents was 9.93×10^{-7} mSv (9.93×10^{-5} mrad) gamma (0.001 percent of the 0.10 mGy [10 mrad] gamma dose limit) and 3.56×10^{-7} mGy (3.56×10^{-5} mrad) beta (0.0002 percent of the 0.20 mGy [20 mrad] beta dose limit) (SCE&G 2002b).

- The critical organ dose from gaseous effluents due to iodine-131, iodine-133, tritium, and particulates with half-lives greater than eight days was 1.52×10^{-6} mSv (1.52×10^{-4} mrem), which is 0.001 percent of the 0.15 mSv (15 mrem) dose limit (SCE&G 2002b).

The applicant does not anticipate any significant changes to the radioactive effluent releases or exposures from V.C. Summer operations during the renewal period and, therefore, the impacts to the environment are not expected to change.

2.2.8 Socioeconomic Factors

The staff reviewed the *V.C. Summer Environmental Report* (SCE&G 2002a) and information obtained from meetings with local and regional agencies during a site visit to Fairfield County and the surrounding area from December 10-12, 2002. The following information describes the housing, public services, land use, demographics, and economy of the communities near V.C. Summer.

Employee Ops #s ?

2.2.8.1 Housing

SCE&G employs a permanent workforce of approximately 600 employees at V.C. Summer and an additional 130 to 140 long-term contract employees who provide security, maintenance, engineering, and janitorial support; this is within the range of 600 to 800 personnel per reactor unit estimated in the Generic Environmental Impact Statement (GEIS) (NRC 1996). Approximately 95 percent of the permanent employees live in Lexington, Richland, Fairfield, and Newberry Counties. The remaining five percent are distributed across 11 South Carolina counties. About 10 percent of the employees live in Fairfield County, and 48 of these (81 percent) live in Winnsboro or Jenkinsville. Table 2-5 summarizes the information for the permanent workforce. Given the predominance of regular employees living in the Central Midlands Region and the absence of the likelihood of significant socioeconomic effects in other counties, the focus of this analysis is Fairfield, Lexington, Newberry, and Richland Counties.

Table 2-5. V.C. Summer Employee Residence Information by County

County	Number of Personnel	Percent of Total
Fairfield	59	9
Lexington	210	34
Newberry	126	20
Richland	197	32
Other Counties	29	5
TOTAL	621	100

Source: SCE&G 2002a.

V.C. Summer is on an 18-month refueling cycle. During refueling outages, which typically last for 30 to 40 days, the number of contractor employees on site increases substantially. In three recent outages, V.C. Summer brought in between 591 and 791 contractor employees for an average of 665 additional contractor employees per outage. Most of these temporary contractor employees are assumed to be located in the same geographic areas as the permanent SCE&G staff. This falls within the GEIS range of 200 to 900 additional contractor employees per reactor outage (SCE&G 2002a).

Table 2-6 provides the number of housing units and housing unit vacancies for the four Central Midlands Counties for 1990 and 2000, derived from U.S. Census Bureau information. Each of

Table 2-6. Housing Units and Housing Units Vacant (Available) by County during 1990 and 2000

	1990	2000	Approximate Percentage Change 1990–2000
Fairfield County			
Housing Units	8730	10,383	18.9
Occupied Units	7467	8774	17.5
Vacant Units	1263	1609	27.4
Newberry County			
Housing Units	14,445	16,805	16.3
Occupied Units	12,314	14,026	13.9
Vacant Units	2141	2779	29.8
Lexington County			
Housing Units	67,510	90,978	34.8
Occupied Units	61,592	83,240	35.1
Vacant Units	5918	7738	30.6
Richland County			
Housing Units	109,563	129,793	18.5
Occupied Units	101,588	120,101	18.2
Vacant Units	7975	9692	21.5

Source: U.S. Census Bureau (USCB) 2000 and CMCOG 2003a.

these counties has a comprehensive plan that addresses housing needs and provides policies for guiding housing choices. Fairfield County accounted for just 1.7 percent of the Central Midlands Region's new housing units in 2001, compared to 56.5 percent in Richland, 38.2 percent in Lexington, and 3.6 percent in Newberry County (CMCOG 2001). These figures do not include mobile homes, which constitute a growing segment of the affordable housing supply in South Carolina. The U.S. Census Bureau reported that 29.3 percent of all housing units in Fairfield County in 2000 were mobile homes (this includes manufactured housing), and these structures provided 24.4 percent of the total housing units in Newberry County compared to 23.1 percent in Lexington County, just 6.6 percent in Richland County, and 20 percent for South Carolina (USCB 2000). Fairfield County has the smallest housing stock in the Central

Midlands Region while Richland County has the largest. The Lexington County housing stock grew the fastest, by nearly 35 percent between 1990 and 2000, but it also had the largest change in vacancy rates. The vacancy rate in Fairfield County in 2000 was 15.5 percent but nearly half of these (724 homes) are actually seasonal and vacation homes (USCB 2000). The vacancy rate for the four Central Midlands counties in 2000 was 8.8 percent and represents nearly 22,000 homes.

2.2.8.2 Public Services

Public services include water supply, education, and transportation.

- **Water Supply**

  Table 2-7 summarizes the daily water consumption and areas served by each water system in Fairfield County, the County most impacted by the relicensing of V.C. Summer. Fairfield County has five public water systems, serving approximately 51 percent of the population. Less than two percent receive water from private residential water systems. The remaining 47 percent rely on individual wells (Fairfield County 1997). Only the town of Winnsboro draws water from a surface supply. The source is a reservoir west of Winnsboro that is part of the Jackson Mill Creek watershed. The reservoir contains approximately 600 million gallons of water (Fairfield County 1997). The remaining four public systems draw from groundwater sources, which have a relatively low yield in the area. However, each of the systems is currently operating below capacity, with room for additional growth and development (Fairfield County 1997). The County has been working to expand water service along major transportation corridors and there has been some discussion of establishing a sewer authority, but the focus of these efforts would likely be the areas along U.S. 21 between Interstate 77 and Lake Wateree and SC 269 south of Winnsboro. Development in western Fairfield County tends to be low-density, single-family residential and served by septic systems that require lots to be an acre or more.

  The major public providers of water in Lexington County include Columbia, West Columbia, the Lexington County Joint Municipal Water and Sewer Commission, Cayce, Lexington, Batesburg-Leesville, Chapin, Pelion, Swansea, the Gilbert-Summit Rural Water District, Gaston Water District, and the Bull Swamp Water District. The remainder are private systems. Nonpublic providers include AAA Utilities, Inc., Carolina Water Service, and Heater Utilities, Inc. Lexington County has ample capacity for additional growth.

Table 2-7. Fairfield County Public and Private Water Suppliers and Capacities

Water Supplier	Average Daily Use m^3/day (MGD)	Maximum Daily Capacity m^3/day (MGD)
Community Systems		
Town of Winnsboro[b]	6738 (1.78)	11,735 (3.1)
Town of Ridgeway[b]	549 (0.145)	3785 (1.0)
Jenkinsville Water District[b]	477 (0.126)	651 (0.172)
Mid-County Water District 1[b]	276 (0.073)	916 (0.242)
Mid-County Water District 2[b]	246 (0.065)	378 (0.100)
Mitford Water District[b]	303 (0.080)	1514 (0.400)
Private Residential Systems		
Royal Hills Subdivision[a]	7.6 (0.002)	45 (0.012)
Chappel Mobile Home Park[b]	not available	95 (0.025)
Coley's Mobile Home Park[b]	not available	7.9 (0.03)
Fairview Manor[a]	not available	15.8 (0.06)
Lambright Care[a]	not available	not available
Industrial Systems		
V.C. Summer[b]	7.3 (0.0278)	342 (1.296)

(a) Fairfield County 1997.
(b) SCDHEC 1998.

Constraints in Newberry County will be mitigated by the construction of additional water treatment facilities as the need arises (Newberry County 1998). While water is available at the interstate interchanges, the supply is not sufficient for industrial or large-scale residential development. The Water and Sewer Authority will make the investment to install water tanks or larger lines only when the demand requires it (Newberry County 1998).

Water service is available to Richland County through public and private water systems. The major public system is operated exclusively by the city of Columbia which has primary

water lines extending into four major planning areas. Water service is provided as far west as Chapin and Lake Murray and north to the town of Blythewood. Water service in the northeast extends very close to the Kershaw County line. Southeast of the city, water lines reach to the McEntire Air National Guard Base and the Hopkins area. Columbia's position has been to delay further water extension into unserved, sparsely populated areas until a sufficient customer base has formed. Outside of Columbia's service area, water supply depends on private wells.

- **Education**

The Central Midlands Region includes 11 school districts and 170 public schools with enrollment totaling more than 107,000 students. There are also 75 private schools and nine colleges and universities (CCEDA 2002). Fairfield County will be the focus of this analysis as it is the school district most directly and fiscally impacted by the relicensing of V.C. Summer.

The Fairfield County School District operates eight schools serving 3600 students. The high school is located in Winnsboro, as is the middle school (Grades 6 to 8). There are also an intermediate school (Grades 4 to 6), one elementary, and one primary school (Grades K to 6) in Winnsboro. There are also two schools providing pre-K through 6th Grade in Blair and Ridgeway. The operating budget for the Fairfield County School District in 2002 was $29.5 million of which approximately $11.4 million is derived from V.C. Summer taxes. Per pupil expenditures for the Fairfield County School District are the highest in the Central Midlands at $8062 in 1999. This compares with $5189 to $6117 for Lexington schools, $5989 for Newberry, and $6035 to $6552 for Richland schools and $5556 for South Carolina (CCEDA 2002).

- **Transportation**

The Central Midlands Region has a transportation network of trucking and railroad terminals and interstate highway access to nine regional airports, three international airports, and three international seaports, giving the area access to both domestic and international markets (CCEDA 2002).

Fairfield County operates a basic public transportation system that operates along established routes but can deviate up to 3.2 km (2 mi) off the route, and does pass close to V.C. Summer along SC 215. The primary means of personal transportation for commuting is private vehicles. Approximately 14 percent of the households in Fairfield County do not have a vehicle (USCB 2000). Road access to V.C. Summer is via SC 311 (Ollie Bradham Boulevard), a two-lane paved road (see Figure 2-3). SC 311

intersects with SC 215 approximately 2.4 km (1.5 mi) east of V.C. Summer. SC 215 has a north-south orientation and is used by employees traveling from the Richland and Fairfield Counties areas. Additionally, employees traveling from the Richland and Lexington Counties areas may use U.S. 176 north to SC 213, which intersects with SC 215 3.2 to 4.8 km (2 to 3 mi) south of V.C. Summer.

Employees coming from the west and Newberry County area may use several secondary roads such as SC 773 or SC 202 to intersect with U.S. 176 and head south to intersect with SC 213. Traffic counts for each of these highways/roads are shown in Table 2-8 (SCE&G 2002a). Two projects appear on the Long-Range Rural System Upgrades map in the vicinity of V.C. Summer: improvements to SC 213 between SC 215 and SC 176, and for the "Peak Bypass."

Railroad access to V.C. Summer is provided with a spur from the Norfolk Southern line along the east side of Broad River that runs through Columbia and Spartanburg. There is a municipal airport south of Winnsboro and another in Newberry County while Columbia Metropolitan Airport provides the entire region with commercial and freight service.

Table 2-8 Traffic Counts for Roads in the Vicinity of V.C. Summer

Route No.	Route Location	Est. AADT[a] (total of both directions)	AADT Year
U.S. 176	SC 34 to SC 219	900	2000
U.S. 176	SC 219 to Richland County Line	1450	2000
SC 213	Newberry County line to SC 215	2300	2000
SC 213	U.S. 176 to Fairfield County line	1750	2000
SC 215	Richland County line to SC 213	1500	2000
SC 215	SC 213 to Chester County line	1250	2000
SC 202	Interstate 26 to U.S. 176	1100	2000
SC 202	U.S. 76 to Interstate 26	1850	2000
SC 773	U.S. 76 to U.S. 176	2700	2000

(a) annual average daily traffic volume.
Source: SCE&G 2002a.

2.2.8.3 Offsite Land Use

Fairfield County

Fairfield County contains approximately 177,414 ha (438,400 ac). Developed or urban land composes just two percent of the County. The largest land use category is forest, accounting for 87 percent of the total acreage. This includes public, commercial, and noncommercial forests, as well as farm woodlands. Nonforested land, including all urban or developed land, accounts for the remaining 13 percent. The surface waters of Wateree Lake and Monticello Reservoir, along with the Broad and Catawba Rivers, compose four percent of the County (Fairfield County 1997). Roughly three percent of the forested land in the County is government owned, primarily in the Sumter National Forest, located in the northwestern part of the County. Privately owned forest land in the County is dominated by corporations, individuals, and the forest products industry. Only six percent of the forested land is owned by farmers, reflecting the continued decline in farming in Fairfield County since the Depression era (Fairfield County 1997). Table 2-9 provides more information about these land use patterns.

Most of the growth in Fairfield County has occurred between Winnsboro and Wateree Lake, along the Interstate 77 corridor, and suburbanization is close to Richland County. Elsewhere, development is characteristically sparse and rural, characterizing the County's agricultural past (Fairfield County 1997). The dominant form of residential land use is single-family detached housing and includes a growing number of mobile homes and other manufactured structures. Residential development is found in both isolated and cluster patterns along most County roads (Fairfield County 1997). In the 20 years that V.C. Summer has operated, Fairfield County has experienced minimal population growth: the increase from 1990 to 2000 was only 0.5 percent. The County's economic base continues to be manufacturing, followed by government, industry, and services. Land use trends tend to be evolving simultaneously with the nationwide movement away from agricultural production and toward commerce built on the processing/ production of goods and the distribution of services. The Fairfield County Comprehensive Plan was prepared in 1997 and provides policies that promote orderly development while protecting natural resources and prime farmland. The Plan also contains eight policies that promote the location and retention of appropriate industries.

Lexington County

Lexington County contains over 110,000 parcels located in a 1813-km^2 (700-mi^2) area (Lexington County 1999). Farmland represents 21 percent of the land, as the County is a relatively strong agricultural center. However, Lexington County is encouraging the growth of residential areas by promoting the quality of the school systems and the accessibility of

Table 2-9. Land Use in Fairfield County, 1997

	ha (ac)	Percent of County Land
Total Area	177,424 (438,400)	
Forested Land (by ownership)	155,240 (383,607)	87
Public		
National Forest	4678 (11,560)	3
Municipal, County, State	193 (478)	0.1
Private		
Forest Industries	52,860 (130,622)	30
Farms (farmers)	11,747 (29,027)	6
Corporations and Individuals	85,761 (211,920)	48
Nonforested Land	22,184 (54,818)	13
Developed (urban)	2974 (7350)	1
Water	6239 (15,416)	4
Other	12,971 (32,052)	7

Source: Fairfield County, 1997.

resources. Overall, Lexington County has no specific growth control regulations or ordinances; however, it does have a blend of zoning styles, unrelated to growth control, that encourages a quality type of expansion characterized by a reduction in land allocations that are random and sporadic. According to the Lexington County Land Use Plan (Lexington County 1999), land will continue to be available for development for a variety of uses for several decades.

Newberry County

Newberry County has a total land area of 1678 km^2 (648 mi^2). According to the Comprehensive Plan for Newberry County (Newberry County 1998), the land is characterized by a mixture of rural and urban uses including agricultural, residential, commercial, industrial, public and

semi-private uses and vacant land. The Comprehensive Plan study was limited to the areas around the municipalities, the lake shores of Lake Greenwood and Lake Murray, the U.S. 76 corridor between the town of Little Mountain and the city of Newberry, and portions of SC 773, SC 219, SC 34, and SC 121. The unincorporated portions of the County that fall outside the defined study area do not have land use regulations but may eventually need them for future development (Newberry County 1998). Residential development is generally characterized by low- to medium-density, single-family development. There are a number of vacant lots inside and outside of the study area. Most of these are located along the lake shores, where most of the neighborhood subdivisions have occurred (Newberry County 1998). There are very few multifamily units in the unincorporated areas of the County. The option most selected for affordable housing is the manufactured home. The number of manufactured homes has increased dramatically since 1980. Most are located on individual lots and, more recently, in subdivisions (Newberry County 1998). Unlike a municipality where there is dense commercial development in a downtown or some other commercial district, Newberry County's commercial development is much less dense. In most cases, the commercial development is limited to stores located at the intersections of major roads. The remainder of commercial development exists in areas that serve local residents (Newberry County 1998). Agriculture is represented by 200 or more ha (500 ac) scattered throughout the Comprehensive Plan study area, an area comprised mostly of incorporated and developed portions of the County. Generally, there is ample land available for future development in the County; however, the exact locations of growth will be guided by two major constraints: natural features and infrastructure. The study area is crisscrossed with streams and rivers, so there will be areas where topography and flood plain characteristics will constrain development.

Richland County

Richland County occupies roughly 1937 km^2 (748 mi^2) of land area. Approximately 38 percent of the unincorporated portion of the County is developed, while the remaining 62 percent of the unincorporated land in the County is undeveloped. The unincorporated portions of the County were divided into four separate planning areas and two subareas to facilitate planning (Richland County 1999). A recently prepared comprehensive plan (Richland County 1999) noted that zoning controls were not established in Richland County until September 7, 1977. The absence of zoning controls and restrictions produced an environment where existing development patterns have been a mixture of many types of residential, commercial, and industrial uses. The plan noted further that rural open spaces and prime farmlands are being converted to residential and other suburban uses. The plan concluded that, in order to protect significant agricultural lands, natural areas, and open space corridors, Richland County will ultimately have to develop specific zoning and growth management tools for directing future development to sustainable areas. As yet, growth control measures have not been developed or adopted.

2.2.8.4 Visual Aesthetics and Noise

V.C. Summer is situated in an undulating wooded area that is primarily rural in character. Residential low-density development typifies this part of Fairfield County. V.C. Summer is visible from certain vantage points along the shore of Monticello Reservoir and SC 215. Several transmission lines can be seen when crossing roads in the area. Noise is generally not an issue because the actual facilities are within an exclusion and buffer zone and front the reservoir.

2.2.8.5 Demography

Population was estimated from V.C. Summer out to 80 km (50 mi) in 16-km (10-mi) concentric rings. In accordance with NRC Guidance, SCE&G used the most recent decennial U.S. Census Bureau census data (USCB 2000) and a geographic information system software to determine demographic characteristics in the V.C. Summer vicinity. Table 2-10 shows population growth rates and projections in the Central Midlands Region from 1980 to 2040.

- **Resident Population Within 80 km (50 mi)**

  All or parts of 21 South Carolina counties and the city of Columbia (State capital), are located within 80 km (50 mi) of V.C. Summer. A small portion of one North Carolina

Table 2-10. Population Growth in the Central Midlands Region of South Carolina 1980 to 2040

	Fairfield County		Lexington County		Richland County		Newberry County	
Year	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1980	20,700[a]	0.4	140,353[a]	5.8	269,735[a]	1.5	31,242[a]	0.7
1990	22,295[a]	0.8	167,611[a]	1.9	285,720[a]	5.9	33,172[a]	0.6
2000	23,454[a]	0.5	216,014[a]	2.9	320,677[a]	1.2	36,108[a]	0.9
2010	24,200[b]	0.5	244,600[b]	1.7	329,000[b]	0.7	36,400[b]	0.5
2020	25,300[b]	0.5	280,400[b]	1.5	350,100[b]	0.6	38,100[b]	0.5
2030	26,474[b]	0.5	321,473[b]	1.5	377,575[b]	0.6	40,304[b]	0.6
2040	27,565[b]	0.4	359,133[b]	1.2	400,258[b]	0.6	42,091[b]	0.4

(a) USCB 2000.
(b) CMCOG 1999.

County (Union) also lies within the 80-km (50-mi) radius. In 2000, an estimated 1.03 million people live within 80 km (50 mi) of V.C. Summer, which equates to a population density of 131 persons per square mile. Table 2-11 presents the population distribution within 80 km (50 mi) of V.C. Summer in 10-year increments between 1990 and 2010.

Table 2-11. Resident Population Within 80 km (50 mi) of V.C. Summer

	0 to 16 km (0 to 10 mi)	16 to 32 km (10 to 20 mi)	32 to 48 km (20 to 30 mi)	48 to 64 km (30 to 40 mi)	64 to 80 km (40 to 50 mi)	Total
Total 1990	9720	101,479	353,400	160,349	268,826	893,774
Total 2000	10,574	127,716	397,546	189,377	307,117	1,032,330
Total 2010 (est.)	11,247	151,154	437,851	215,455	340,649	1,156,356

Source: CMCOG 2003b.

Applying the GEIS proximity measures, V.C. Summer is classified as Category 3 (having one or more cities with 100,000 or more persons and less than 73 persons/km^2 [190 persons/mi^2] within 80 km [50 mi]). According to the GEIS sparseness and proximity matrix, V.C. Summer ranks of sparseness Category 3 and proximity Category 3 result in the conclusion that V.C. Summer is located in a medium population area.

Pomaria?

The largest population centers within the 16-km (10-mi) area are the communities of Jenkinsville (948 people in 2000) in Fairfield County and Peak in Newberry County. These areas have not experienced growth relative to other areas that lie outside the 16-km (10-mi) ring, but some new residential development has occurred along SC 215 on the shore of Monticello Reservoir. In fact, the Monticello-Salem area of Fairfield County, where V.C. Summer is located, lost about 10 percent of its population (approximately 240 people) between 1970 and 1990, and currently has a population of about 2200. Fairfield County had a lower population in 2000 (23,454) than it did at the turn of the 20th Century in 1900 (29,425), and it has experienced the slowest growth compared to the three other counties (USCB 2000).

Winnsboro is 24 km (15 mi) west of V.C. Summer and has a population of 16,000. The Fairfield County Comprehensive Plan projects that most of the housing and population growth will occur in and around Winnsboro and Ridgeway. These areas of Fairfield County increased in population by nearly 10 percent or about 1700 people between 1980 and 1990 (Fairfield County 1997). The area between Winnsboro, the Broad River, and U.S. 321 is projected to grow up to eight percent between 2000 and 2010 (CMCOG 2002).

more than 2 counties

Areas 32 to 48 km (20 to 30 mi) from V.C. Summer include eastern Newberry County, northern Lexington County, including the rapidly growing Irmo area, and Columbia, the State capitol in Richland County. These are the most rapidly growing areas within the 80 km (48 mi) radius of V.C. Summer where population gains of the 1990s are projected to continue at similar rates during the next 10 years (CMCOG 2002). There were 163 residential building permits issued in 2001 in Newberry County, in contrast to 1724 in Lexington County, and 2550 in Richland County. By comparison, just 78 residential building permits were issued in Fairfield County (CMCOG 2002). The Columbia metropolitan statistical area (Lexington and Richland Counties) grew by 8.4 percent during the 1990s, and is projected to grow by 10.7 percent between 2000 and 2010 (CCEDA 2002).

Population and growth rates 64 to 80 km (38 to 48 mi) away from V.C. Summer tend to diminish with distance. This is particularly true to the north and east.

Table 2-12 lists the age distribution of Fairfield County reported by the 2000 census and compares it to South Carolina's population for the same year. Fairfield County is essentially consistent with South Carolina for each age bracket.

- **Transient Population**

The area within the first 16 km (10 mi) of V.C. Summer is characterized as rural, wooded, and low-density residential. There is no concentration of industrial or commercial facilities or uses within this area, and none are anticipated based upon the

Table 2-12. Age Distribution of Population in Fairfield County

	Fairfield County		South Carolina	
Age Group	**Number**	**Percentage**	**Number**	**Percentage**
Under 4	1580	6.7	264,679	6.6
5 to 17	4548	19.4	744,962	18.5
18 to 44	8539	36.4	1,593,806	39.6
45 to 64	5693	24.3	923,232	23.2
65 and over	3094	13.2	485,333	12.1
Total	23,454	100.00	4,012,012	100.00

Source: CMCOG 2003b.

land uses denoted in the Comprehensive Plans for Fairfield and Newberry Counties. Transient employment is most likely to be out of this zone rather than into it, with the exception of V.C. Summer.

Monticello Reservoir and the private wooded lands that predominate are within the 16-km (10-mi) area. A small part of the Sumter National Forest is also within this area. The reservoir offers recreational opportunities, including camping and fishing, and day-time activities such as picnic tables, ball fields, and a playground. There are five public boat ramps related to the Parr Project (two on Monticello Reservoir, one on the Monticello Sub-impoundment, and two on Parr Reservoir). Gasoline-powered boat use is only restricted on the Monticello Sub-impoundment. Deer hunting is very popular in this area of Fairfield County. Private lands are leased specifically for this purpose by various sports clubs because the County is among the most densely forested in South Carolina.[a]

? Peak daily and annual transient population numbers are not available for these lake and hunting activities. The Rock Around the Clock Festival is held in late September in Winnsboro to celebrate the nation's oldest continually running municipal clock and attracts between 5000 and 12,000 people. The Pig in the Ridge Barbeque is held in Ridgeway in November and attracts several thousand. V.C. Summer refuels on an 18-month cycle and the employee population increases substantially during these 30- to 40-day outages. An average of 665 additional contractor employees have been brought in during the past three refueling outages.

outside 10 mi

- **Migrant Labor**

Migrant farm workers are individuals whose employment requires travel to tend or harvest agricultural crops. Migrant workers are typically members of minority or low-income populations. Because migrant workers travel and can temporarily spend a significant amount of time in an area without being actual residents, they may be unavailable for census takers to count. If this occurs, migrant workers would be under-represented in U.S. Census Bureau minority and low-income population counts. There is a growing Hispanic presence in the Central Midlands living near work opportunities such as the poultry processing plants in Newberry and Columbia Farms in Lexington County.[b] While Hispanics are increasingly represented in Fairfield County,

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(a) Personal communication with Mark Talbert, Clemson Agricultural Extension Service, Winnsboro, South Carolina, December 10, 2001.
(b) Personal communication with Cary Smith, United Way of the Central Midlands, Columbia, South Carolina, December 10, 2001.

there has been an exceptional increase in Newberry County as indicated by the 2000 census that shows 4.2 percent of the population as Hispanic, which is a nine-fold increase since 1990 (United Way of the Central Midlands 2002).

In 1997, Fairfield County had 172 individual farms averaging 108 ha (271 ac) and 51 full-time farms. Hay and turkeys are the major products, and the County ranks 38th of 46 in agricultural cash receipts—about $13.5 million in 2001. Timber harvesting is important in Fairfield County where the 1999 delivered value of timber was $32.2 million, placing the County third out of 46 in the State (South Carolina Agricultural Statistics Service 2002 and USDA 1997). The Clemson Agricultural Extension Service estimates that tree harvesting has increased considerably during the past 20 years while the labor to accomplish this has decreased considerably. Approximately 200 people, mostly local African Americans, are employed seasonally, and crews of migrant workers from Mexico plant trees and spray them. There are no migrant worker camps within Fairfield County.[a]

Given the expected small number of migrant workers, and the fact that they are not concentrated in Fairfield County, the staff concludes that migrant workers would not materially change the population characteristics of any particular census tract within the County.

2.2.8.6 Economy and Taxes

The communities potentially impacted socioeconomically by relicensing V.C. Summer are located in the four Central Midlands counties: Fairfield, Lexington, Newberry, and Richland. Fairfield County would experience the largest impacts of relicensing because V.C. Summer is located there, and because economic conditions including the County's tax base are much more affected by V.C. Summer than are the other three counties. Table 2-13 summarizes and compares the unemployment, family poverty level, and median household income for each of the four counties and compares these figures with the State of South Carolina. The data are from the 2000 Census.

Fairfield County has the highest unemployment and poverty rates and the lowest median household income when compared to the three other Central Midlands counties and South Carolina. There is a higher percentage of families in poverty in Fairfield County than in the State (Table 2-13). The contrast is higher when compared to the three other counties, particularly Lexington and Richland where family poverty is below the State levels. Both

(a) Personal communication with Mark Talbert, Clemson Agricultural Extension Service, Winnsboro, South Carolina, December 10, 2001.

Table 2-13. Unemployment, Poverty Level, and Median Household Income Comparison

	Percent Unemployed in Civilian Labor Force	Percent Families Below Poverty Level	Median Household Income in Dollars
Fairfield County	6.9	17.2	30,376
Lexington County	2.6	6.4	44,659
Newberry County	4.7	13.6	32,867
Richland County	4.3	10.1	39,961
South Carolina	5.9	10.7	37,082

Source: USCB 2000; Fairfield County Chamber of Commerce 2002.

Newberry and Fairfield Counties also have a median household income that is lower than the State; however, the median household income in Fairfield County is projected to rise 24 percent over the next 10 years. Fairfield County unemployment has lowered over time: it was close to 10 percent in 1997. The staff concludes that Fairfield County economic trends should be more closely analyzed regarding the relicensing of V.C. Summer because of these factors.

The Central Midlands Region, composed of Richland, Lexington, Newberry, and Fairfield Counties, is a varied mixture of rural and metropolitan areas with a total population of almost 600,000 (596,253) and an average annual growth rate of 1.7 percent (USCB 1991, 2000).

Newberry and Fairfield Counties are rural. Richland and Lexington Counties encompass the metropolitan area of Columbia, the State capital, and comprise 90 percent of the Central Midland Region's population. From 1990 to 2000, South Carolina's average annual population growth rate was 1.5 percent, while Richland, Lexington, Newberry, and Fairfield Counties increased by 1.2, 2.9, 0.9, and 0.5 percent, respectively (USCB 1991, 2000). Between 2000 and 2040, Richland, Newberry, Lexington, and Fairfield Counties are projected to grow at average annual rates of 0.6, 0.4, 1.7, and 0.4 percent, respectively (USCB 2000, TtNUS 2002). In 2000, South Carolina reported a population of approximately 4.0 million people (USCB 2000). By the year 2040, South Carolina is projected to have 5.6 million people, growing at an average annual rate of 1.0 percent (USCB 2000, TtNUS 2002).

Fairfield and Newberry Counties were settled by Scotch-Irish, English, and German immigrants in the mid-18th century. In the 19th century, large-scale cotton farming replaced small farms, and the introduction of the railroad made this a leading area for the cotton market. In recent years, emphasis has been on the manufacturing, trade, and government sectors. More

specifically, manufacturing is the number one sector for Fairfield and Newberry Counties (34.2 percent and 41.3 percent, respectively). Trade (28 percent) and government services (29.7 percent) are the largest sectors for Lexington and Richland Counties (CCEDA 1998). Although agriculture played a more significant role in the past, it is no longer a dominant force in the regional economy.

Columbia, the State capital, is located in Richland County. Nineteen Fortune 500 companies and 41 company headquarters are located in Columbia. Columbia's top employers in the public sector include Federal, State, and local government, Fort Jackson, and the University of South Carolina. Major employers in the private sector include SCE&G, Richland Memorial Hospital, Blue Cross and Blue Shield of South Carolina, Computer Sciences Corporation (formerly Policy Management Systems), and Bell South (Realty World America 2002). The major private employers in Fairfield County include V.C. Summer, Uniroyal Goodrich, Standard Products, Isola USA, Fuji Copian, Plastech Engineered Products, Salant, Wal-Mart, Lang Mekra, and Gividi USA. These 11 companies employed approximately 2835 people in 2002. Mack Truck, which employed 1300 employees during peak operations in the late 1990s, recently shut down its Fairfield County operations (CCEDA 2002). Government employs about 1030 people, and 250 work at the hospital. Since nearly 11,000 residents in Fairfield County are in the civilian labor force, and employees commute to these major employers from outside the County, it can be surmised that most County residents work in other pursuits and smaller businesses. For example, nearly 1200 list retail trade as a household occupation in the 2000 census. Private wage and salary workers compose about 78 percent of the labor pool, government accounts for about 18 percent, and those who are self-employed account for five percent. This is nearly consistent with the State as a whole, where 78 percent are private wage and salary workers, 16 percent are government workers, and six percent are self-employed (USCB 2000). Table 2-14 lists the major employers in Fairfield County.

Most of the retail and service establishments in Fairfield County are located in the incorporated areas of Winnsboro and Ridgeway where the population is sufficiently concentrated to support business activities. Most of the industrial plants are located in or near Winnsboro, and newer development occurs at the Walter Brown Industrial Park near Interstate 77 (Fairfield County 1997). While the trend is toward diversification in the manufacturing base, major employment in Fairfield County continues to be in the government, services, and retail sectors. An example of this is the October 2002 announcement that Infinity Health Foods will move into a previously occupied manufacturing facility on SC 321 and will employ up to 100 people over the next five years (CCEDA 2002). V.C. Summer has been and will continue to be a major employer located in Fairfield County, provided that it is relicensed and continues operations.
V.C. Summer pays annual property taxes to Fairfield County. These taxes fund Fairfield County operations, including the Fairfield County Public Schools. The County's operating budget includes the coroner, assessor, auditor, sheriff, detention center, road maintenance,

Table 2-14. Major Employers in Fairfield County, South Carolina

Employer	Product	Number of Employees
Fairfield County Schools	government	700
V.C. Summer	power plant	625
Ben Arnold-Sunbelt Beverage Co.	bottler	372
Uniroyal Goodrich Tire Co.	tire cords	317
Standard Products Co.	automotive trim	302
Fairfield Memorial Hospital	medical services	250
Isola USA	printed circuit boards	238
Fairfield County	government	235
Fuji Copian Corp.	typewriter cassettes	209
Plastech Engineered Products Co.	molded automotive plastics	200
Salant Corporation	textiles and clothing	200
Wal-Mart	retail	170
Lang Mekra	truck mirrors	138
Town of Winnsboro	government	96
Gividi USA	fiberglass computer parts	64

Source: CCEDA 2002, Fairfield County Chamber of Commerce 2002.

solid waste, emergency management, social services, veterans affairs, and recreation facilities. For the years 1995 to 2000, V.C. Summer property taxes provided between about 41 percent and 50 percent of Fairfield County's total property tax revenue and approximately the same percentage of Fairfield County's total operating budget. The trend has been downward during this time. Residential property taxes have increased modestly during this time as well. Other sources of revenue include various fees and fines, State aid, inventory taxes, and motor carrier taxes (Johnson 2002).

Schools in South Carolina are funded primarily with the property tax. The Fairfield County School District derived $11.4 million from taxes paid by V.C. Summer in 2002. This equates to almost 40 percent of the district's $29.5 million budget. Table 2-15 compares V.C. Summer's tax payments to Fairfield County tax revenue and operating budgets.

Table 2-15. Fairfield County Property Tax Revenues, Property Taxes Paid by V.C. Summer, and Fairfield County Operating Budget 1995 to 2000

Year	Total Fairfield County Property Tax Revenues[a] (excluding debt)	Property Tax Paid by V.C. Summer	Percent of Total Property Taxes	Operating Budget for Fairfield County[a] (excluding debt)
1995	23,338,821	11,671,000	50	23,096,221
1996	24,472,690	12,324,000	50	24,387,997
1997	25,256,855	12,629,000	50	25,234,991
1998	26,730,639	12,943,000	48	26,795,321
1999	27,772,061	12,529,000	45	27,508,743
2000	29,604,792	12,272,000	41	29,540,322

(a) SCE&G 2002a.

The South Carolina Legislature is studying the issue of electric power industry deregulation. The effects of deregulation are not yet fully known but could affect tax payments by utilities to the counties. Any changes to V.C. Summer tax rates due to deregulation would, however, be independent of license renewal.

2.2.9 Historic and Archaeological Resources

This section discusses the cultural background and the known and potential historic and archaeological resources at V.C. Summer and the immediate surrounding area.

2.2.9.1 Cultural Background

The area around V.C. Summer is rich in prehistoric and historic Native American and historic Euro-American resources. Recent literature provided adequate background information for the area. Consequently, only a brief summary is provided here. Prehistoric period overviews for South Carolina are provided by U.S. National Park Service (2003) and South Carolina Indians (2002). Historic period overviews for South Carolina are provided by Edgar (1998) and Milling (1969).

Prehistoric Period

The prehistoric Native American occupation of the region around V.C. Summer includes four general periods: Paleo-Indian period (about 10,000 to 8000 BC), the Archaic period (about

Section 4.2 References

1. Clark, Ann C. 2006. *South Carolina NPDES General Permit for Stormwater Discharges from Large and Small Construction Activities,* Power Point presentation from the series of SCDHEC information sessions on new General Permit. Effective September 1, 2006. Available at http:// www.scdhec.gov/water/powerpoint/sw1_frame.htm.

2. FPC (Federal Power Commission) 1974. *Order Issuing New License (Major), Authorizing Project Redevelopment, Permitting use of Project Waters for Condenser Cooling Purposes, Vacating Hearing Order, and Permitting Withdrawal of Intervention*, Project No. 1894, Issued August 28, 1974.

3. SCDHEC (South Carolina Department of Health and Environmental Control) 2006. *NPDES General Permit for Storm Water Discharges from Large and Small Construction Activities,* Stormwater, Construction, and Agricultural Permitting Division, Division of Water. Available at www.scdhec.gov/water/ html/erfmain.html, accessed July 28.

4. USGS (U.S. Geological Survey) 2007. Letter from Toby D. Feaster, Hydrologist of the U.S. Geological Survey, South Carolina Water Science Center, Clemson, SC, to Steve Summer, SCE&G. March 6, 2007.

Sec 4.2 Ref 1

Clark 2006

South Carolina NPDES General Permit for Stormwater Discharges from Large and Small Construction Activities

AGENDA Session I- Overview

Session II- Technical

What activities require NPDES coverage?

Review Timelines

"Operator:"

Co-Permittee and Contractor Certifications

Pre-Construction Meetings

Inspector Qualifications

Inspector Qualifications

Inspection Frequency

Inspection Frequency

Inspection Locations

Inspection Reports

Inspection Reports

Example Inspection Form

Site Stabilization

South Carolina NPDES General Permit for Stormwater Discharges from Large and Small Construction Activities

Ann Clark, Manager
Stormwater, Dams, and Agricultural Permitting Section

D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

SCEG-315

South Carolina NPDES General Permit for Stormwater Discharges from Large and Small Construction Activities

AGENDA Session I- Overview

Session II- Technical

What activities require NPDES coverage?

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Pre-Construction Meetings

Inspector Qualifications

Inspector Qualifications

Inspection Frequency

Inspection Frequency

Inspection Locations

Inspection Reports

Inspection Reports

Example Inspection Form

Site Stabilization

What activities require NPDES coverage?

- Sites that disturb 1 acre or more
- All sites within ½ mile of a receiving waterbody in the Coastal Zone [submission of the Notice of Intent (NOI) is not required for sites disturbing 0.5 acre or less]
- Less than 1 acre on case-by-case basis (statewide)

Operators and Co-Permittees

Operator: The party with operational control over construction plans and specs or the party that has operational control over day-to-day activities at a Project that are necessary to ensure compliance with a SWPPP for the site and other permit conditions (authorized to direct workers at a Site to carry out activities required by the SWPPP or comply with other permit conditions)

Co-Permittee: a permittee to an NPDES permit that is only responsible for permit conditions relating to the discharge for which it is Operator

Co-Permittee and Contractor Certifications

If you will be performing land-disturbing activities on the site, you must sign one of the statements described below

All **co-permittees** must sign a certification statement that they accept the terms and conditions of the Stormwater Pollution Prevention Plan (SWPPP) as required by the CGP issued to the Owner/ Operator and have participated in the pre-construction meeting

All **contractors that are not co-permittees** must sign a certification statement that they understand they may be accountable to DHEC to ensure compliance with the SWPPP and that they have participated in the pre-construction meeting

Pre-Construction Meetings

Purpose: Explain the SWPPP to co-permittees and contractors before they perform land-disturbing activities at the site

Meetings required **onsite** (unless approved by DHEC to be conducted offsite)

Linear projects may conduct meeting offsite

All **co-permittees, contractors that are not co-permittees and preparer of the SWPPP** (or someone with registration equivalent) or person with operational control of plans and specs must attend

Certification of pre-construction meeting required for projects disturbing 10 acres or more

Inspection Frequency

Must choose one of the following schedules and indicate on the SWPPP

(1) Once every 7 calendar days; or

(2) Once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater

Inspection frequency may be reduced to at least once every month if the **entire** site is temporarily stabilized

Site Stabilization

Existing Permit

Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than fourteen (14) days after work has ceased, unless activity in that portion of the site will resume within the next seven (7) days.

Sec 4.2 Ref 2

FEDERAL POWER COMMISSION
Bureau of Power

FINAL ENVIRONMENTAL IMPACT STATEMENT

PARR HYDROELECTRIC PROJECT
No. 1894 - SOUTH CAROLINA

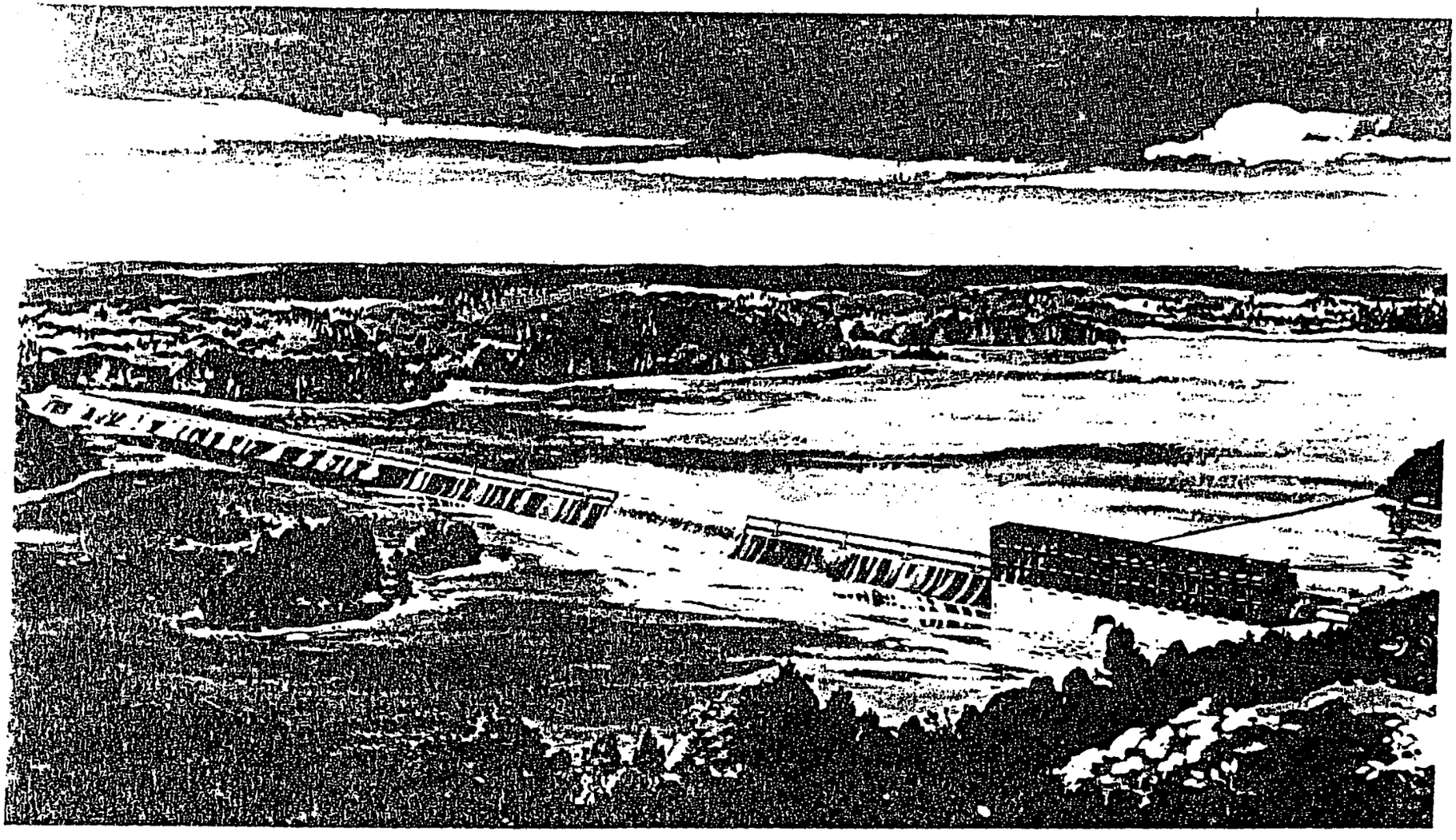
Applicant: South Carolina Electric & Gas Co.
Post Office Box 764
Columbia, South Carolina 29218

SCEG-243

Copies of this statement, No. FPC-PWR-1894, are available from the

Federal Power Commission
Washington, D. C. 20426

March - 1974

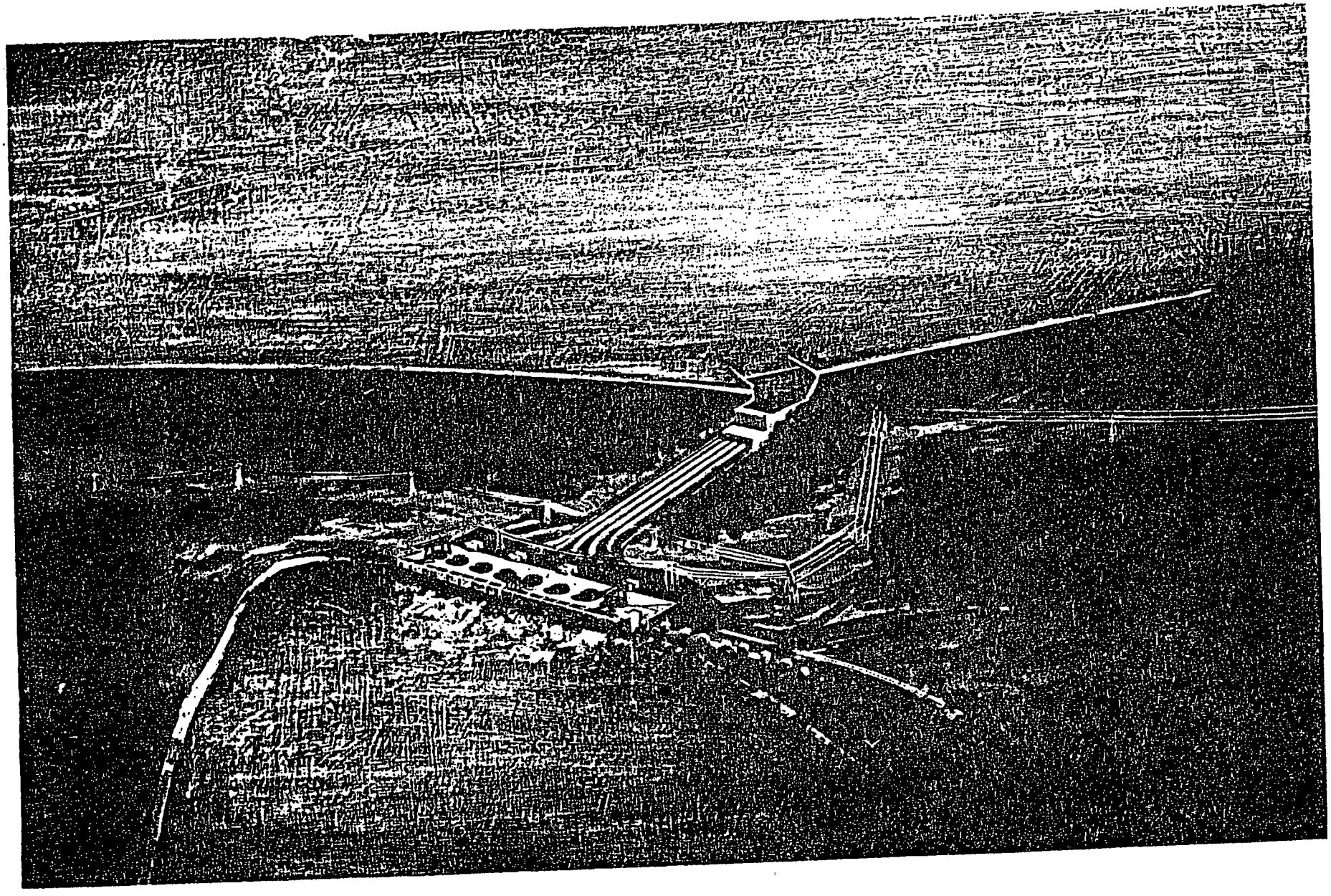


PARR PROJECT NO. 1894

PARR POWERHOUSE AND DAM WITH BASCULE GATES

PARR, SOUTH CAROLINA

SOURCE: SOUTH CAROLINA ELECTRIC & GAS COMPANY



PARR PROJECT NO. 1894

FAIRFIELD PUMPED STOR[illegible] FACILITY
PARR, SOUTH CAR[illegible]A

FOREWORD

The Federal Power Commission pursuant to the Federal Power Act is authorized to issue licenses for terms up to 50 years for the construction and operation of non-Federal hydroelectric developments subject to its jurisdiction, on the necessary condition:

> [T]hat the project adopted . . . shall be such as in the judgement of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water power development, and for other beneficial public uses, including recreational purposes . . .*

The Commission may require such other conditions not inconsistent with the provisions of the Act which may be found necessary to provide for the various public interests to be served by the project.** Compliance with such conditions during the license period is required. Section 1.6 of the Commission's Rules of Practice and Procedure allows any person objecting to Licensee's compliance with such conditions, to file a complaint noting the basis for such objection for the Commission's consideration.***

* 16 U.S.C. Sec. 803(a).
** 16 U.S.C. Sec. 803(g).
*** 18 C.F.R. Sec. 1.6 (1973).

PARR HYDROELECTRIC PROJECT
No. 1894 - South Carolina

FINAL ENVIRONMENTAL IMPACT STATEMENT

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FEDERAL POWER COMMISSION
Bureau of Power

FINAL ENVIRONMENTAL IMPACT STATEMENT

Parr Hydroelectric Project No. 1894 - South Carolina

SUMMARY SHEET

1. This is an administrative action.

2. The proposed action consists of granting or denying an application by South Carolina Electric & Gas Company (SCE&G) for a new major license for its constructed Project No. 1894, comprising the Parr hydroelectric project, located on the Broad River in Fairfield and Newberry Counties, South Carolina. In addition, Applicant seeks authorization to construct and include within the new license a pumped storage project utilizing an enlarged Parr reservoir to serve as the lower pool. The enlarged reservoir would be developed by raising the elevation of the present Parr dam approximately 9 feet and retaining the existing powerhouse structure and generating equipment. The enlarged reservoir would extend upstream about 13 miles (4.5 miles further than the existing reservoir), and would also serve as the lower pool of the proposed Fairfield pumped storage addition to the project. The pumped storage project would consist of the enlarged Parr reservoir; four random fill dams impounding the upper pool, to be known as Monticello reservoir, having a surface area of 6,800 acres; an intake channel; penstocks; the Fairfield generating station, containing eight reversible pump-turbine units having a total generating capacity of 518.4 mw; and other pertinent facilities. The upper pool would provide condenser

cooling water for the currently authorized 900-mw Unit I of the Virgil C. Summer nuclear station (Atomic Energy Commission Docket No. 50-395) and its future 900-mw Unit II. A possible second 900-mw nuclear station (totaling three 900-mw Units) to be located on the western shore of Monticello Reservoir, is also contemplated by the Applicant. However, Commission authorization to use the upper pool (Monticello reservoir) as a source of condenser cooling water has been requested for only the Virgil C. Summer nuclear complex (AEC Docket No. 50-393). The Summer nuclear station and the proposed future nuclear site would be set apart from public entry by nuclear exclusion zones established in accordance with criteria developed by the Atomic Energy Commission. The two reservoirs would have a combined water surface area of 11,200 acres at normal maximum elevations and would provide storage for power generation, cooling waters for a nuclear generating station, and recreational uses. Initial recreation facilities would include a subimpoundment for fishing, an overlook, and two boat launching areas. Appropriate parking, pincicking, water supply, and waste disposal facilities would be provided.

3. Significant environmental impacts of the proposed project would include: (1) inundation of an additional 9,350 acres of land, eliminating farmland, timber crops, and wildlife habitat, and displacing 25 homes; (2) enhanced recreational values provided by public recreational facilities at the reservoirs.

and (3) changes in existing land use. With prudent evaluation and selection of construction methods and project operation, no serious cumulative adverse environmental effects are foreseen. Conditions can be imposed in any license issued to prevent or mitigate adverse effects as well as to replace some lost resources and values.

4. Alternatives considered as realistic include: (1) the use of other means of cooling for the authorized nuclear plant and its future nuclear unit in lieu of Monticello reservoir of the redeveloped Parr project; (2) other generation modes; (3) other pumped storage hydroelectric sites; (4) denial of the application for license; and (5) issuance of a license with conditions that would protect and develop the project resources.

5. The Draft Environmental Impact Statement was circulated for comments on September 7, 1973. Federal, State, and local agencies from whom comments on the draft environmental statement were received include:

A. FEDERAL AGENCIES

Department of Agriculture, U.S. Forest Service

Department of the Army, Chief of Engineers

Department of Commerce

Department of Health, Education, and Welfare

Department of Housing and Urban Development

Department of Interior

Department of Transportation, U. S. Coast Guard

B. REGIONAL AGENCIES

Central Midlands Regional Planning Council

C. STATE OF SOUTH CAROLINA

Department of Agriculture

Department of Archives and History

Forestry Commission

Highway Department

Office of Economic Opportunity

Water Resources Commission

D. LOCAL AGENCIES AND OTHER PARTIES

South Carolina Environmental Coalition

South Carolina Electric & Gas Company

6. The final environmental impact statement was transmitted to the Council on Environmental Quality and made available to the public on or about March 19, 1974.

1. DESCRIPTION OF THE PROPOSED ACTION

South Carolina Electric and Gas Company, Licensee for the existing Parr project No. 1894, filed on July 26, 1972, an application for a new license. This application also proposes redevelopment of the Parr project to include the construction of a new development, the Fairfield pumped storage facility, located adjacent to the existing project and utilizing the existing reservoir enlarged to serve as its pumping pool. The existing Parr project, as redeveloped to include the Fairfield pumped storage facility, will be known as the Parr hydroelectric project.

The July 26, 1972, filing superseded the application for a new license for the existing Project No. 1894, filed June 19, 1969, and the amendments thereto, filed February 27 and November 16, 1970, September 29 and 30, 1971, and March 1, 1972. On January 14, 1974, an amended model study from Alden Research Laboratories was filed. On February 25, 1974, the application was amended by the filing of "Baseline Biota Study."

1.1 PURPOSES OF THE PROPOSED ACTION

The major purposes of the proposed project are to provide the Applicant with additional electrical peak generating capacity and to provide condenser cooling water for the Applicant's Virgil C. Summer nuclear station.

The application includes requests for:

(1) A new license under Section 15 of the Federal Power Act for its existing Parr Hydroelectric Project No. 1894.

(2) Authorization to enlarge the existing Parr reservoir to serve as the lower pool of the new pumped storage project.

(3) Authorization to redevelop the project to include a pumped storage project.

(4) Authorization to use the upper pool (Monticello reservoir) of the pumped storage project as a cooling impoundment for the proposed Virgil C. Summer nuclear complex. (The AEC has issued a construction permit for Unit I, Docket No. 50-395.)

Studies furnished by the Applicant show that the upper impoundment cooling capacity is adequate for two 900-mw nuclear units. A possible second 900-mw nuclear station (totaling three 900-mw units) would require alternative cooling means. The first unit of the Summer nuclear plant is scheduled for operation in 1977; however, the upper reservoir of the Fairfield project would be needed prior to that time to supply cooling water for testing purposes, provided that a license is issued for the pumped storage project. If a license is not issued, an alternative means of cooling the nuclear plant will have to be provided.

Applicant would set the Summer nuclear station and the possible future nuclear site apart from public entry by nuclear exclusion zones established in accordance with criteria developed by the Atomic Energy Commission.

1.2 GENERATING CAPACITY

The existing Parr project has an installed capacity of 14,880 kw. The proposed Fairfield pumped storage facility would have an initial installed capacity of 259,200 kw scheduled for operation in 1976, and an additional 259,200 kw scheduled for operation in 1978. The proposed initial installation would have a dependable generating capacity of 240 mw. The final installation would increase the facility's dependable capacity to 480 mw. Including the first 900-mw unit of the Summer nuclear plant, scheduled for operation in 1977, the total dependable capacity to be added to the Applicant's system will amount to 1,380 mw from 1976 to 1978. This amounts to an increase of 45 percent in system capacity and accounts for all of the Applicant's scheduled capacity additions in that period.

The average annual energy generated by the existing Parr project is about 84,000,000 kwh. Under the redevelopment plan, this would increase to about 88,000,000 kwh, due to the higher average operating head resulting from the enlarged Parr Reservoir.

It is estimated that the proposed Fairfield pumped storage development would generate about 650,000,000 kwh in 1978 and 800,000,000 kwh in 1982. The increased generation would result from operating at a higher plant factor, because of the availability of additional low-cost nuclear pumping energy from the second unit of the Summer nuclear plant.

1.3 NEED FOR POWER

The Federal Power Commission Staff has reviewed peak load and energy growth in the Applicant's service area, and also in the Virginia-Carolinas subregion of the Southeastern Electric Reliability Council, of which Applicant's service area is a part. Table 1-1 shows the estimate of Applicant's peak-load growth for the years 1975 to 1980. The table also shows scheduled capacity additions to the system for the same period. Without the Fairfield capacity, system reserve in the year 1976 would be only 6.4 percent, and in 1978 it would be only 6.9 percent. This appraisal does not include an estimate of the effects of an organized energy conservation program in the Applicant's area. Such a program might have an effect similar to that detailed in Section 8.3. The approximate effect would be to delay the growth figures shown in Table 1-1 by one year at most.

Generally, a system reserve of about 20 percent of system peak load is considered the minimum required for reliable operation. The Virginia-Carolinas subregion is planning on a minimum reserve capacity of about 19 percent in the middle and later years of the 1970's. On this basis, capacity additions equivalent to the Fairfield facility are essential in 1976 and 1978 to help meet projected reserve requirements. Even with the availability of the Fairfield capacity, the Applicant's reserve would only be 14.3 percent in 1976 and 14.4 percent in 1980; hence other sources of reserve capacity might be required

Table 1-1

Peak Load and Capacity Forecast, 1975-1980,
South Carolina Electric & Gas

	1975	1976	1977	1978	1979	1980
Load-Peak Demand mw						
Area Peak	2563	2857	3186	3554	3960	4410
Contract Sales	149	149	149	149	70	-
Total Load	2712	3006	3335	3703	4034	4410
Capacity - mw						
Capacity Additions						
Fossil	-	-	-	-	611	-
Summer Nuclear	-	-	900	-	-	-
Fairfield Pump Hydro	-	240	-	240	-	-
Total Capacity						
Fossil	2526	2526	2526	2526	3137	3137
Hydro	243	243	243	243	243	243
Gas Turbine	289	289	289	289	289	289
Pump Hydro	-	240	240	480	480	480
Nuclear	-	-	900	900	900	900
Total	3058	3298	4198	4438	5049	5049
Purchases	140	140	-	-	-	-
Total Capacity Available	3198	3438	4198	4438	5049	5049
Reserve with Fairfield	486	432	863	735	1015	639
Reserve without Fairfield	486	192	623	255	535	159
Percent Reserve with Fairfield	18.0	14.3	25.8	19.8	25.2	14.4
Percent Reserve without Fairfield	18.0	6.4	18.7	6.9	13.3	3.6

on a short-term basis, such as purchases from neighboring utilities or small additional gas turbine installations.

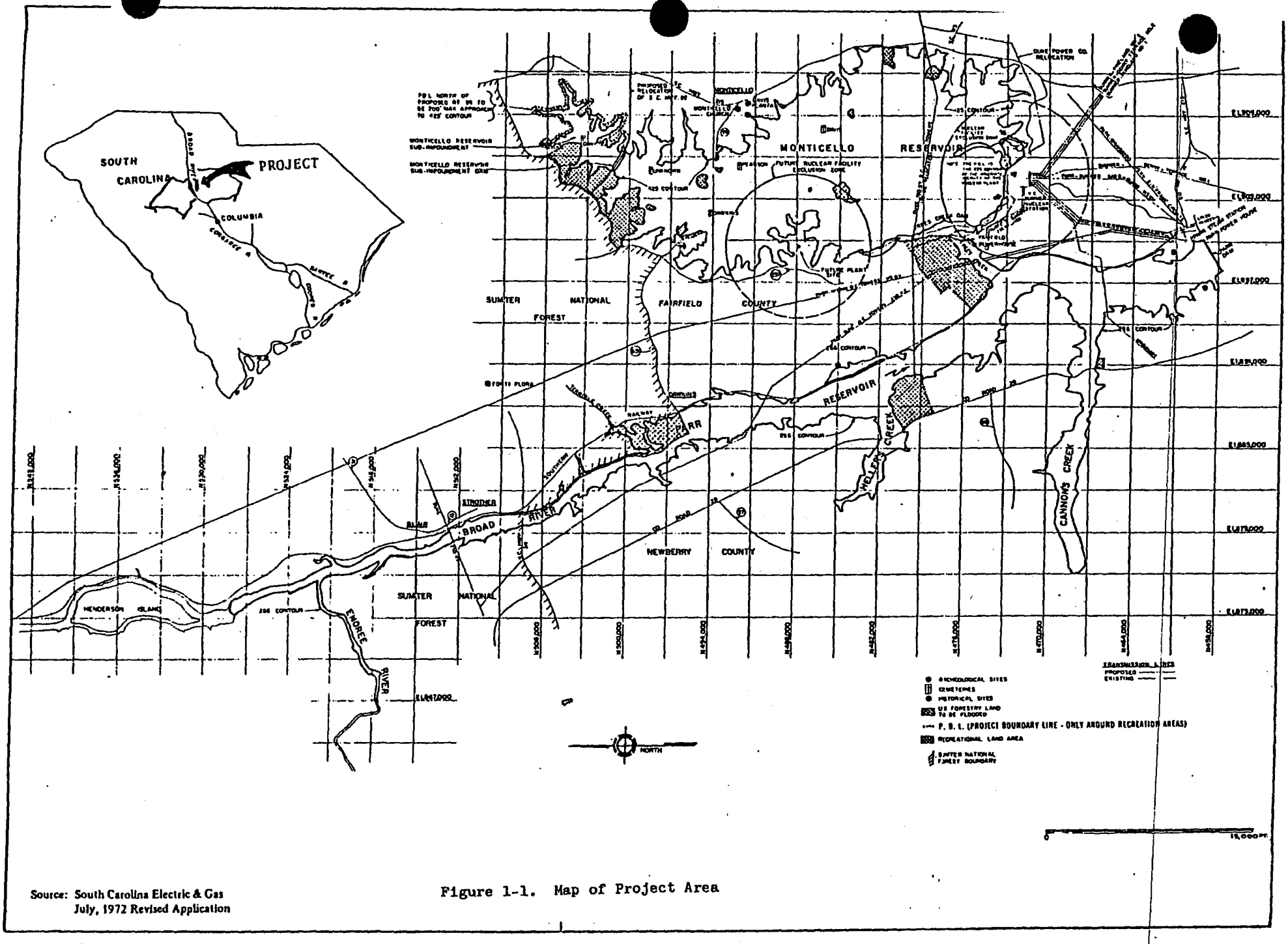
1.4 LOCATION AND RELATIONSHIP TO OTHER HYDRO PROJECTS

The redeveloped Parr project would be located in Fairfield and Newberry Counties, with the major portion of the project in Fairfield County. The project site is along the Broad River, about 26 miles northwest of Columbia, South Carolina, at river mile 28 (Figure 1-1).

The site includes a fossil-fuel steam electric generating plant, a gas turbine plant, and an existing hydroelectric plant (Parr Project No. 1894), as well as the decommissioned Virginia-Carolinas tube-reactor nuclear power experimental plant.

The Broad River, is one of the major headwater tributaries of the Santee River Basin and has its origin in the Blue Ridge Mountains of North Carolina. The Broad River joins with the Saluda River at Columbia, South Carolina, to form the Congaree River, which flows into Lake Marion of the Santee-Cooper project, where its confluence with the Wateree-Catawba River forms the Santee River proper.

The central portion of the Santee Basin lies in the industrial Piedmont Crescent that extends from Raleigh, North Carolina, to Atlanta, Georgia. The basin is served by 60 electric utility systems, South Carolina Electric & Gas being one of the five largest. Hydroelectric developments in the basin and a basin profile are shown in Figures 1-2 and 1-3, respectively.



Source: South Carolina Electric & Gas
July, 1972 Revised Application

Figure 1-1. Map of Project Area

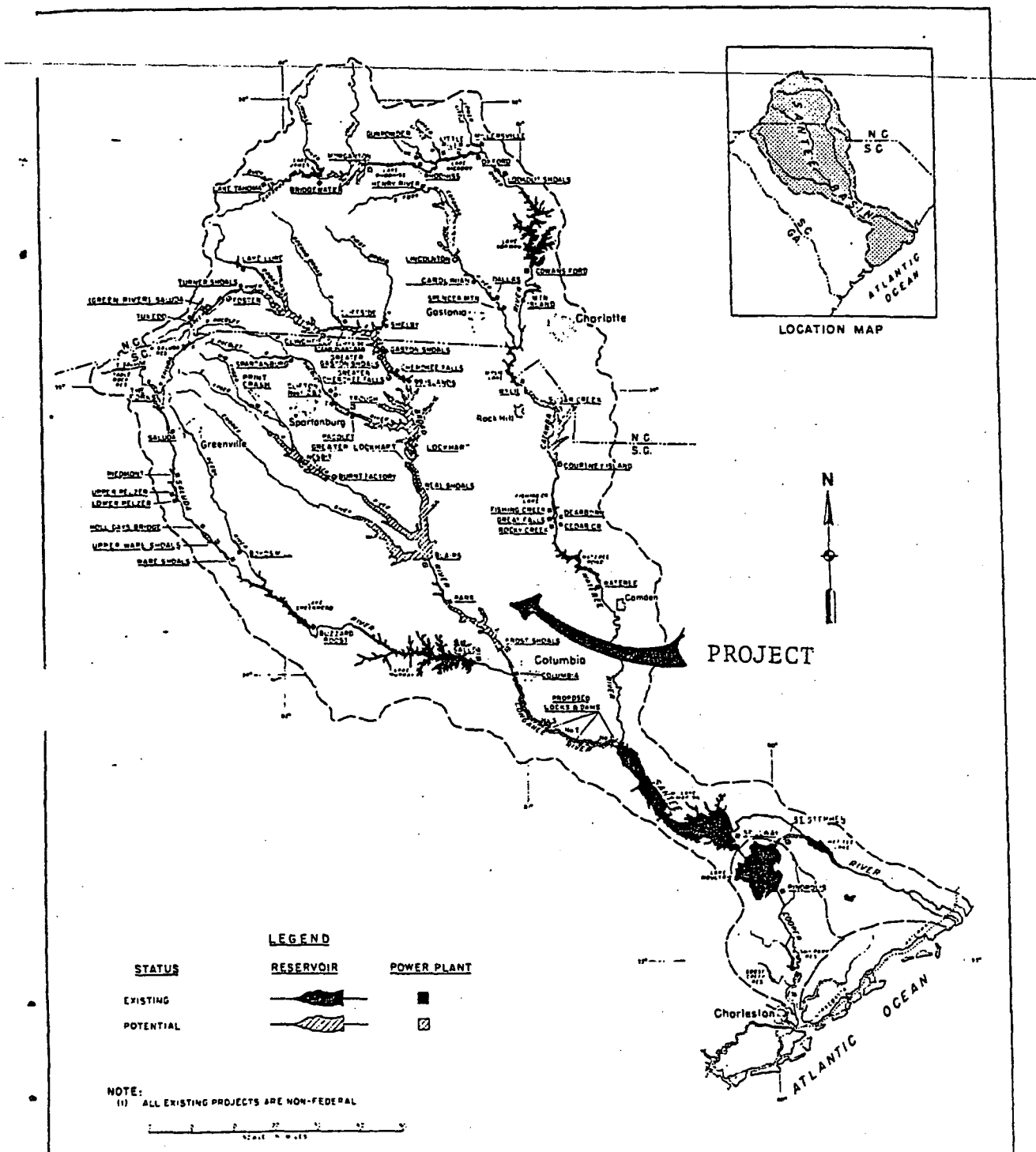


Figure 1-2. Basin Map, Santee River

Source: Federal Power Commission Santee River Basin Development Report

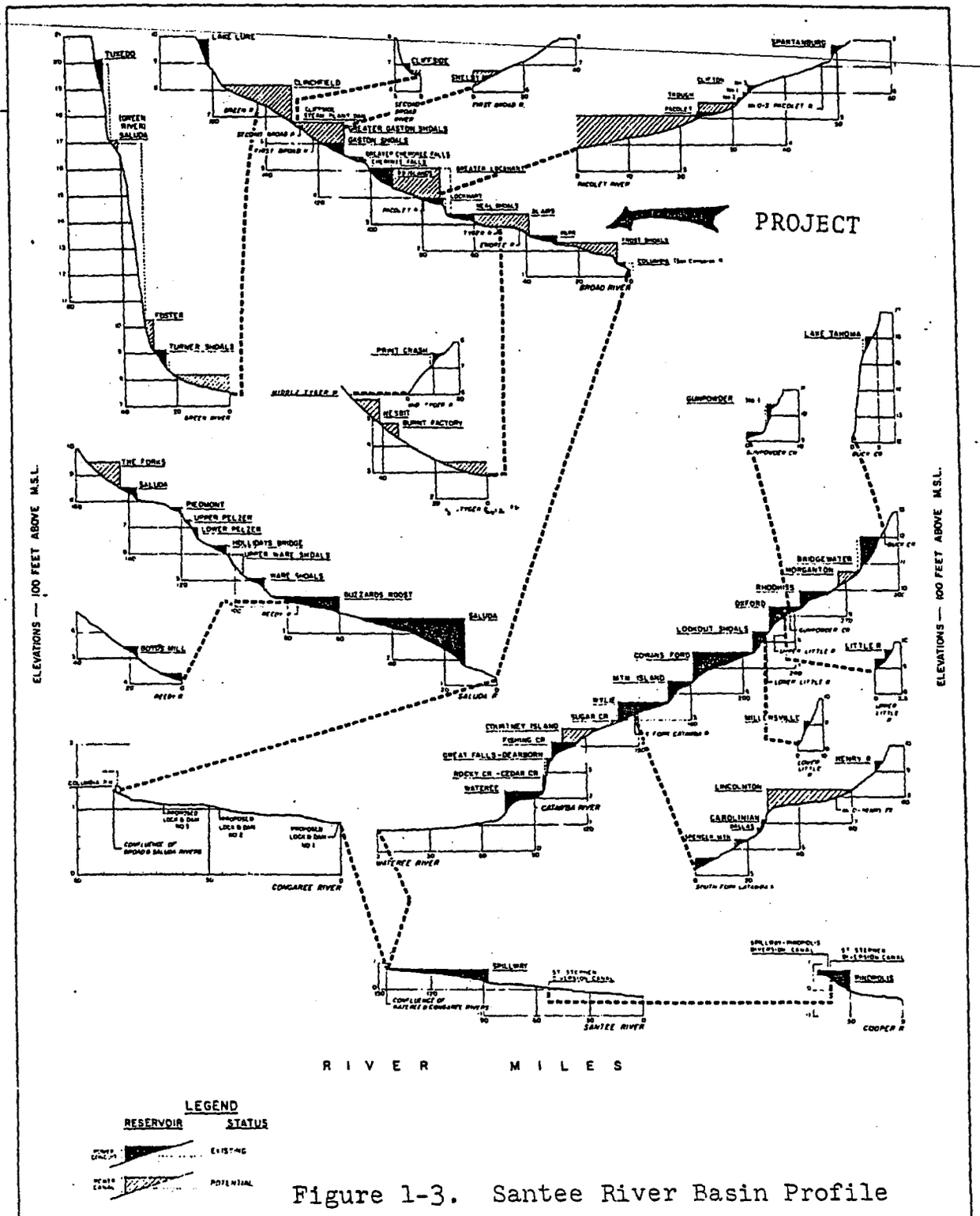


Figure 1-3. Santee River Basin Profile

Source: Federal Power Commission Santee River Basin Development Report

The Broad River drainage system contains 18 hydroelectric projects, of which eight are located on the main stem. Table 1-2 shows data for these projects. Of these eight plants, three are operating under FPC license. In addition, license applications for four projects on the main stem and six projects on tributaries are being processed.

There are also 11 hydroelectric projects located within the Saluda, Santee, and Cooper River systems. One of these projects is on a tributary of the Saluda River, and eight are on the main stem. The Santee-Cooper project has one powerhouse on the Santee River and one on the headwaters of the Cooper River drainage. No hydroelectric projects are located on the Congaree River. Six of the 11 hydroelectric projects are operating under existing licenses, and three have applications for licenses pending. Pertinent engineering data for each plant are shown in Table 1-3.

Besides Parr, Applicant owns two other hydroelectric plants on the Broad River: Neal Shoals, located 32 miles upstream from Parr Shoals, and Columbia, located 26 miles downstream. These three plants, all under FPC licenses, furnish a total capacity of 30,680 kw to the Applicant's system. Each plant has sufficient pondage to provide six hours of continuous generation.

Applicant also owns two other hydroelectric plants, Saluda on the Saluda River and Stevens Creek on the Savannah River.

Table 1-2

Data for Hydroelectric Projects,
Broad River System

Plant name	Lake Lure	Tuxedo	Turner	Cliffside	Shelby	Gaston Shoals
Project number	2665 a/	2563 a/	2563 a/	-	-	2332
Date license expires	-	-	-	-	-	-
Owner	Town of Lake Lure	Duke Power Co.	Duke Power Co.	Cone Mill Corp.	Lily Mills Co.	Duke Power Co.
River	Broad	Green	Green	Second Broad	First Broad	Broad
River mile	161	42	23	2	4	110
Drainage area, sq. mi.	95	42	126	211	285	1,250
Mean flow, cfs.	170	90	280	295	380	2,030
Spillway design, cfs.	-	6,300	34,000	-	-	-
Elevations, feet, msl 1/						
Top of dam 2/	-	2,020.8	922.6	-	-	613.4
Max. water surface 3/	-	2,017.4	918.6	-	-	614.2
Top of gates 4/	991	-	-	702	660	605.4
Crest of spillway	-	2,012.6	911.6	698	658	599.4
Max. power pool	991	2,012.6	911.6	702	660	605.4
Min. power pool	975	2,005.6	908.6	698	660	600.4
Normal tailwater 5/	887	1,717.1	825.9	672	635	558.6
Min. tailwater 6/	883	1,715.3	822.8	672	635	553.4
Reservoir						
Max. power pool, acre-ft.	-	10,204	11,927	-	-	-
Min. power pool, acre-ft.	-	8,069	10,657	-	-	-
Usable for power, acre-ft.	13,500	2,135	1,270	Pondage	-	1,150
Max. area, acres	900	324	438	-	-	251
Heads, feet 1/						
Gross static 7/	108	297.3	88.8	30	25	52.0
Net effective 8/	100	285.5	83.2	28	25	46.5
Min. net	84	278.5	80.2	26	25	41.5
Power plant						
Installed capacity, kw	3,600	5,000	5,500	1,625	600	9,140
Auxiliary capacity, kw	0	0	0	0	0	125
Min. head capability, kw	3,000	5,900	5,600	1,300	600	7,200
Avg. ann. generation, mwh	10,000	21,300	14,600	2,900	1,800	30,100
Construction date	1927	1920	1925	1933	1900	1908

Table 1-2 (contd)

Data for Hydroelectric Projects,
Broad River System

Plant name	Cherokee Falls 10/	99 Islands	Spartanburg	Clifton No. 3	Clifton No. 1	Clifton No. 2
Project number	-	2331	-	2626	2625	2625
Date license expires	-	-	-	-	-	-
Owner	Burlington Ind	Duke Power Co.	Comm. of Pub. Wks.	Dan River Mills	Dan River Mills	Dan River Mills
River	Broad	Broad	South Pacolet	Pacolet	Pacolet	Pacolet
River mile	102	91	2	33	32	31
Drainage area, sq. mi.	1,500	1,550	93	318	319	320
Mean flow, cfs.	2,350	2,400	150	440	440	440
Spillway design, cfs.	-	-	-	-	-	-
Elevations, feet, msl 1/						
Top of dam 2/	-	523.6	-	-	-	-
Max. water surface 3/	-	524.6	-	-	-	-
Top of gates 4/	543	511.1	778	626	-	575
Crest of spillway	539	509.1	773	621	597	572
Max. power pool 5/	543	511.1	778	625	597	575
Min. power pool 6/	541	506.1	761	620	592	571
Normal tailwater	524	442.9	722	598	576	558
Min. tailwater	523	437.4	720	597	575	557
Reservoir						
Max. power pool, acre-ft.	-	-	4,462 9/	-	-	-
Min. power pool, acre-ft.	-	-	1,074	-	-	-
Usable for power, acre-ft.	Pondage	4,127	Pondage	Pondage	Pondage	Pondage
Max. area, acres	-	885	1,914	-	-	-
Heads, feet 1/						
Gross static 7/	20	73.7	58	28	22	18
Net effective 8/	19	67.9	56	27	21	17
Min. net	17	62.9	39	22	16	13
Power plant						
Installed capacity, kw	1,750	18,000	1,000	1,100	800	532
Auxiliary capacity, kw	0	250	0	0	0	0
Min. head capability, kw	-	16,300	1,000	1,000	500	500
Avg. ann. generation, mwh	5,000	65,600	4,400	2,800	3,000	2,100
Construction date	1955	1910	1925	1903	1929	1888

Table 1-2 (contd)

Data for Hydroelectric Projects,
Broad River System

Plant name	Pacolet	Lockhart	Neal Shoals	Print Crash	Parr Shoals	Columbia
Project number	2621 a/	2620 a/	2315	-	1894	1895
Date license expires	-	-	12-31-93	-	6-30-70	6-30-70
Owner	Pacolet Mfg. Co.	Lockhart Power Co.	S.C.E.&G. Co.	Startex Mills	S.C.E.&G. Co.	S.C.E.&G. Co.
River	Pacolet	Broad	Broad	Middle Tyger	Broad	Broad
River mile	23	72	60	10	28	2
Drainage area, sq. mi.	460	2,600	2,730	72	4,750	5,230
Mean flow, cfs.	620	3,640	3,800	95	5,600	6,300
Spillway design, cfs.	-	-	-	-	-	-
Elevations, feet, msl 1/						
Top of dam 2/	-	410	340.8	-	272.2	171.0
Max. water surface 3/	-	-	-	-	-	-
Top of gates 4/	524	-	334.1	755	-	-
Crest of spillway	521	400	330.8	753	257.2	153.8
Max. power pool	524	396	334	755	257.0	153.8
Min. power pool	518	390	331	749	256.0	148.8
Normal tailwater 5/	498	344	310	701	223.0	119.3
Min. tailwater 6/	497	343	308	701	223.0	118
Reservoir						
Max. power pool, acre-ft.	-	-	-	-	-	-
Min. power pool, acre-ft.	-	-	-	-	-	-
Usable for power, acre-ft.	Pondage	Pondage	Pondage	Pondage	Pondage	Pondage
Max. area, acres	-	300	600	-	2,925	265
Heads, feet 1/						
Gross static 7/	27	53	26	54	35.0	36.0
Net effective 8/	26	52	24	54	33.0	32.0
Min. net	20	46	21	48	31.0	27.0
Power plant						
Installed capacity, kw	800	12,300	5,200	1,200	14,880	10,600
Auxiliary capacity, kw	0	0	0	0	0	0
Min. head capability, kw	600	13,000	0	1,000	13,000	7,000
Avg. ann. generation, mwh	2,700	70,000	30,000	2,300	75,000	50,500
Construction date	1937	1920	1905	1895	1914	1928

a/ License application pending.
1/ Figures containing decimal indicate data furnished by owner, others have been estimated from best available data.
2/ Bulkhead or embankment. 3/ Experienced or expected. 4/ Or flashboards. 5/ With plant at normal full operation.
6/ With plant shut down or maximum power pool at downstream plant. 7/ Maximum power pool minus minimum tailwater.
8/ Maximum power pool minus normal tailwater and losses. 9/Water supply only - power generated when excess water available.

Table 1-3

Data for Hydroelectric Projects,
Saluda-Santee River System

Plant name	Saluda (Greenville)	Piedmont	Upper Pelzer	Lower Pelzer	Holidays Bridge	Ware Shoals
Project number	2406	2428 a/	-	-	2465	2416 a/
Date license expires	12-31-93		-	-	12-31-93	-
Owner	Duke Power Co.	J.P. Stevens & Co.	The Kendall Co.	The Kendall Co.	Duke Power Co.	Rigel Textile
River	Saluda	Saluda	Saluda	Saluda	Saluda	Saluda
River mile	137	120	117	114	103	89
Drainage area sq. mi.	315	375	409	414	531	564
Mean flow, cfs.	600	740	750	800	880	1,000
Spillway design, cfs.	-	-	-	-	-	-
Elevations, feet, msl 1/						
Top of dam 2/	855.7	-	-	702	638.2	-
Max. water surface 3/	854.2	-	-	-	636.7	-
Top of gates 4/	849.0	774	725	700	634.0	508
Crest of spillway	845.7	773	720	696	628.6	503
Max. power pool	849.0	774	725	700	634.0	508
Min. power pool	846.0	773	723	699	628.6	504
Normal tailwater 5/	807.6	750	700	662	592.0	457
Min. tailwater 6/	804.9	748	700	658	590.0	456
Reservoir						
Max. power pool, acre-ft.	7,228	-	-	-	-	-
Min. power pool, acre-ft.	5,684	-	-	-	-	-
Usable for power, acre-ft.	1,544	Pondage	Pondage	Pondage	Pondage	Pondage
Max. area, acres	475	-	-	-	465	-
Head, feet 1/						
Gross static 7/	44.1	26	25	42	44.0	52
Net effective 8/	41.1	24	25	38	41.7	51
Min. net	38.1	23	23	37	36.3	47
Power plant						
Installed capacity, kw	2,400	1,000	1,650	3,280	3,500	5,000
Auxiliary capacity, kw	70	0	0	0	55	0
Min. head capability, kw	2,100	500	500	1,000	-	5,000
Avg. ann. generation, mwh	7,800	6,700	6,000	10,000	12,700	19,000
Construction date	1905	1937	1920	1894	1906	1906

Data fc [illegible] oelectric Projects,
Saluc [illegible] ee River System

Plant name	Boyds Mill	Buzzard Roost	Saluda	Spillway	Pinopolis
Project number	2649 a/	1267	516	199	199
Date license expires	-	2-10-85	8-4-77	4-1-76	4-1-76
Owner	Duke Power Co.	Greenwood Co. 9/	S.C.E.&G. Co.	S.C.P.S. Auth. b/	S.C.P.S. Auth. b/
River	Reedy	Saluda	Saluda	Santee	Cooper Canal
River mile	17	60	12	87	49
Drainage area, sq. mi.	224	1,150	2,400	14,700	15,000
Mean flow, cfs.	315	1,650	2,700	2,200	14,000
Spillway design, cfs.	-	147,500	-	800,000	-
Elevation, feet, msl 1/					
Top of dam 2/	540.8	457.0	375.0	88.0	88.0
Max. water surface 3/	543.2	450.0	368.0	76.8	75.2
Top of gates 4/	535.3	441.5	365.0 & 362.0	76.8	-
Crest of spillway	532.7	415.0	340.0 & 330.0	63.0	-
Max. power pool	535.3	440.0	360.0	75.7	75.2
Min. power pool	535.3	420.0	330.0	60.0	60.0
Normal tailwater 5/	487.6	385.0	186.5	27.0	7.2
Min. tailwater 6/	485.9	375.0	171.7	26.0	-1.5
Reservoir					
Max. power pool, acre-ft.	-	270,000	2,096,000	1,450,000	1,110,000
Min. power pool, acre-ft.	-	96,000	1,040,000	350,000	450,000
Usable for power, acre-ft.	Pondage	174,000	1,056,000	1,100,000	660,000
Max. area, acres	246	11,400	51,000	110,600	60,400
Heads, feet 1/					
Gross static 7/	49.4	65.0	188.0	49.7	76.7
Net effective 8/	47.4	53.5	172.0	46.7	67.5
Min. net	47.4	33.5	142.0	31.0	52.3
Power plant					
Installed capacity, kw	960	15,000	208,750 10/	1,920	132,615
Auxiliary capacity, kw	35	0	0	0	0
Min. head capability, kw	-	8,000	182,000 10/	1,900	91,100
Avg. ann. generation, mwh	5,200	47,000	236,800	12,000	657,000
Construction date	1909	1940	1930	1950	1942

a/ License application pending. b/ South Carolina Public Service Authority.
1/ Figures containing decimal indicate data furnished by owner, others have been estimated from best available data.
2/ Bulkhead or embankment. 3/ Experienced or expected. 4/ Or flashboards. 5/ With plant at normal full operation.
6/ With plant shut down or maximum power pool at downstream plant. 7/ Maximum power pool minus minimum tailwater.
8/ Maximum power pool minus normal tailwater and losses. 9/ Owned by Greenwood County Electric Power Commission and leased to Duke Power Company. 10/ Includes 78,750 kw additional unit under construction.

The total existing hydroelectric capacity owned by the Applicant is about 250 mw, which represented about 10 percent of the total system's dependable capacity of 2,427 mw at the end of 1972.

1.5 DESCRIPTION OF EXISTING AND PROPOSED FACILITIES

The project as proposed would consist of: (1) the existing 14,880-kilowatt Parr Hydroelectric Project No. 1894, as modified to include 9-foot high Bascule gates atop the dam, forming an enlarged Parr reservoir which would serve as the lower pool of the 518.4-mw Fairfield pumped storage addition; and (2) an upper reservoir (Monticello), which would also be used as a cooling impoundment for the currently authorized 900-mw Unit I and the future 900-mw Unit II of the nuclear electric power plant.

The plans showing the layout of the existing project, the proposed redevelopment, and technical features of project works are shown in Figures 1-4 through 1-8.

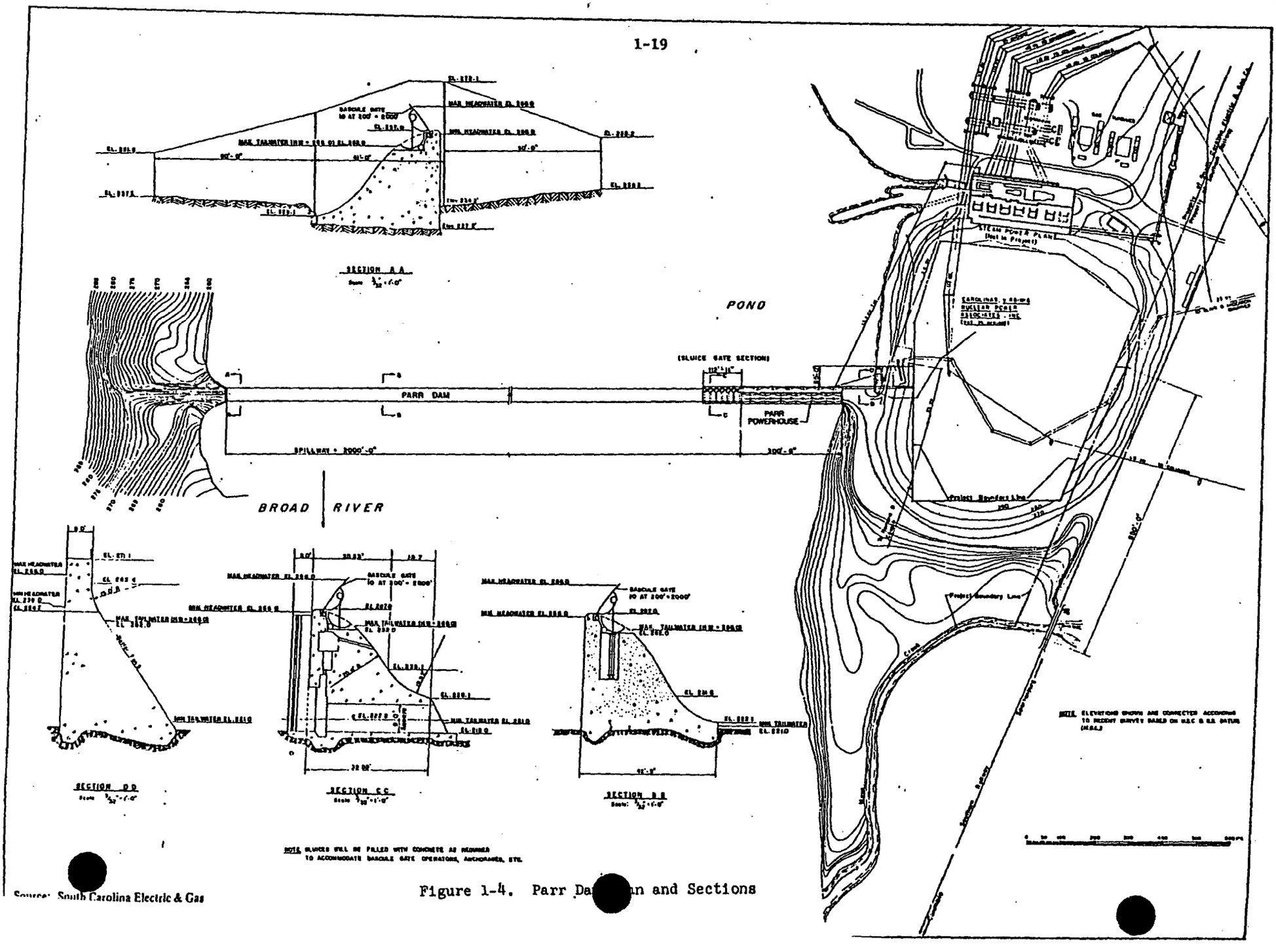
The existing project is a conventional hydroelectric facility comprising: (1) a 2,715-foot long dam having a 39-foot high, 2,000-foot long concrete overflow section with a crest elevation of 257.0 feet msl, joined on the westerly end by an earth dike about 300 feet long and on the easterly end by a 300-foot long integral powerhouse section, a 90-foot long concrete nonoverflow section, and a 25-foot long earth-fill section; (2) a reservoir having a surface area of 1,850 acres with normal surface elevation of 257.0 feet msl, extending about 8-1/2 miles upstream; (3) a steel-frame brick powerhouse containing six

generators rated at 2,480 kilowatts each, and two empty bays; and (4) all other facilities appurtenant to operation of the project, including a transmission tie to the 13,200-volt bus at the Applicant's nearby Parr steam electric plant.

The redeveloped project for which a license is requested of the Federal Power Commission would consist of four major project parts.

The first part would be (a) the existing Parr powerhouse structure and generating equipment; (b) the existing Parr dam, raised in elevation approximately 9 feet by installing Bascule gates atop the dam; and (c) an enlarged Parr reservoir having a surface area of 4,400 acres at maximum normal headwater elevation of 266 feet msl, extending upstream for about 13 miles, and having a usable storage capacity of 29,000 acre-feet in a drawdown of 10 feet. The enlarged Parr reservoir would continue to provide water for operation of the existing Parr project, would serve as the lower reservoir of the proposed pumped storage project, and would have sufficient capacity to provide for eight hours of continuous pumped storage generation at 480 mw. The existing dam, shown with the proposed Bascule gates, and the existing powerhouse are depicted on Figures 1-4 and 1-5.

The second part would be the Fairfield pumped storage facility, comprising (a) an upper pool (Monticello reservoir) having a surface area of 6,800 acres and a gross capacity of 400,000 acre-feet at normal elevation of 425 feet msl, with a usable capacity of 29,000 acre-feet in 4.5 feet of drawdown; (b) a 5,000-



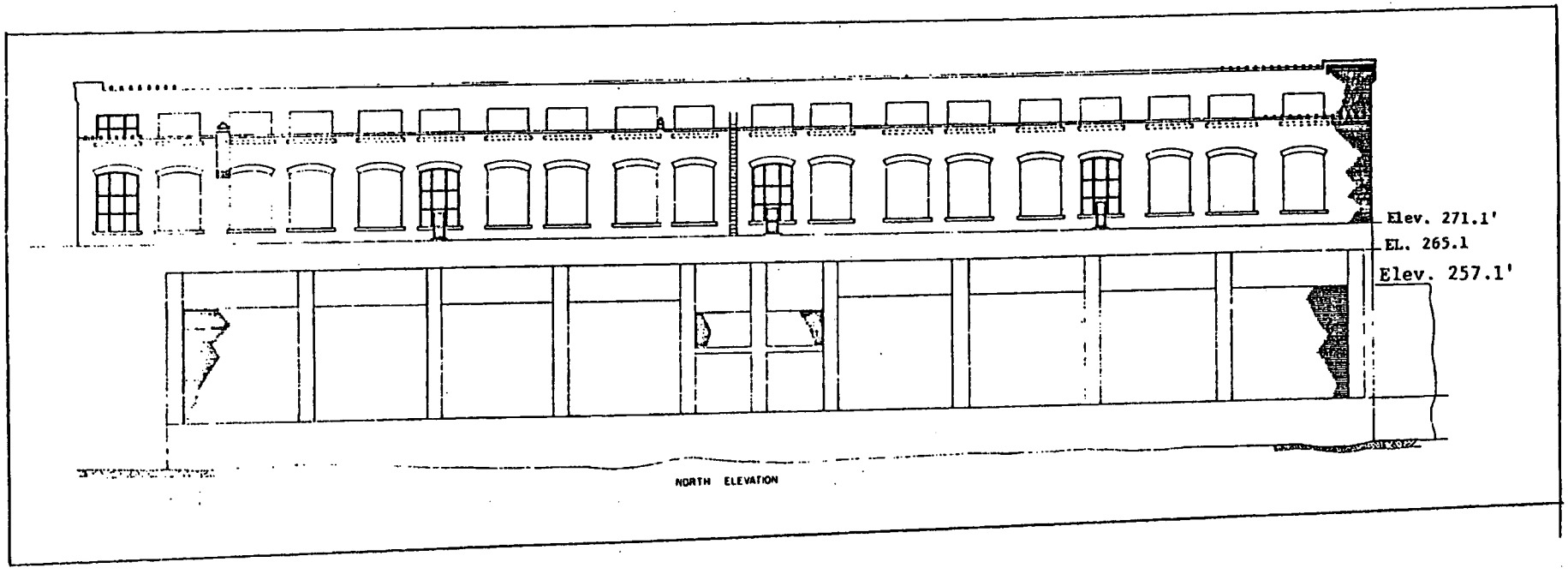
Source: South Carolina Electric & Gas

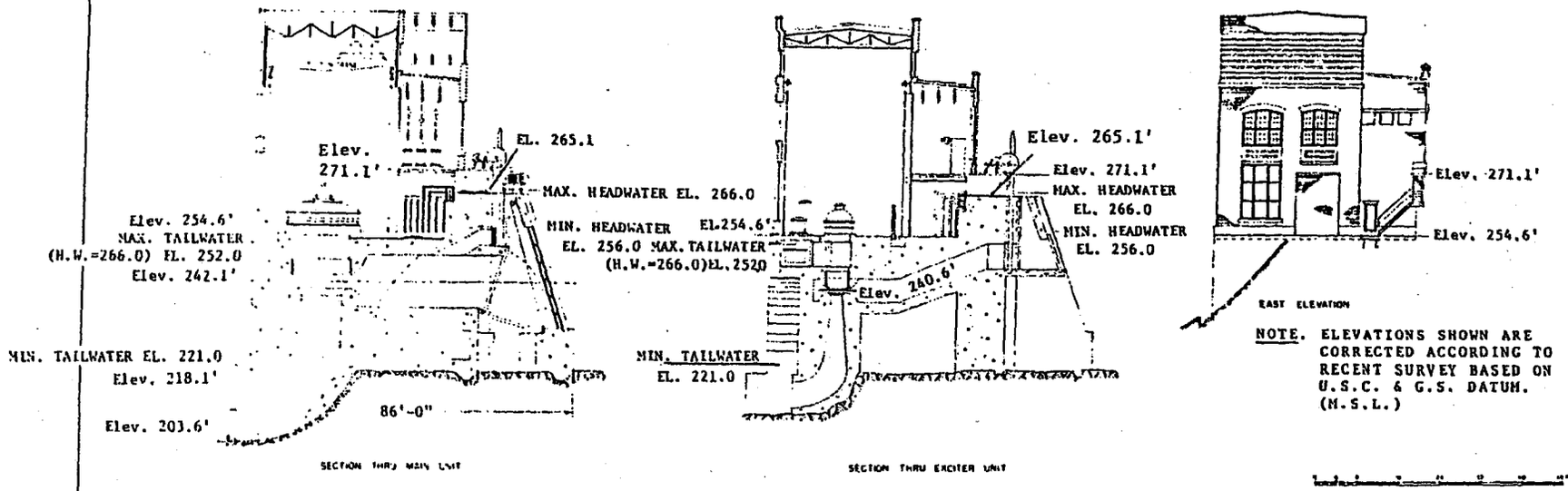
Figure 1-4. Parr Da[illegible]n and Sections

foot long, 180-foot high Frees Creek dam and three smaller saddle dams having lengths of 3,400 feet, 1,700 feet, and 900 feet and varying in height from 50 to 90 feet, all of earth-fill, with crests at an elevation of 434 feet msl, as shown in Figure 1-7; (c) a 400-foot wide, 600-foot long intake channel in the south abutment of the main dam, terminating at a gated intake structure with invert at elevation 375 feet, and four 26-foot diameter surface penstocks, bifurcating into eight 18-foot diameter concrete-encased penstocks connecting to the powerhouse; (d) the Fairfield powerhouse, containing eight reversible pump-turbine units having a minimum capability of 83,000 hp each, at the minimum head of 150 feet, directly coupled to eight motor-generators, each with a nameplate rating of 64,800 kw in the generating mode and 100,000 hp when operating as a motor; (e) a switchyard at the powerhouse; (f) two 6,000-foot long, 230-kv transmission lines connecting the Fairfield plant with the Summer nuclear plant; and (g) all other appurtenant facilities.

The Fairfield powerhouse and switchyard are shown schematically in Figure 1-8.

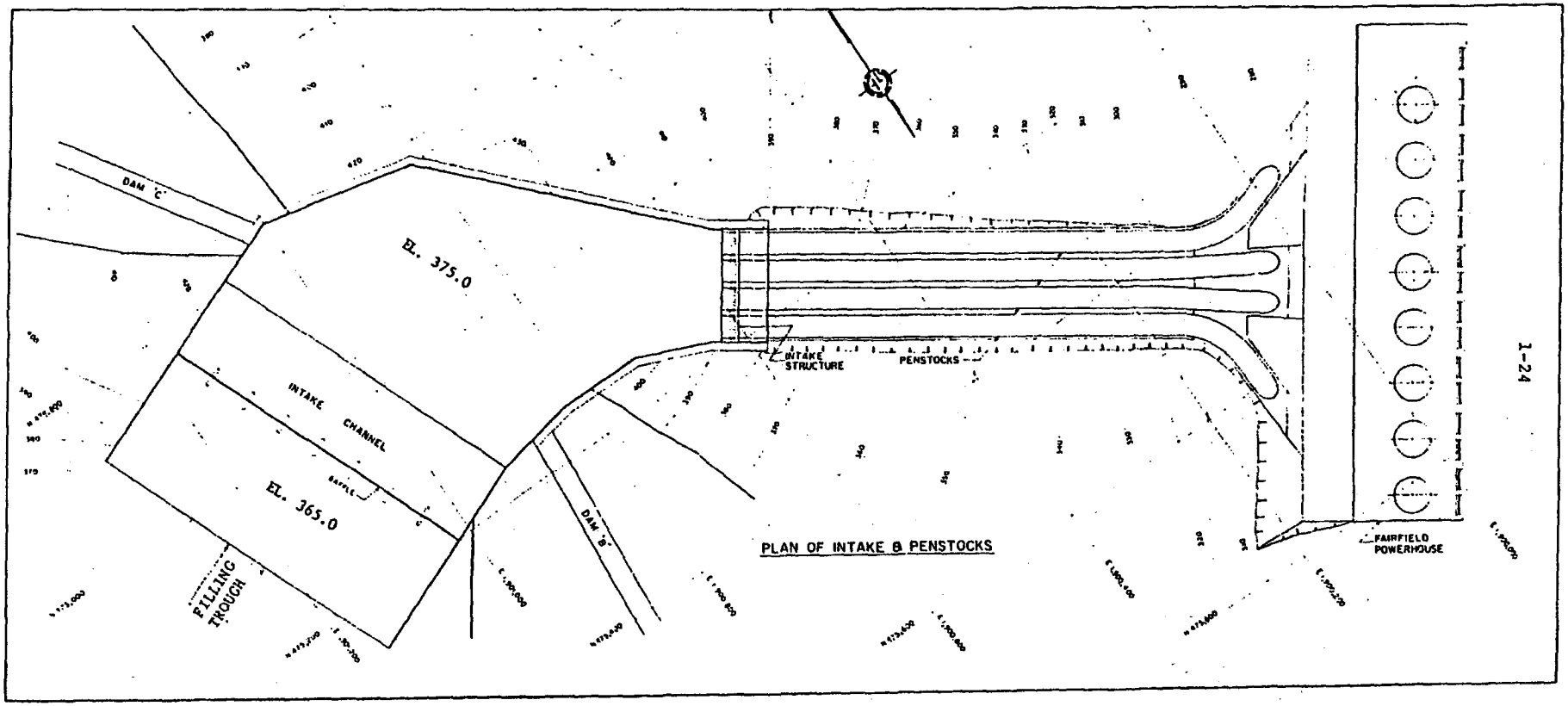
The third part would be recreational features, including (a) a boat launching area on Parr reservoir adjacent to the crossing of Hellers Creek by County Road 28; (b) a separate 300-acre subimpoundment within the northernmost portion of Monticello reservoir, containing a public boat launching area with parking and sanitary facilities, on land to be purchased for


Elev. 271.1'
EL. 265.1
Elev. 257.1'
NORTH ELEVATION

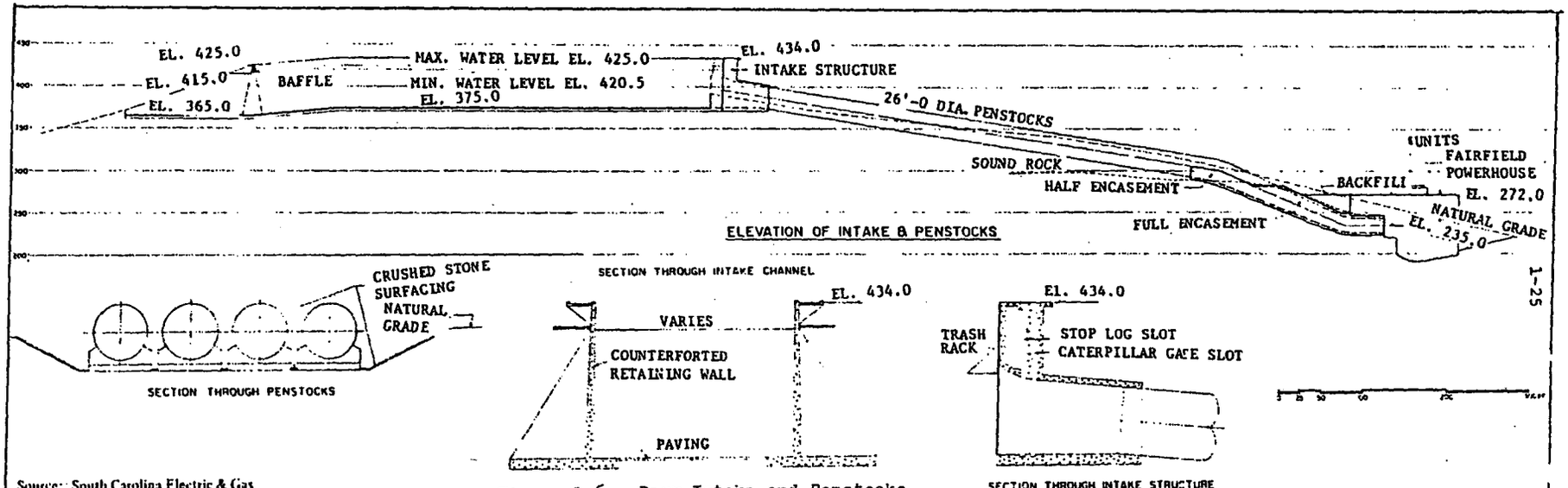


Source: South Carolina Electric & Gas
July, 1972 Revised Application

Figure 1-5. Parr Powerhouse

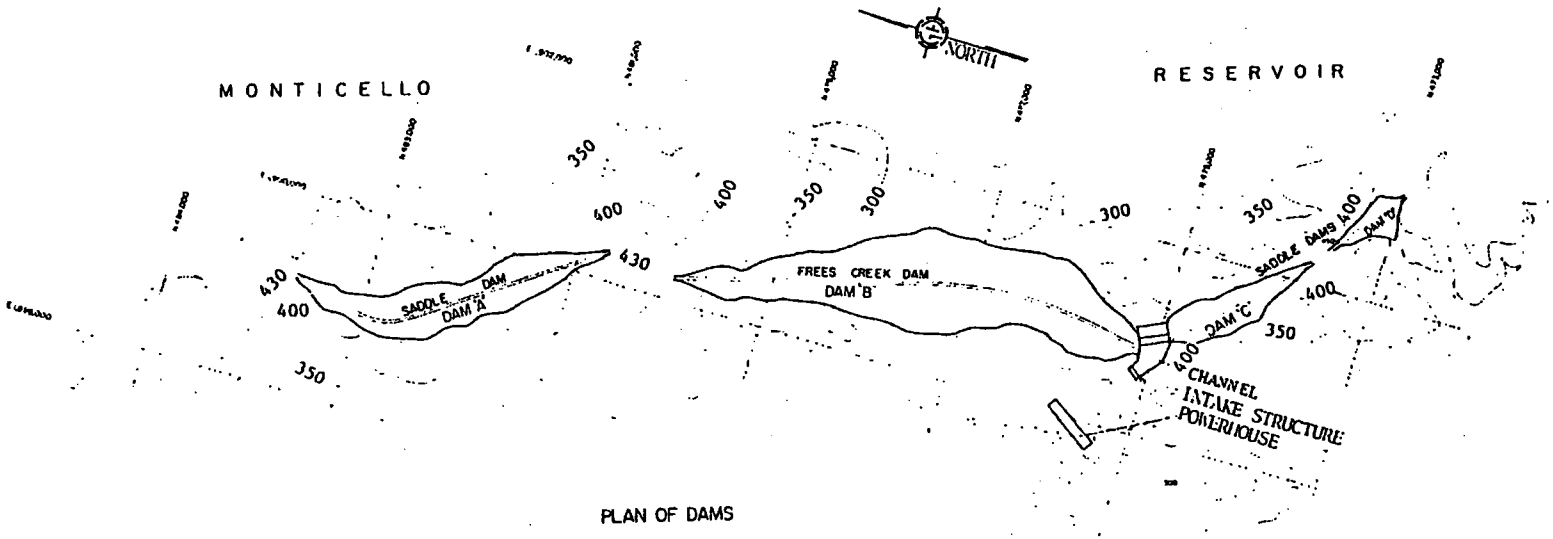


PLAN OF INTAKE & PENSTOCKS

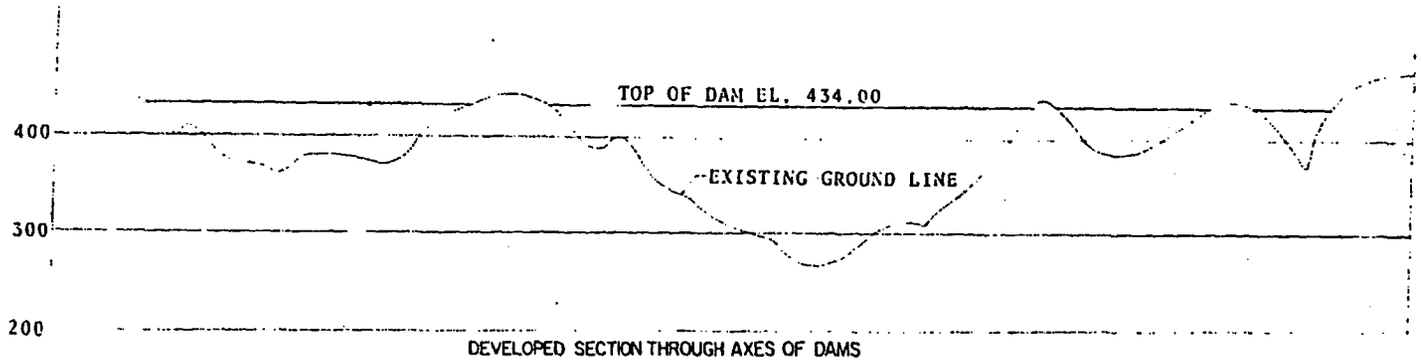


Source: South Carolina Electric & Gas
July, 1972 Revised Application

Figure 1-6. Parr Intake and Penstocks

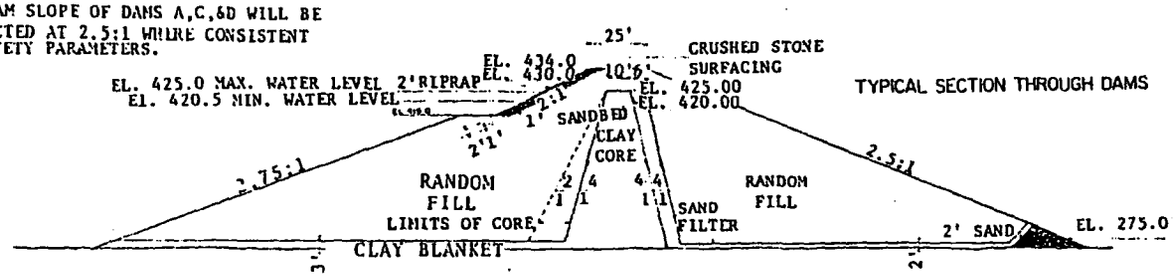

MONTICELLO
RESERVOIR
NORTH
SADDLE DAM
DAM 'A'
FREES CREEK DAM
DAM 'B'
SADDLE DAMS
DAM 'C'
DAM 'D'
CHANNEL
INTAKE STRUCTURE
POWERHOUSE
430
400
350
300

PLAN OF DAMS



DEVELOPED SECTION THROUGH AXES OF DAMS

NOTE:
UPSTREAM SLOPE OF DAMS A,C,&D WILL BE CONSTRUCTED AT 2.5:1 WHERE CONSISTENT WITH SAFETY PARAMETERS.



TYPICAL SECTION THROUGH DAMS

ROCK TOE BELOW EL. 275.0 ON DOWNSTREAM SIDE DAM "B" ONLY.

Source: South Carolina Electric & Gas
July, 1972 Revised Application

Figure 1-7. Frees Creek Dams

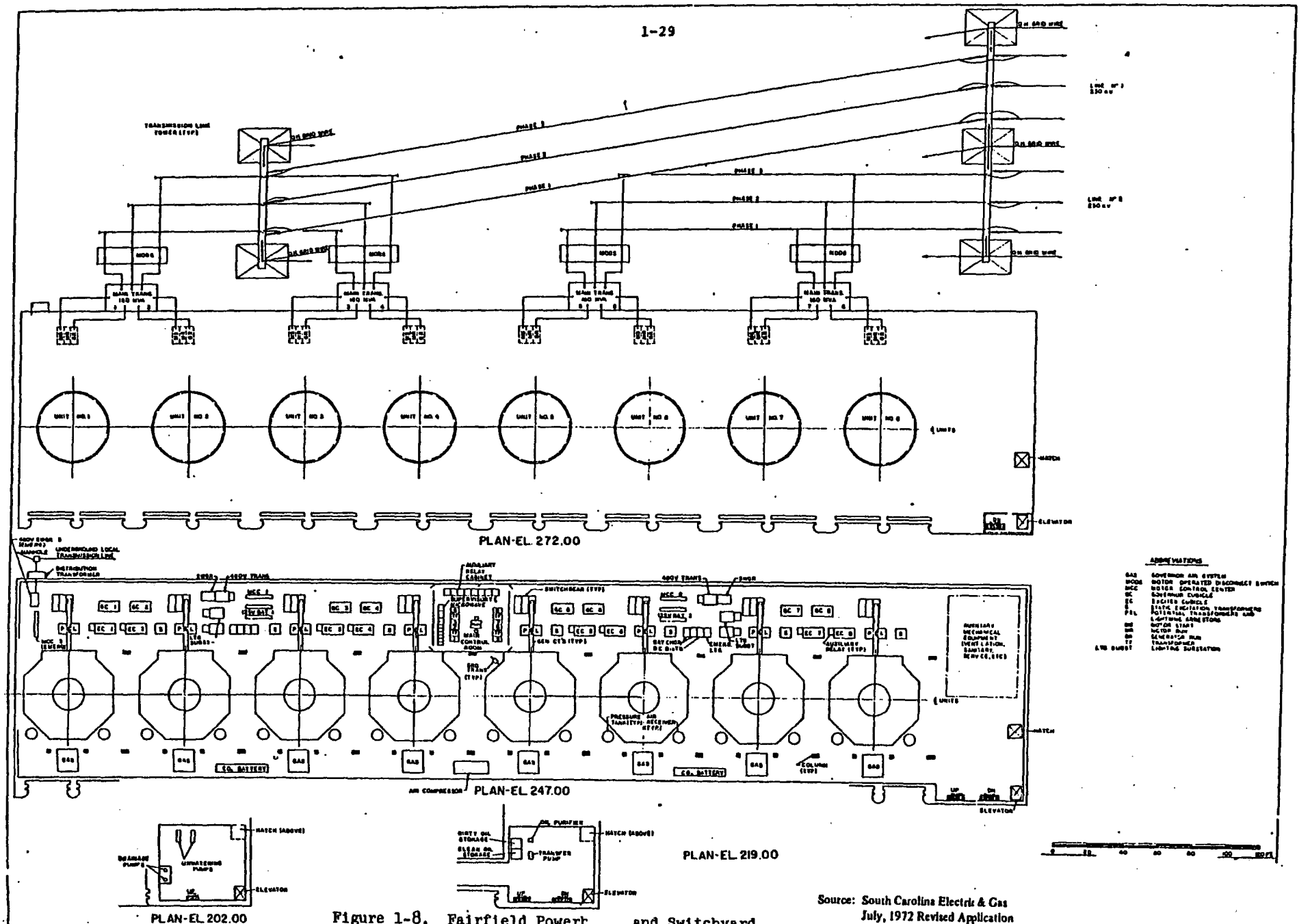


Figure 1-8. Fairfield Powerr and Switchyard

Source: South Carolina Electric & Gas
July, 1972 Revised Application

recreational purposes; and (c) a 23-acre scenic overlook with an observation platform, to be located on the eastern shore of Monticello reservoir, with parking, sanitary, and picnic facilities (Figure 1-1).

The fourth part, the Virgil C. Summer nuclear station, would initially contain a single nuclear reactor and a single 900-mw generator, and would be a major facility of an overall electric power generating complex. A permit to construct the Virgil C. Summer plant and its initially proposed 900-mw unit was issued by the Atomic Energy Commission in AEC Docket No. 50-395 on March 21, 1973. The nuclear plant would utilize a pressurized water reactor, and cooling water would be provided by the Monticello reservoir of the redeveloped Parr project. Authorization to permit utilization of Monticello reservoir as a source of condenser cooling water for the proposed nuclear plant is requested of the Federal Power Commission in this action. A final environmental statement for this nuclear facility was issued by the Atomic Energy Commission in January 1973.

No navigation works or fish ladders, hatcheries, or protective devices are affected by the existing project or the proposed redevelopment.

A geological investigation of the project sites, conducted by the Applicant, has revealed adequate foundation conditions for the project structures. The investigation consisted of: seismic refraction surveys, test borings and test pits, field investigation and mapping of site vicinity, and a magnetic anomaly survey.

At Dam A, the northernmost dam, the underlying migmatitic rock is overlain by 50 to 90 feet of residual soil, consisting generally of stiff, clayey and sandy silts underlain by saprolitic, generally dense, micaceous silty sand.

The main dam, Dam B , to be constructed across Frees Creek, is underlain by Charlotte Belt gneiss on the north side of the creek, migmatitic rock in the immediate vicinity of Frees Creek, and granodioritic rock on the south side of the creek. On the ridge flanks and slopes to either side of Frees Creek, stiff and dense saprolitic soil, ranging in depth from 10 to 110 feet, overlies the rock. Soft and loose alluvial deposits ranging from 13 to 35 feet deep overlie the migmatitic rock in the Frees Creek bottom.

Dams C and D, south of Frees Creek, are underlain by granodioritic rock beneath a 40 to 110-foot thickness of saprolitic soil.

Borings drilled near the existing Parr dam generally encountered migmatitic rock, overlain by a 10 to 35-foot thickness of stiff and dense sandy soil. Field evidence compiled by the Applicant suggests that a fault, inactive for over 200 million years, might be located near Parr dam. Future activity of this fault, if it does exist, is considered very unlikely.

The migmatitic rock encountered in the borings drilled in the Fairfield powerhouse area is overlain by 5 to 38 feet of a loose silty sand, increasing in density with depth.

The conclusions drawn in the geological study are: (1) the diverse combination of metamorphosed, sedimentary, and volcanic rock, covered by the varying depths of residual soil underlying the dam and powerhouse sites, should provide adequate support for the proposed facilities; and (2) there are no geological features of the project area which would preclude its use for construction and operation of the redeveloped project.

The staff of the Federal Power Commission utilized this basic geological information and other technical data for its engineering analysis of the project, including the existing structures. This evaluation included a study of the design of project structures for safety and adequacy purposes.

The transmission facilities associated with the project would consist of two parallel 230-kv transmission line circuits, approximately one mile in length, between the Fairfield powerhouse and the Virgil C. Summer nuclear station. The lines would be carried on wooden H-frame structures 60 to 70 feet high. The two circuits would be located on a common right-of-way with about eight structures per circuit. The proposed right-of-way would be 170 feet wide.

A nonproject, 100-kv, double-circuit transmission line belonging to Duke Power Company would have to be relocated to a new right-of-way about 5-1/2 miles in length. The relocated Duke line and the project lines would utilize a common right-of-way 240 feet wide for a distance of 2,000 feet.

Due to the combined limitations of the pumped storage project and the nuclear cooling impoundment, recreational opportunities would be primarily restricted to three areas: Hellers Creek, the scenic overlook, and the subimpoundment on Monticello reservoir.

Plans for initial development of project recreation facilities include a boat launching area on the Heller's Creek arm of Parr reservoir; a 300-acre subimpoundment fishing area on Monticello reservoir, containing a public boat-launching area, swimming area, and parking and sanitary facilities; and a scenic overlook on Monticello reservoir, with an observation platform and parking, sanitary, and picnic facilities. No bank fishing, primitive camping on the islands, or water contact sports would be allowed on the main body of Monticello reservoir, since preliminary restrictions by the South Carolina Water Pollution Control Authority classify Monticello reservoir as a waste heat impoundment. Permission to allow swimming in the subimpoundment will be requested after the project is constructed. Estimated costs of initial recreation development and annual operating costs are shown in Table 1-4.

A list of proposed recreational facilities with land areas is given in Table 1-5.

Table 1-4

Estimated Costs of Initial
Recreational Development and Annual Operating Costs

Land 1,416.5 acres at $450/acre	$ 637,425.00
Fishing Area Impoundment	325,000.00
Boat Launching Facilities (2)	18,000.00
Overlook & Picnic Area	32,000.00
Total Cost of Initial Development	$1,012,425.00
Annual Operating Cost of Initial Development	$ 25,000.00

Table 1-5

Recreation Development Acreage

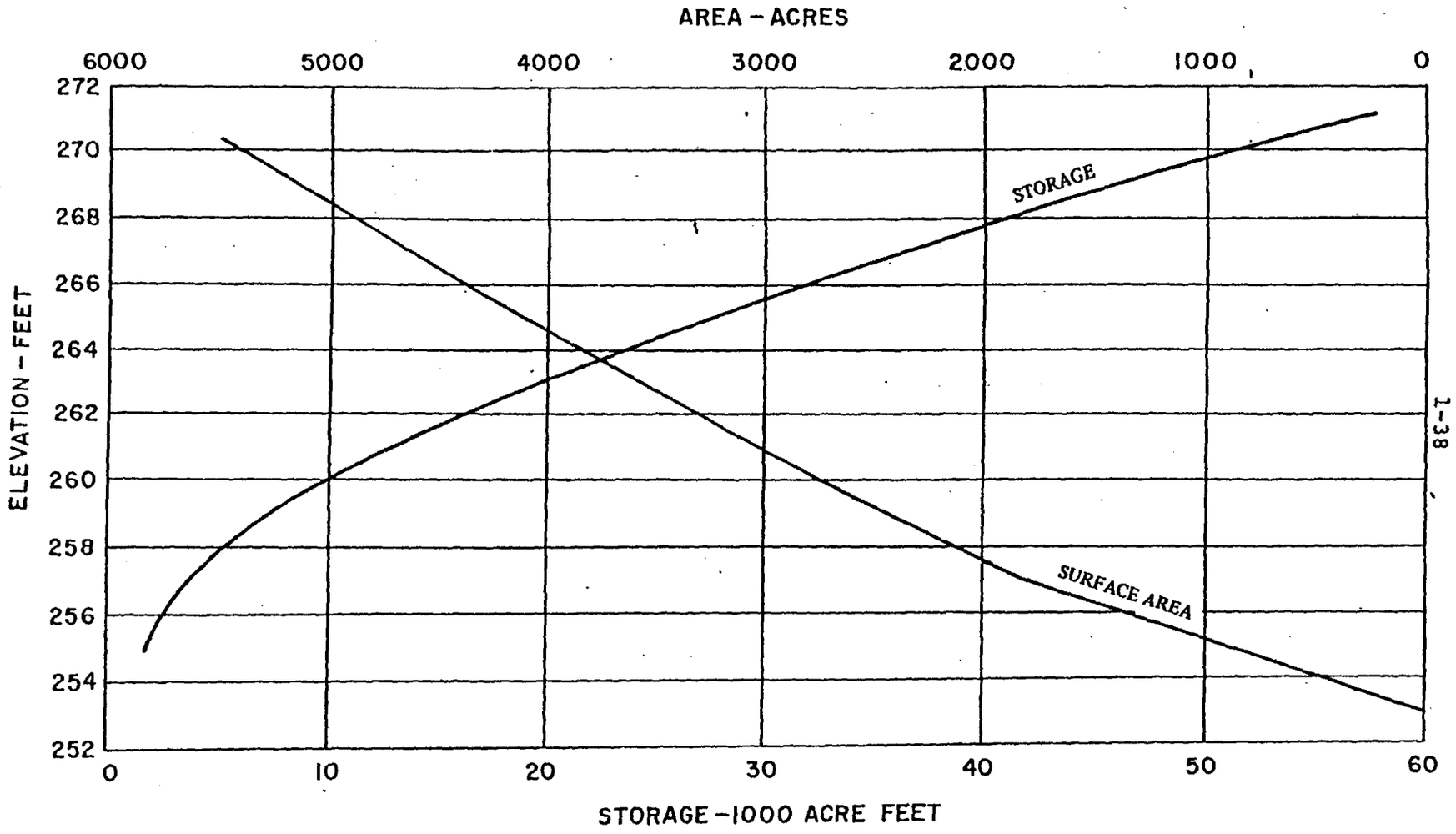
	Acres
Recreational Areas - Initial Development	
Monticello Reservoir Subimpoundment	300
Scenic Overlook	
Covered Platform Benches (2) Picnic Tables (10) Walkways Parking (15 cars) Water Sanitary Facilities Visitor Center	30
Boat Landing Area (Subimpoundment)	
Parking (10 cars with connected trailers) Ramp (12' width, concrete) Sanitary Facilities	2
Boat Landing Area (Parr Reservoir)	
Parking (5 cars with connected trailers) Ramp (12' width, concrete) Sanitary Facilities	2
Total Initial Development	334.0
Reserved for Future Recreational Development, General	1,082.5
Total Recreational Development	1,416.5

1.6 DESCRIPTION OF RESERVOIRS AND CONTROL WORKS

At normal maximum elevation of 266 feet msl, the proposed Parr reservoir would have a usable storage capacity of 29,000 acre-feet and a surface area of approximately 4,400 acres. At normal minimum pool elevation of 256 feet msl, the surface area would be about 1,400 acres and the volume would be about 2,500 acre-feet. The operating drawdown of the pool would be 10 feet. Figure 1-9 shows area and storage capacity curves, and Table 1-6 lists certain specific surface areas and storage capacities of the proposed Parr reservoir.

The proposed Monticello upper reservoir would have a surface area of about 6,800 acres and a total volume of about 400,000 acre-feet at normal maximum water surface elevation of 425 feet msl. The maximum daily withdrawal for generating purposes would be 29,000 acre-feet, lowering the pool to elevation 420.5 feet msl, and reducing the surface area to approximately 6,500 acres. Pumping operations at night would refill the reservoir. Figure 1-10 and Table 1-7 give area and capacity curves and a tabulation of surface areas and capacities, respectively.

The recreation subimpoundment proposed for the upper end of Monticello reservoir would have a surface area of about 300 acres with its level maintained at elevation 425



Source: South Carolina Electric & Gas
July, 1972 Revised Application

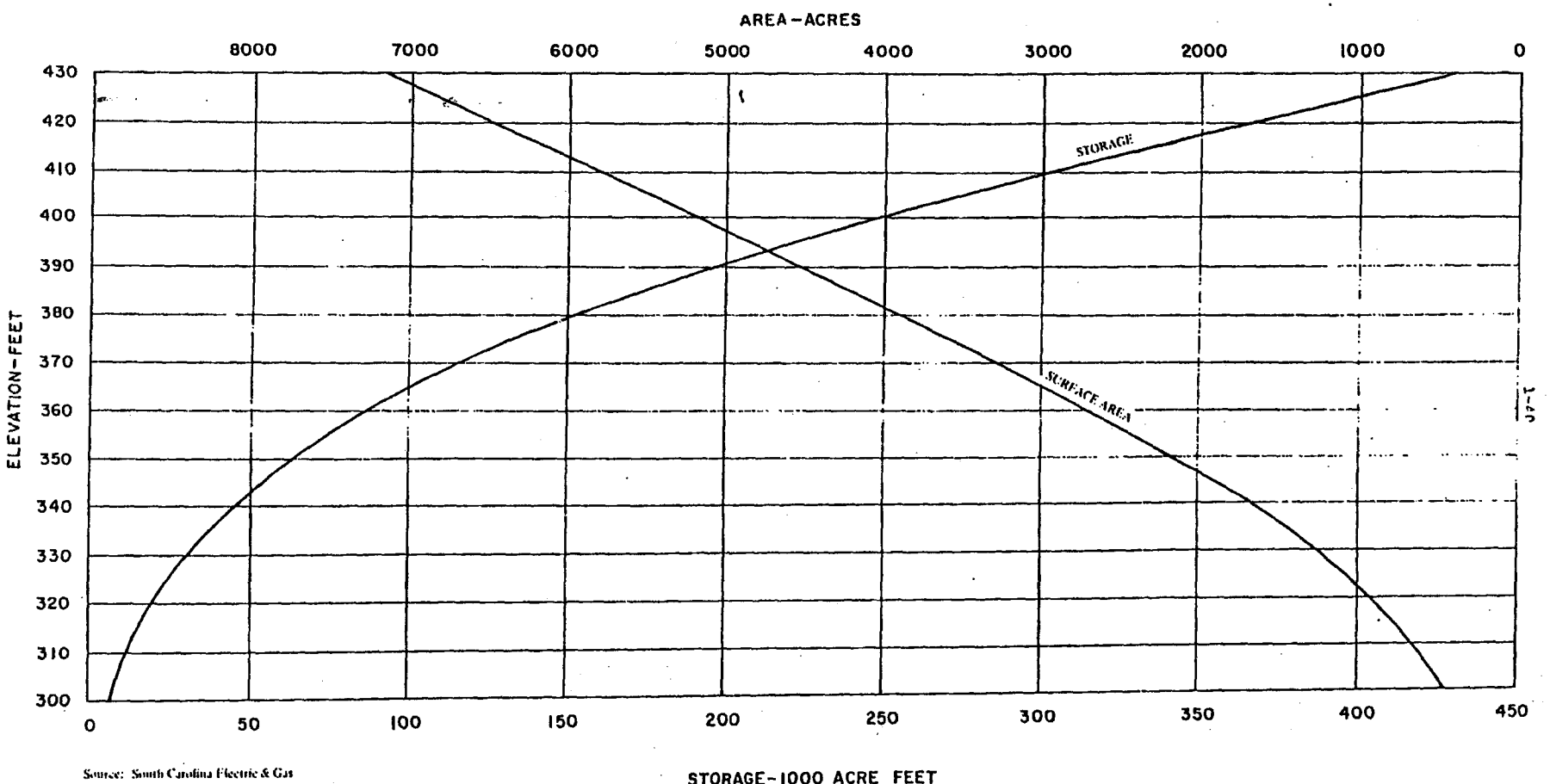
Figure 1-9. Area and Storage Capacity Curves, Parr Reservoir

Table 1-6

Parr Reservoir, Surface Areas and Capacities

Elevation (feet)	Area (acres)	Differential Volume (acre-feet)	Cumulative Volume (acre-feet)
253	0		
		2,500	
256	1,375		2,500
		7,671	
260	2,727		10,171
		21,329	
266	4,369		31,500
		19,616	
270	5,402		51,116

Source: South Carolina Electric & Gas
Revised Application For License July 26, 1972



Source: South Carolina Electric & Gas
July, 1972 Revised Application

Figure 1-10. Area and Storage Capacity Curves, Monticello Reservoir

1-40

Table 1-7

Monticello Reservoir, Surface Areas and Capacities

Elevation (feet)	Area (acres)	Differential Volume (acre-feet)	Cumulative Volume (acre-feet)
270	37		
		870	
280	137		870
		2,080	
290	279		2,950
		3,650	
300	451		6,600
		5,550	
310	649		12,150
		7,960	
320	943		20,110
		10,920	
330	1,242		31,030
		14,620	
340	1,682		45,650
		19,160	
350	2,150		64,810
		24,440	
360	2,730		89,250
		30,250	
370	3,320		119,500
		36,200	
380	3,920		155,700
		42,200	
390	4,520		197,900
		48,400	
400	5,160		246,300
		55,200	
410	5,880		301,500
		61,550	
420	6,430		363,050
		68,000	
430	7,170		431,050

Source: South Carolina Electric & Gas
Revised Application, July 26, 1972

feet msl. The subimpoundment would be separated from Monticello reservoir by a dike and causeway formed by the relocated County Route 99. The flow between the two lakes would be through a gated conduit of presently undetermined size. After initial filling, the flow into or out of the recreation subimpoundment from Lake Monticello would be regulated to maintain a constant elevation. The water flows from Frees Creek into the recreation lake would not be adequate to fill the recreation pool, and probably would not replace evaporative losses. Consequently, initial filling would be from Monticello reservoir, and thereafter additional water would be provided as necessary.

The maximum depth of Monticello reservoir would be about 130 feet and the average depth would be about 57 feet. The recreation subimpoundment would have a maximum depth of about 65 feet and an average depth of approximately 30 feet.

Thermal stratification with a twice yearly turnover, fall and spring, would normally be expected in a temperate climate in a reservoir the size and depth of the proposed upper pool.

A comparative study of a conventional reservoir (Philpott on the Smith River in Virginia) and a pumped storage project (Smith Mountain on the Roanoke River in Virginia) demonstrated that the large volumes of water circulated in a pumped storage project tended to improve the reservoir water quality.1/ The pumped storage reservoir water tended to be better oxygenated at all depths, and although the natural stratification was not destroyed, the epilimnion was depressed and a higher

than expected dissolved oxygen content was found in the thermocline and the hypolimnion.

The proposed use of the upper impoundment for cooling waters for a nuclear plant would tend to increase the thermal stratification phenomenon by discharging heated waters on the reservoir surface. Stratification would be beneficial to the operation of the nuclear plant because it would minimize recirculation of cooling waters. 2/

Another factor that would affect stratification of the upper reservoir would be the turbid water which would be pumped into Lake Monticello from the lower pond of the project. This would limit light penetration and absorption, preventing deeper warming and thus tending to create a shallower epilimnion.

As Chen and Orlab have said, "However, while thermal stratification has often created water quality problems in reservoirs, its complete destruction is not necessarily desirable; some thermal structure is necessary to regulate energy loss, and thus control evaporation, and to ensure a varied environment suitable for a diverse and varied biota." 3/

The intake channel to the penstocks would have a surface baffle extending down to elevation 415 feet msl, 10 feet below the maximum reservoir elevation, to minimize the discharge of any heated surface waters into Parr re-

servoir. The apron of the water intake structure where the baffle is located is at elevation 365 feet msl, 60 feet below the normal maximum elevation of the upper pool. This intake design would, in all probability, result in the withdrawal of water from, and discharge of water into, all three strata (epilimnion, thermocline, hypolimnion) of the upper reservoir during summer stratification periods. The amount of water to be withdrawn each day (maximum of 29,000 acre-feet) would be approximately 7 percent of the total reservoir volume. In all probability, this volume of water withdrawn from and returned to the upper reservoir would not completely destroy the stratification, but would increase both the instability of the strata and the dissolved oxygen content of the upper reservoir through entrainment of air and oxygen-rich surface waters during circulation through the powerhouse, tailrace, and intake structures.

1.7 PROPOSED OPERATIONAL MODES

Although the proposed action would raise the height of the existing Parr dam approximately 9 feet and create a weekday reservoir fluctuation of approximately 10 feet, this would not be expected to significantly alter operation of the Parr hydro facility.

The proposed Fairfield pumped storage facility would be operated at or near maximum capacity on weekdays and at approximately half capacity on Sundays. Generation would

normally take place between 10 a.m. and 10 p.m. EST, and pumping between 11 p.m. and 9 a.m. EST during weekdays and Saturdays. Limited generation would be expected on Sundays, and pumping would occur until the upper reservoir (Monticello) is filled. Under this operational mode, the upper reservoir elevation would vary between 425 and 420.5 feet approximately, except on Sundays and holidays when the fluctuation would be less.

Monticello reservoir would be constructed on the Frees Creek drainage, inundating about 70 percent of the creek's drainage area of about 9,800 acres, and it would have to be initially filled by pumping from Parr reservoir.

1.8 CONSTRUCTION SCHEDULES

The Applicant has proposed a construction schedule for the project (Figure 1-11) that would bring the first four units of the Fairfield pumped storage station on line 3-1/4 years after commencement of construction. The proposed pumped storage and nuclear-generating facilities are intended to meet future power needs which are projected by Staff to more than double (both energy load and maximum demand) by 1980 over the 1970 requirements, and double again by 1990. Figures 1-12, 1-13, and 1-14 show Applicant's expected peak load and capacity forecast from 1974 to 1982 and total load curves for peak weeks in 1976 and 1978.

1.9 RELOCATIONS

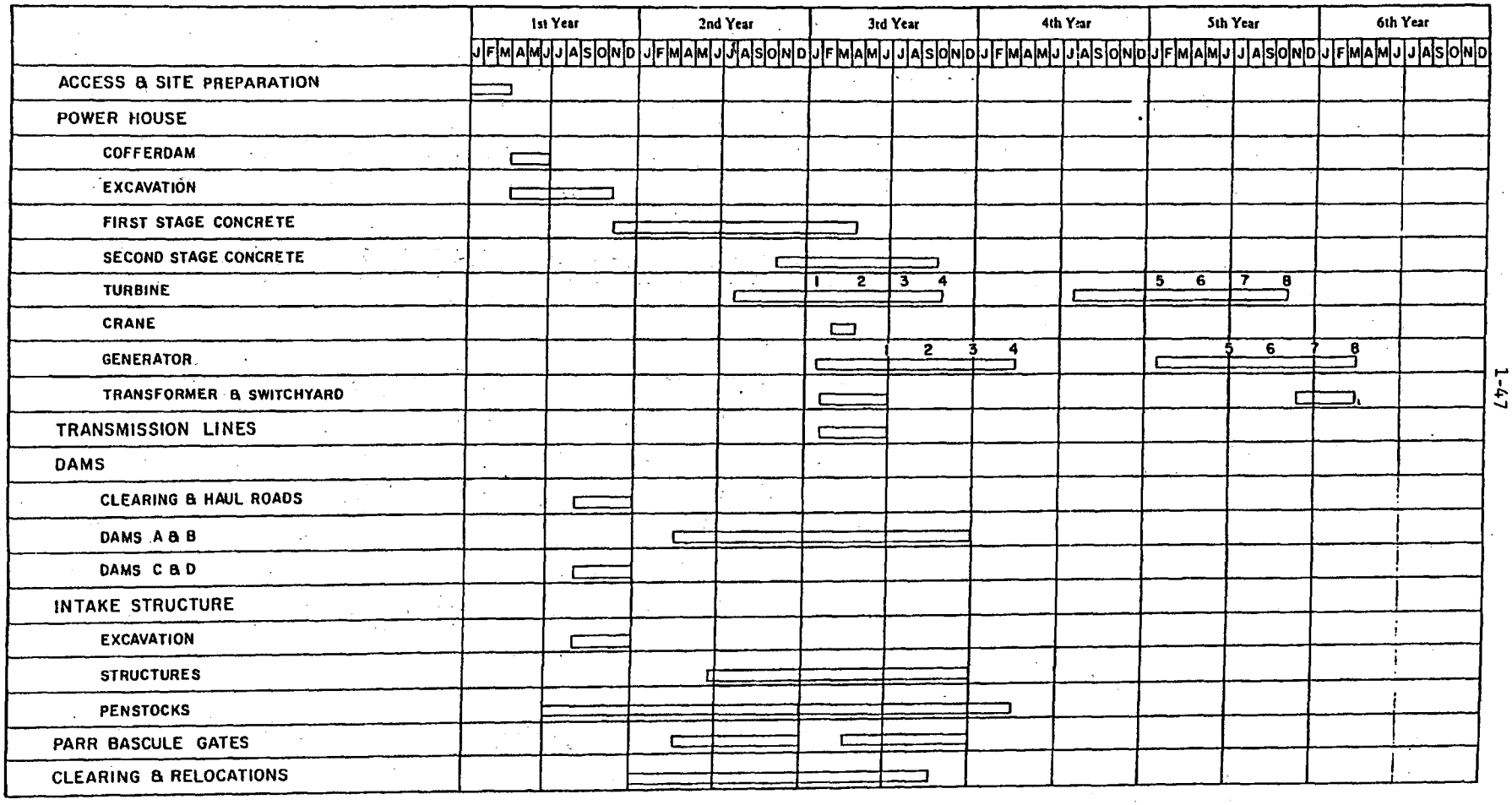
The Applicant's construction schedule shows that relocation of all residents' facilities and homes would occur during the second and third years of project construction. All necessary construction for highways and transmission lines would be completed prior to removing existing facilities from service.

Applicant has indicated it would pay relocatees fair appraised values for their property and make relocation reimbursements. Assistance would be given to the landowners in finding property. Homes that are sound would be physically moved to the new property if the homeowner desires, and the Applicant's representatives would also aid in handling payments to movers for relocation.

Surveying for project facilities was being conducted in November 1972, and the land acquisition program was moving forward rapidly. Clearing had not begun in the area. The Applicant has submitted a land management program and a biological monitoring program for carrying out the proposed action with the least possible environmental damage. Both programs are discussed in Section 4.

1.10 RECREATIONAL OPPORTUNITY CREATED BY THE PROJECT

The initial public recreational developments at the project would consist of the subimpoundment, two boat launching



Source: South Carolina Electric & Gas
July, 1972 Revised Application

Figure 1-11. Construction Schedule, Parr Project

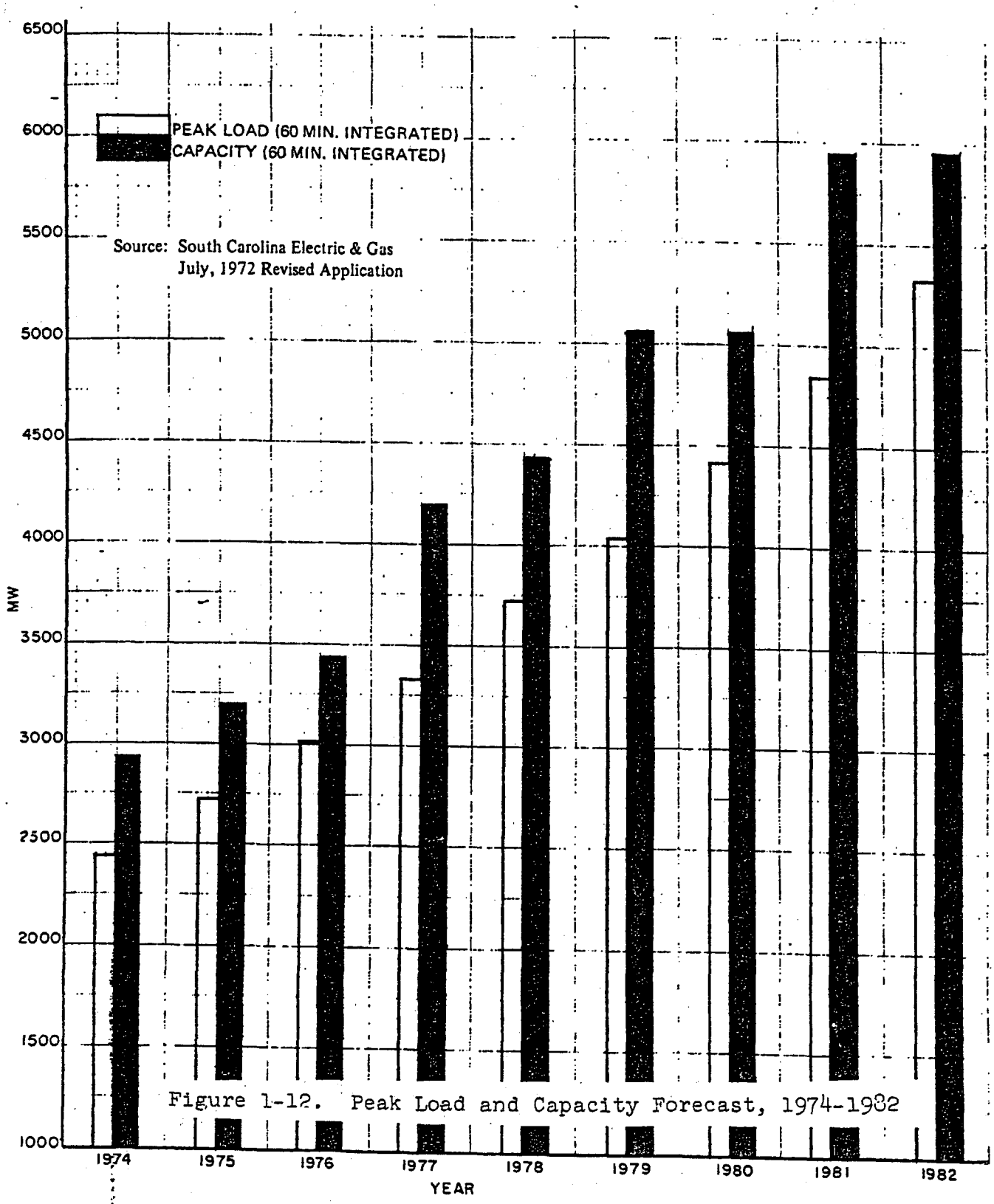


Figure 1-12. Peak Load and Capacity Forecast, 1974-1982

areas, and a scenic overlook.

Plans for the initial development of the 300-acre subimpoundment on the Monticello reservoir include a parking area for 10 cars with connected trailers, a 12-foot wide concrete boat ramp, a swimming area, and pit-type sanitary facilities. Gasoline-powered engines would be excluded from the subimpoundment.

The project boundary would be approximately 200 feet wide around the subimpoundment, to control access by the public and allow for expansion of facilities.

Plans for the boat launching area on Hellers Creek include parking for five cars with connected trailers, a paved ramp, and sanitary facilities.

The scenic overlook would contain an elevated, covered platform with two benches and a surrounding guardrail. Parking for 15 cars, 10 picnic tables, and sanitary facilities would be provided.

In addition, the Applicant stated in the revised application, filed July 26, 1972, that a visitor center and construction observation point would be built on the south shoreline of Monticello reservoir, overlooking the proposed Virgil C. Summer nuclear station site.

Initial annual usage at the proposed developments is estimated at 10,000 visitor-days, with an ultimate average annual visitation rate estimated at 100,000, assuming maximum development of facilities.

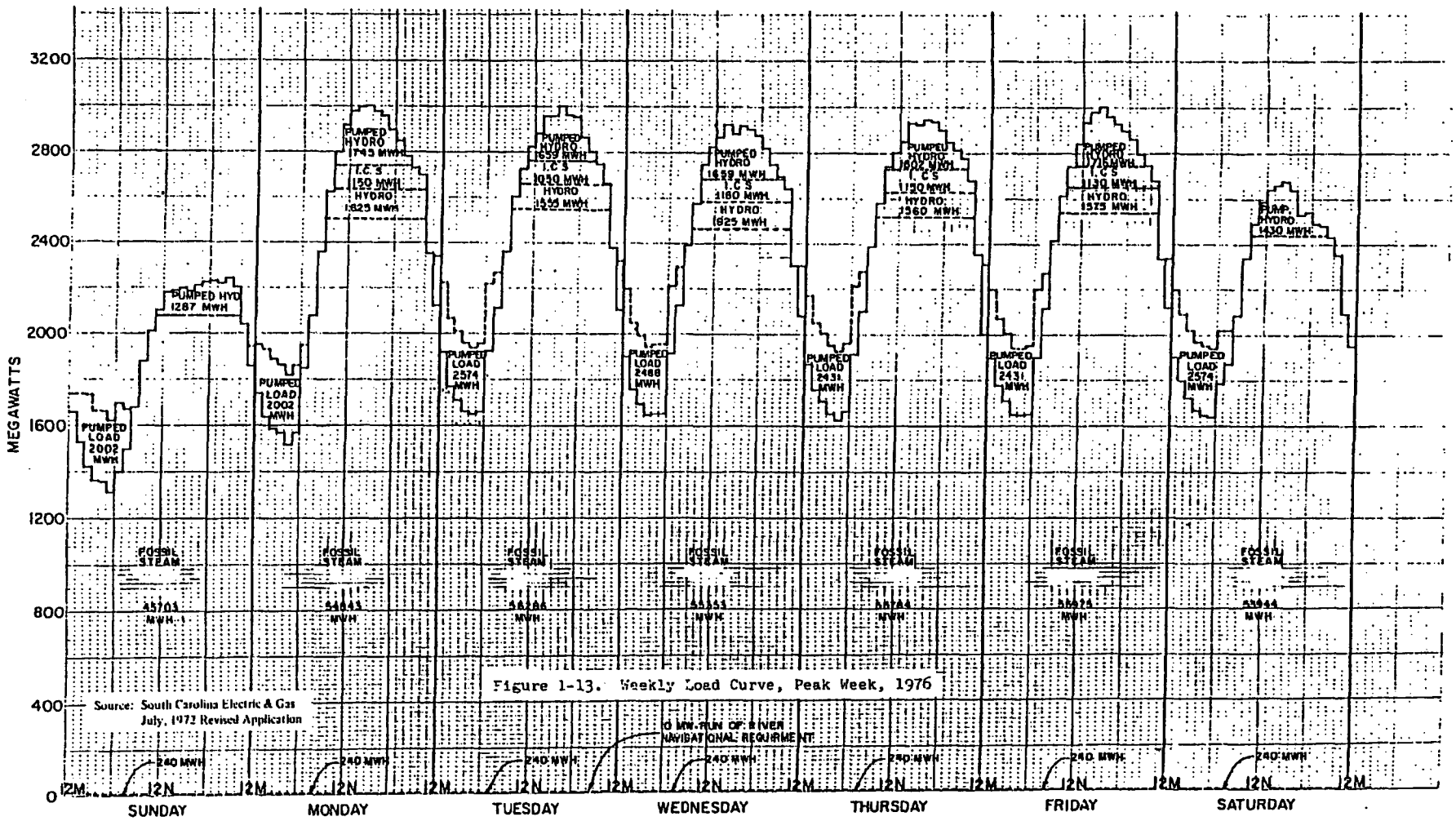
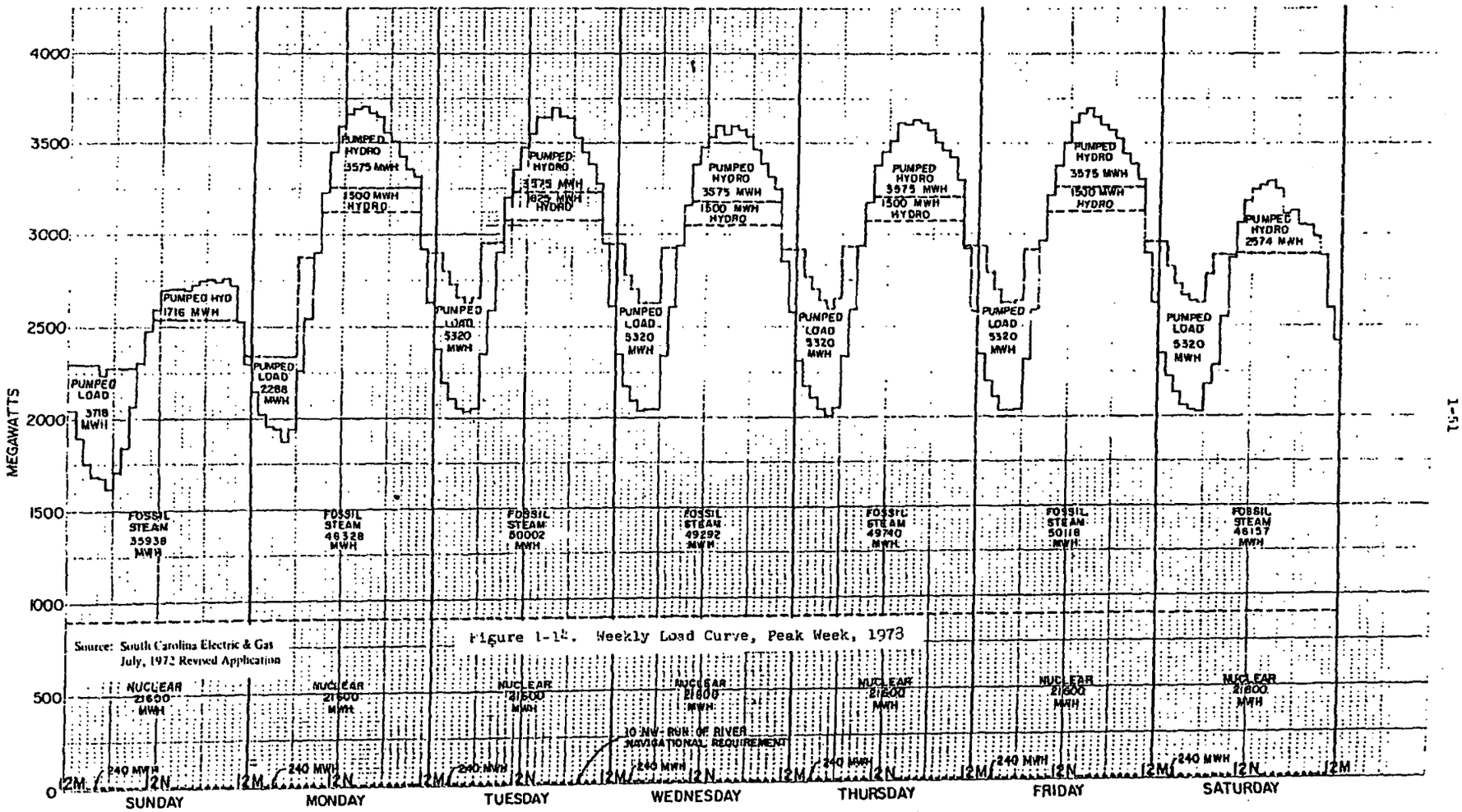


Figure 1-13. Weekly Load Curve, Peak Week, 1976

Source: South Carolina Electric & Gas
July, 1972 Revised Application



Source: South Carolina Electric & Gas
July, 1972 Revised Application

Figure 1-14. Weekly Load Curve, Peak Week, 1973

1.11 PROVISIONS FOR PUBLIC HEALTH AND SAFETY

Appropriate directional signs to the recreational facilities would be installed along local, State, and county roads. Identification signs would be located at the entrance to each public access area, indicating type and location of facilities, together with special use and occupancy rules as appropriate. Prior to the opening of a recreational facility, the public would be informed by notice in local newspapers.

All recreational facilities would be regularly maintained. Shrubs and brush would be trimmed back from the edge of hard-surfaced access and parking areas. Landscaping of exposed areas would be accomplished where appropriate. Periodic collections of trash would be made, and toilet facilities would be maintained at regular intervals. Applicant has stated that waste disposal would be accomplished in accordance with applicable South Carolina Pollution Control Authority standards. The Applicant would be responsible for operation and maintenance of the recreational facilities.

Pit-type sanitary facilities would be provided at all boat launching facilities and the scenic overlook. Applicant has stated that sanitary facilities would be constructed and maintained in compliance with all applicable requirements of the South Carolina Pollution Control Authority and the South Carolina State Department of Health.

All pit-type toilet facilities would include a corrugated metal or plastic shelter, approximately 4 by 8 feet, with a partition dividing the facility. The shelter would include a fabricated metal toilet box with a hinged plastic seat. The shelter would be positioned on a reinforced concrete pad that would cover a concrete-lined pit of dimensions approximately 4 by 8 by 6 feet. The reinforced concrete pad would be fitted to facilitate cleaning.

The public would be excluded from certain areas within the project because of potential danger. These areas would include, but not be limited to, a 300-foot maximum approach distance to all points where intake or discharge structures exist on the Monticello impoundment shoreline, and are part of the operation of the Fairfield pumped storage facility or the Virgil C. Summer nuclear station. All restricted areas in Monticello reservoir would be marked with can buoys, bearing the standard inland waterways "No Boats Allowed" symbol. Also excluded from public use would be the tailrace of the Fairfield powerhouse, which would be marked by can buoys with the standard inland waterways "No Boats Allowed" symbol, and by signs on both ends of the Southern Railway Company trestle, facing Parr reservoir.

The area upstream of Parr powerhouse is already marked with 11 buoys, and 11 additional buoys would be added. All buoys would be made of hard, durable plastic. Each buoy would be anchored to two 250-pound concrete anchors by 50 feet of 7/16-inch galvanized guy wire. The Parr dam and Bascule gates would be flood-lighted at dark, and the tail-race of Parr powerhouse would be marked with warning signs.

Appropriate warning signs and maps would be located at all company boat landings, and the Applicant would be responsible for maintenance of the signs. All warning signs would be readable during daylight from a distance of 1,000 feet.

Reevaluation of the restricted areas for public use would be made after the project is in operation and during the biennial review of the recreational needs of the area.

The proposed project boundary would include lands acquired for recreational development. Other lands needed for safe operation and maintenance of the project, and/or encompassed by nuclear exclusion zones superimposed on the Monticello impoundment, are shown as proposed by Applicant on Figure 1-1. The project boundary line would be precisely defined upon completion of field surveys presently being conducted.

1.12 COMPLIANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS

The Applicant has filed its application for new license in general accordance with the Commission's Regulations under the Federal Power Act. Applicant has indicated intentions to comply with all other Federal, State, and local requirements.

The Applicant contacted the U. S. Army Corps of Engineers for a permit to dredge a tailrace channel for the proposed pumped storage powerhouse in Frees Creek at its confluence with Parr reservoir. The Corps informed the Applicant (letter dated August 19, 1971, Appendix A) that no dredging permit would be necessary under Section 10 of the Rivers and Harbors Act of 1899, since the Corps does not classify the Broad River as navigable above Columbia, South Carolina.

In accordance with the Federal Water Pollution Control Act Amendments of 1972 (33 USC §§1251-1376), the Applicant applied to the South Carolina Pollution Control Authority for a permit for dredging that would be required in the mouth of Frees Creek. This permit was granted by letter dated February 3, 1973 (Appendix A).

The Applicant applied to the South Carolina Pollution Control Authority for a Water Quality Certificate pursuant to Section 401 of the Federal Water Pollution Control Act Amendments of 1972, (33 USC §1341). The certificate was granted by letter dated January 11, 1973 (Appendix A), stating that reasonable

assurance exists that the construction and operation of the Monticello impoundment and pumped storage facilities would not violate applicable water quality standards, assuming the operation of the 900-mw Unit I of the Virgil C. Summer nuclear station only.

Portions of South Carolina Highways Route 99 and Route 215 would be inundated by Monticello reservoir and portions of Newberry County Road 28 would be covered by raising Parr reservoir. According to Applicant, the South Carolina General Assembly enacted a bill on April 5, 1973, bearing Ratification Number R-248 and approved by the Governor on April 6, 1973, that would authorize the necessary closure, elevations, or relocations of South Carolina highways at the Applicant's expense and in accordance with agreements which have been made between the Applicant and the State and County highway departments.

Permits would be obtained from the South Carolina Highway Department for oversize, overweight, and overlength loads, and for required entrance roads on the State highway system.

Building permits for the construction of water quality monitoring stations on the Enoree, Tyger, and Broad Rivers have been obtained from Union County and are on file in the auditor's office in Union, South Carolina. A building permit for the construction of major project works would be obtained by the Applicant from the Fairfield County auditor's office several weeks prior to the commencement of construction.

A permit from the State Board of Health for the use of X-ray equipment for the testing of structural welds would be obtained when required.

The State Board of Health would be asked for authorization to use the 300-acre Monticello subimpoundment for swimming, after filling.

A memorandum of understanding (Appendix A) has been entered into between the Applicant and the South Carolina Wildlife and Marine Resources Department, to assure the continuous flow of water downstream from Parr powerhouse necessary for the survival, reproduction, and normal life-cycle activities of all species of fish, with particular regard to striped bass spawning during the months of March, April, and May.

Permits required for open burning would be obtained as necessary from the South Carolina Pollution Control Authority (Air Section) during the clearing operations.

The Applicant applied for a license from the Atomic Energy Commission (Docket No. 50-395) for authorization to construct, operate, and maintain Unit I of the Virgil C. Summer nuclear station on the proposed Monticello reservoir. The Atomic Energy Commission issued a construction permit to the Applicant on March 21, 1973.

The Applicant consulted the South Carolina Department of Archives and History concerning areas of historical significance. A reply dated June 1, 1972 (Appendix A) indicated that three sites existed in the area: Davis Plantation, Monticello

Church, and Fonti Flora. Of these, only Davis Plantation is listed on the National Register of Historic Sites. The effects of the proposed project on Davis Plantation and the local sites of historic interest are discussed in Section 2.