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December 21, 1982

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In the Matter of
Carolina Power & Light Company
and North Carolina Eastern
Municipal Power Agency
(Shearon Harris Nuclear Power Plant, Units 1 and 2)
Docket Nos. 50-400 OL and 50-401 OL

Administrative Judges Kelley, Bright and Carpenter:

Please find enclosed Chapters 8 and 11 of the Shearon Harris Nuclear Power Plant Environmental Report (ER) (Benefits and Costs) as amended by Amendment No. 5 to the ER. Amendment No. 5 was filed with the Director, Office of Nuclear Reactor Regulation, on December 15, 1982. Copies were distributed to the two public document rooms and lead intervenors. In serving a copy of this letter on each intervenor, all parties will have a copy of Chapters 8 and 11, as amended.

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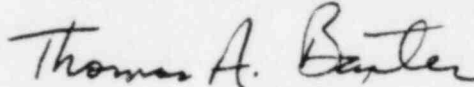
SHAW, PITTMAN, POTTS & TROWBRIDGE

A PARTNERSHIP OF PROFESSIONAL CORPORATIONS

Administrative Judges Kelley,
Bright and Carpenter
December 21, 1982
Page Two

Chapter 8, as amended, provides an analysis of the system production cost savings resulting from operation of the Shearon Harris Nuclear Power Plant for the ten year period from 1986 (when Harris Unit 1 is scheduled to commence commercial operations) through 1995. Chapter 11 compares benefits of operation of the Harris Plant with environmental and economic costs. This analysis is consistent with the approach to a cost-benefit balance at the operating license stage taken by the Commission in amending 10 C.F.R. Part 51 to provide that "need for power" and "alternative energy sources" need not be considered in operating license proceedings for nuclear power plants. Applicants committed to provide such an analysis in responding to certain proffered contentions, and this commitment figured prominently in a number of rulings by the Board in its September 22, 1982 Memorandum and Order. See Applicants' Response to Supplement to Petition to Intervene by Wells Eddleman, at 29-30 (June 15, 1982).

Respectfully submitted,



Thomas A. Baxter
Counsel to Applicants

TAB/dg

Enclosures

cc: per Service List

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)

CAROLINA POWER & LIGHT COMPANY)
AND NORTH CAROLINA EASTERN)
MUNICIPAL POWER AGENCY)

(Shearon Harris Nuclear Power)
Plant, Units 1 and 2))

Docket Nos. 50-400 OL
50-401 OL

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CHAPTER 8
BENEFITS AND COSTS

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ENVIRONMENTAL REPORT - OPERATING LICENSE STAGE

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8.0 BENEFITS AND COSTS8.1 BENEFITS

This section describes certain of the social and economic benefits associated with the operation of the SHNPP. The social and economic impacts of plant construction and eventual plant operation as well as the relative benefits and costs of alternative sites and alternative energy sources, are discussed in detail in the SHNPP Construction Permit Environmental Report.

The Commission has amended 10 CFR Part 51, "Licensing and Regulatory Policy and Procedures for Environmental Protection" effective April 26, 1982, to provide that "need for power" and "alternative energy sources" need not be considered in ongoing and future operating license proceedings for nuclear power plants, absent a showing of "special circumstances" pursuant to 10 CFR 2.758. See 47 Fed. Reg. 12940 (March 26, 1982). In promulgating this rule, the Commission established a presumption of continuing validity at the Operating License stage of the favorable cost-benefit balance already struck in the Construction Permit proceeding. Thus, in the Commission's Statement of Background of the Rule, published with the final rule, the Commission explained:

In accordance with the Commission's NEPA responsibilities, the need for power and alternative energy sources are resolved in the construction permit proceeding. The Commission stated its tentative conclusion that while there is no diminution of the importance of these issues at the construction permit stage, the situation is such that at the time of the operating license proceeding the plant would be needed to either meet increased energy needs or replace older less economical generating capacity and that no viable alternatives to the completed nuclear plant are likely to exist which could tip the NEPA cost-benefit balance against issuance of the operating license. Past experience has shown this to be the case. In addition, this conclusion is unlikely to change even if an alternative is shown to be marginally environmentally superior in comparison to operation of a nuclear facility because of the economic advantage which operation of nuclear power plants has over available fossil generating plants. 47 Fed. Reg. at 12940.

The SHNPP Operating License Environmental Report was prepared prior to the adoption of the new rule by the Commission. This amendment revises the cost-benefit section to reflect the production cost savings which directly result from operation of the SHNPP as compared to system production costs without SHNPP being available. This analysis simply confirms the Commission's experience that the operation of a nuclear facility provides a substantial cost savings to the overall system cost in generating electricity and validates the cost-benefit balance struck at the Construction Permit proceeding.

The only analysis of costs and benefits required at the Operating License stage as a result of the new Commission Rule is one that compares the environmental costs of plant operation with the benefits from production cost savings resulting from the SHNPP operation. Certainly the major benefit from operation of the SHNPP is approximately eleven billion kilowatt-hours of electrical energy that will be produced annually (once both units are

operational). The addition of the SHNPP will also improve CP&L's ability to meet system load requirements by adding 1800 megawatts of electrical generating capacity. This additional capacity contributes to an adequate reserve margin and reduces the possibility of interruptions of power supply. Secondary benefits from the operation of the SHNPP will include tax revenues generated, increased employment opportunities, increased regional product, and increased knowledge as a result of environmental studies. However, these benefits were discussed in detail in the Construction Permit Environmental Report and need not be restated here.

8.1.1 PRIMARY BENEFITS

Each SHNPP Unit has an expected net generating capacity of 900 megawatts. The expected average annual generation per unit (assuming a capacity factor of 70 percent) is 5.52 billion kilowatt-hours electrical energy. Table 8.1.1-1 shows the projected proportional distribution of the generated electricity by user class.

The need for the power generated by the SHNPP has been discussed in detail in the SHNPP Construction Permit Environmental Report, and it is not at issue at the Operating License stage. The additional 1800 megawatts installed capacity will contribute to system generation reserve margin and system reliability, decreasing the possibility of interruption in power supply. For purposes of a cost-benefit comparison consistent with the Commission's recently adopted Rule on need-for-power and alternative energy sources, CP&L prepared an analysis of the savings in system production costs associated with the availability of the SHNPP as compared to system production costs without the SHNPP capacity. The results of this analysis are summarized in Table 8.1.1-2. The analysis was performed by utilizing a production cost simulation computer model to project the total system production cost over the 10-year period from 1986 through 1995. The production cost modeling assumptions include CP&L's December 1981 load forecast, commercial operation dates of March 1986 for the SHNPP Unit 1 and March 1989 for the SHNPP Unit 2, and an average annual capacity factor for each SHNPP unit of approximately 70 percent. This analysis reveals that the total system production cost savings for the first ten years of operation alone (1986-1995) will be approximately \$2.021 billion (1986 dollars). For comparison, total system production costs without the SHNPP were calculated by assuming that replacement capacity would principally be coal generation.

A sensitivity study was performed to determine the effects on this analysis if lower than predicted capacity factors for the SHNPP were taken into consideration. If the annual average SHNPP capacity factor is assumed to be 60 percent or 50 percent, the anticipated system production cost savings resulting from operation of the SHNPP during the same ten year period are calculated to be approximately \$1.560 billion and \$1.056 billion (in 1986 dollars), respectively. A sensitivity study was also performed to determine the impact on production cost savings assuming zero load growth. Even if system load remained at 1981 levels during the ten year period from 1986 through 1995, the cost savings from the operation of the SHNPP are estimated to be approximately \$1.136 billion (1986 dollars). Finally, the estimated production cost savings from operation of the SHNPP were calculated assuming only Unit 1 was available during the same ten year period. The anticipated system production cost savings from the operation of Unit 1 alone are estimated to be \$1.131 billion (in 1986 dollars). These sensitivity studies confirm that even with unusually low capacity factors or assuming a constant electrical demand based on 1981 demand figures, the total system savings is over a billion dollars. Such savings will accrue not just for the ten year period of this analysis but for the entire plant life.

TABLE 8.1.1-1

ESTIMATED BENEFITS OF SHNPP

DIRECT BENEFITS

Number of Units	2
Capacity Per Unit	900,000 KW
Expected Average Annual Generation Per Unit*	5.52×10^9 KWH
Proportional Distribution of Electrical Energy Per Unit**	
Industrial	2.02×10^9 KWH
Residential	1.27×10^9 KWH
Commercial	0.88×10^9 KWH
Public Street and Highway Lighting	0.02×10^9 KWH
Other Sales to Public Authority	0.11×10^9 KWH
Sales for Resale	1.22×10^9 KWH

INDIRECT BENEFITS

Taxes	See Table 8.1.2-1
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- * Assuming 70 percent capacity factor
 ** For the period 1986 through 1995

TABLE 8.1.1-2

SYSTEM PRODUCTION COST¹
(millions of dollars)

<u>Year</u>	<u>With Harris² Plant</u>	<u>Without Harris Plant</u>	<u>Production Cost Savings³</u>
1986 ⁴	967	1,067	100
1987	1,109	1,234	125
1988	1,192	1,377	185
1989 ⁴	1,297	1,601	304
1990	1,432	1,743	311
1991	1,599	2,087	488
1992	1,843	2,352	509
1993	2,047	2,551	504
1994	2,371	2,892	521
1995	2,607	3,092	485

NOTE: ¹ Nominal dollars
² The capacity factor for the Harris Plant is assumed to be approximately 70 percent during commercial operation.
³ The total in 1986 dollars is \$2,021 million
⁴ Commercial operation is assumed to begin in March 1986 for Unit 1 and March 1989 for Unit 2.

SHNPP FUEL COST

The average fuel cost for SHNPP operating from 1986 through 1995 is 6.7 mills/KWH in 1986 dollars.

8.1.2 SECONDARY BENEFITS

The operation of the SHNPP will benefit the regional economy by providing employment opportunities, increased regional product, tax revenues and increased knowledge of the regional environment as a result of environmental studies. This information was provided in the Construction Permit Environmental Report and is not at issue at the Operating License stage. In response to an NRC Staff inquiry, included in this section is updated information on ad valorem taxes.

8.1.2.1 Taxes and Tax Effects

Estimated ad valorem taxes to be paid to government agencies are as shown in Table 8.1.2-1. The estimated taxes were computed based on the CP&L's 1982 Construction Budget projections, the 1982 ratio of assessed value to undepreciated original cost, and the 1982 Wake County tax ratio of \$0.83 per \$100 valuation. The State of North Carolina's ratio of assessed value to undepreciated original cost has varied historically from one to three percent per year. The County tax rate is dependent on many factors including County services and tax base. However, as expenditures on the SHNPP units increase the taxable base, the County tax rate should not increase as it otherwise might. Table 8.1.2-1 shows total estimated ad valorem taxes related to the SHNPP, and therefore includes the estimated tax of the portion of the SHNPP being purchased by the North Carolina Eastern Municipal Power Agency.

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TABLE 8.1.2-1

ESTIMATED AD VALOREM TAXES
(thousands of dollars)

Estimated Ad Valorem Tax on the Shearon Harris Nuclear Power Plant for 1986 through 1995: (thousands of dollars)

<u>YEAR</u>	<u>UNIT 1</u>	<u>UNIT 2</u>	<u>TOTAL</u>
1986	10,423		10,423
1987	12,508		12,508
1988	12,508		12,508
1989	12,508	7,403	19,911
1990	12,508	8,884	21,392
1991	12,508	8,884	21,392
1992	12,508	8,884	21,392
1993	12,508	8,884	21,392
1994	12,508	8,884	21,392
1995	12,508	8,884	21,392

The estimated tax is computed based on the Company's 1982 construction budget projections, the 1982 ratio of assessed value to undepreciated original cost, and the 1982 Wake County tax rate of \$0.83 per \$100 valuation. The State's ratio of assessed value to undepreciated original cost has historically varied approximately from one to three percent per year. The above estimate includes the tax related to the portion of the SHNPP being purchased by the North Carolina Eastern Municipal Power Agency.

8.2 COST

8.2.1 INTERNAL COST

Total Fuel Cycle costs over the life of the project are estimated to be \$1.592 billion; other operating and maintenance costs, \$1.049 billion (both in 1986 dollars).

Uranium and Conversion cost estimates are based primarily on existing contracts with market price estimates used as a supplement as needed. Future cost estimates are determined by applying escalation rates by component as supplied by Data Resources Incorporated (DRI). Enrichment cost estimates are based on a Requirements Contract with the Department of Energy which extends through 2002. Fabrication cost estimates are based on the contract cost for the initial core of each SHNPP unit. Future cost estimates are determined using market prices obtained from Pickard, Lowe & Garrick, Inc. and escalated using DRI indices. Carrying charge estimates are based on CP&L's projected cost of money. Spent Fuel Storage and Disposal costs are determined using the 1 mill/kwh value as specified in the recently passed Senate bill (S.1662) (Reference 8.2.1-1). Future Spent Fuel Storage and Disposal costs are determined by applying escalation rates supplied by DRI.

The O&M costs are based on a 1982 estimate of company and contract payroll and materials, and services required for operation and maintenance of the SHNPP. As a result of operation of the SHNPP, CP&L expects to spend approximately \$615 million of the total O&M cost in salaries. These salaries are based on the company's estimate of all company personnel, both onsite and offsite, required by the project and any contract labor required.

Decommissioning costs for a 1175 MW(e) Reference Nuclear Plant in 1978 dollars will probably fall within the range of \$42.1 million for immediate dismantlement to \$51.8 million for safe storage with deferred dismantlement (Reference 5.8.1-1). The cost for SHNPP may be somewhat higher. Decommissioning costs are discussed in Section 5.8.

Levelized revenue requirements are shown in Table 8.2.1-1. Each Unit has a depreciable lifetime of 25 years. Since the first Unit is assumed to begin commercial operation in 1986 and the second in 1989, the depreciable life of the project is 28 years. All levelized revenue requirements are computed over this period.

TABLE 8.2.1-1

ESTIMATED COSTS OF ELECTRICAL ENERGY GENERATION¹

Fixed Charges	<u>Lifetime Levelized Costs Mills/Killowatthour²</u>	<u>Initial Year³ millions of dollars</u>
Adminstrative & General ⁴	7.2	41.3
Fuel Cycle Costs		
Uranium/Conversion/Enrichment	12.2	28.9
Fabrication	2.3	5.5
Spent Fuel Storage/Disposal	2.5	6.0
Carrying Charges	<u>0.9</u>	<u>2.1</u>
Subtotal	17.9	42.5
Operation & Maintenance Costs	12.3	36.1
Nuclear Liability Insurance	0.1	0.6
Decommissioning Costs	See Section 5.8	

¹ Using 70 percent capacity factor

² Levelized 1986-2014

³ First 12 months of operation of Unit 1.

⁴ Administrative & General is the only component of the fixed charge rate that would be affected substantially if SHNPP is not granted an operating license.

8.2.2 EXTERNAL COSTS

Beyond the primary internal costs of the operation of SHNPP, there is a potential for external economic and social costs. As much as possible, the probable number and location of any population group affected, the estimated economic and social impact, and special measures taken to alleviate the impact are described for each potential cost.

8.2.2.1 Long-Term External Costs

Possible long-term external costs from operation of any nuclear generating facility include impairment of recreational values; deterioration of aesthetic and scenic values; restrictions on access to areas of scenic, historic, or cultural interest; degradation of areas having historic, cultural, natural, or archaeological value; removal of land from present or contemplated alternative uses; creation of locally adverse meteorological conditions; creation of noise, reduction of regional products, lost income from recreation or tourism; lost income of commercial fishermen; decrease in real estate values; increased costs to local governments and increased regulatory cost. A discussion of the anticipated external costs of the operation of the SHNPP in these areas follows.

a) Impairment of Recreational Values

The Main Reservoir and adjacent lands will provide a significant recreational resource available for public use. CP&L's land and reservoir use policy is described in Section 2.1.3. Operation of SHNPP will generally not affect recreational use of these areas; however, control of areas within the exclusion area boundaries may be established as discussed in FSAK Section 2.1.2.

b) Deterioration of Aesthetic and Scenic Values

Because the site was not previously considered aesthetically unique (Section 2.6) the Main Reservoir coupled with its accessibility to the public for recreational use has enhanced the aesthetic value of the area. However, the SHNPP has some visual impact on the area. One major negative visual impact results from the presence of the 526 ft. natural draft cooling towers which are visible over long distances.

c) Restriction of Access and Degradation to Areas of Scenic, Historic, or Cultural Interest

The regional historic, archaeological, architectural, scenic, cultural, and natural features are discussed in Section 2.6. Recognized and maintained areas of scenic, historic, or cultural significance are not located in or near the project area. Therefore, operation of the plant will not restrict access or degrade any such area.

d) Removal of Land from Present or Contemplated Alternative Uses

The site related removal of land from its preconstruction uses was addressed in the Construction Permit Environmental Report. (See Section 4.5.1.4)

e) Creation of Locally Adverse Meteorological Conditions

The possibility of the creation of adverse meteorological conditions due to plant operation was addressed prior to issuance of the Construction Permit. Refer to Sections 3.3.2 and 3.3.3 of the SHNPP Construction Permit Environmental Report and Sections 5.1.2.1, 5.1.2.2, and 5.1.2.3 of the Revised Final Environmental Statement - Construction Permit Stage. No significant changes have been made, except that the cooling tower evaporative losses have been revised. An updated discussion of plume, fogging, icing, and drift is included in Section 3.4 and 5.1.4 of this report. None of these factors is expected to have a significant impact on the local meteorological conditions.

f) Creation of Noise

The SHNPP produces noise during normal operation. However, the plant's predicted environmental noise emission will have little impact on the residents living at or near the plant boundary. (Section 5.6)

g) Reduction of Regional Products

There is no significant reduction of regional products due to the operation of SHNPP.

h) Lost Income from Recreation or Tourism

There are no nearby recreational or tourist sites or facilities that are expected to be impaired by environmental disturbances caused by the SHNPP. Therefore, no loss of income to such developments is anticipated.

5 i) Lost Income of Commercial Fishermen

As discussed in Section 2.1.3, commercial fish and shellfish catch is negligible within 50 miles of the SHNPP and was non-existent at the site. Therefore, no loss of income to commercial fishermen results from the operation of SHNPP.

j) Decrease in Real Estate Values

Decreases of real estate values in areas adjacent to the facility are not expected to occur. Present trends in real estate indicate an appreciation in property values in areas near the plant site. If present trends continue, the operation of the plant will not adversely affect local real estate values.

k) Increased Cost to Local Governments

Increased costs to local governments for service required by the permanently employed workers and their families are expected to be minimal. Additionally, these employees will help support local governments through local expenditures and taxes.

l) Increased Regulatory Cost to Taxpayers

Based upon 1983 Nuclear Regulatory Commission budget estimates, the cost to the taxpayers to regulate the SHNPP will be approximately \$3 million per unit

in 1983. This estimate was calculated conservatively by dividing the total 1983 NRC budget (Reference 8.2.2-1) by the number of nuclear plants either operating or under construction and subtracting fees paid to the NRC by CP&L for certain routine inspections. This calculation therefore ignores all other activities regulated by the NRC. One could assume this reflects the annual cost for regulation in 1983 dollars and make future projections accordingly. However, we are unable to project the future NRC cost of regulation. The estimated cost to the North Carolina taxpayers to administer the SHNPP National Pollutant Discharge Elimination System permit would be approximately \$2,100 per year (Reference 8.2.2-2).

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REFERENCES: SECTION 8.2

- 8.2.1-1 Congressional Budget Office, "Financing Radioactive Waste Disposal," September, 1982.
- 8.2.2-1 Budget Estimates Fiscal Year 1983, NUREG-0870, U.S. Nuclear Regulatory Commission, January, 1982.
- 8.2.2-2 Letter from R. Paul Wilms, Assistant Director, Division of Environmental Management, N.C. Department of Natural Resources and Community Development to S. R. Zimmerman, Manager, Licensing and Permits, Carolina Power & Light Company. October 25, 1982.

11.0 SUMMARY COST BENEFIT ANALYSIS

11.1 BENEFITS

The savings in system production costs as a result of the operation of the SHNPP is estimated to be \$2,021 billion (1986 dollars) for the first ten years of plant operation. Comparable savings are expected to accrue over the entire plant life.

Each SHNPP Unit has an expected net generating capacity of 900 megawatts. The expected average annual generation per unit (assuming a capacity factor of 70 percent) is 5.52 billion kilowatt-hours of electrical energy.

Sensitivity studies demonstrate significant savings even at an assumed capacity factor of 60 or 50 percent or assuming no growth rate whatsoever in CP&L's system demand. This analysis takes no credit for the fact that the SHNPP will be needed to meet anticipated demand and to provide an adequate reserve margin.

11.2 COST

The cost for fuel, operations, and maintenance of SHNPP over the life of the project is expected to be approximately \$2,578 million (1986 dollars). In addition, there are other external costs (Section 8.2.2) due to the environmental impacts discussed in Chapters 4 and 5. These costs, while difficult to quantify, have been investigated and are believed not to be significant when compared to the benefits derived from the project. Decommissioning costs for an 1175 MW(e) Reference Nuclear Plant in 1978 dollars will probably fall within the range of \$42.1 million for immediate dismantlement to \$51.5 million for safe storage with deferred dismantlement, depending on the method selected. The cost for SHNPP may be somewhat higher. (See Section 5.8).

11.3 CONCLUSIONS

The benefits from operation of the SHNPP significantly outweigh the minimal environmental costs. The analysis of costs and benefits from SHNPP operation validates the cost-benefit balance struck at the Construction Permit stage.